

This introductory course is a core course for the Agriculture, Food and Natural Resources Career Cluster and is built to serve as a mandatory pre-requisite for all other agricultural education courses. This course builds a knowledge base and technical skills in all aspects of the industry. Learners will be exposed to a broad range of agriculture, food, and natural resources careers. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundations of Agriculture, Food, & Natural Resources

0101.1	Demonstrate understanding of agribusiness (e.g., SAE, expenses).
0101.1.1	Identify and describe the types of agribusiness ownership.
0101.1.2	Calculate return on investment.
0101.1.3	Identify methods of marketing agricultural commodities, products, and services in domestic and international markets and create a marketing plan for an agricultural commodity, product, or service.
0101.1.4	Define basic finance terms and provide examples - personal inventory, net worth, income, expense.
0101.1.5	Define and develop a Supervised Agricultural Experience Program (SAE).
0101.1.6	Define the Four Ps of marketing (product, place, price, and promotion).
0101.1.7	Create an advertisement for an agricultural product.
0101.1.8	Research local supply and demand of agricultural products.
0101.1.9	Create a plan and begin development for their own agricultural enterprises (SAE).
0101.2	Demonstrate understanding of animal systems (e.g., breeds of livestock, anatomy).
0101.2.1	Identify and describe the origin, significance, distribution, and domestication of animal systems.
0101.2.2	Recite and identify the common and scientific names of major animal species.
0101.2.3	Identify and differentiate between breeds of livestock.
0101.2.4	Identify anatomical parts of animals.
0101.2.5	Define livestock terminology (steer, heifer, barrow, gilt, etc.).
0101.2.6	Identify, draw, and label parts of animal cells.
0101.2.7	Define and identify animal health disorders and provide recommendations for common preventions and treatment.
0101.2.8	Explain the importance of biosecurity in the animal industry.
0101.2.9	Identify common feedstuffs and their nutritional value.
0101.2.10	Explain the difference between animal welfare and animal rights and their value to the animal industry.
0101.2.11	Identify and describe the facilities needed to house and produce animal species safely and efficiently.
0101.2.12	Describe the effects of animal agriculture on the environment.
0101.2.13	Diagram a typical animal cell and identify the organelles.
0101.2.14	Practice administering injections.
0101.2.15	Perform a basic health exam on a live animal.
0101.2.16	Debate the issues associated with animal welfare and animal rights.
0101.3	Demonstrate understanding of agriculture innovation and technology.

0101.3.1	Define agricultural biotechnology.
0101.3.2	Identify and describe how biotechnology is applied in the agriculture industry.
0101.3.3	Identify and describe significant innovations and inventions in the history of agriculture and their impacts on the industry.
0101.3.4	Utilize agricultural related technology and equipment.
0101.3.5	Identify and debate the issues associated with biotechnology use in the agriculture industry.
0101.3.6	Research current agricultural products impacted by biotechnology practices.
0101.4	Demonstrate understanding of food products and processing (e.g., protein sources, food preservation).
0101.4.1	Identify key advancements in the history of animal and food processing.
0101.4.2	Discuss the importance of food labeling to consumers.
0101.4.3	Define and differentiate the quality and yield grades of food products and what they mean to the consumer.
0101.4.4	Identify food products derived from meat, egg, poultry, fish, and dairy products.
0101.4.5	Identify food products derived from fruit and vegetables.
0101.4.6	Identify food products derived from grains, legumes, and oilseeds.
0101.4.7	Identify common weights and measures in the food production and processing industry and apply the use of those measurements.
0101.4.8	Identify and describe methods of food preservation.
0101.4.9	Produce a food product (cheese, sausage, sauerkraut, etc.).
0101.4.10	Compare and contrast various food labels.
0101.4.11	Conduct a food preservation experiment.
0101.5	Demonstrate understanding of natural resources (e.g., renewable resources).
0101.5.1	Identify, define, and describe characteristics of various ecosystems.
0101.5.2	Identify, define, and describe characteristics of various renewable resources.
0101.5.3	Identify, define, and describe characteristics of various nonrenewable resources.
0101.5.4	Identify, define, and describe characteristics of various alternative energy sources.
0101.6	Demonstrate understanding of plant systems (e.g., plant parts, processes, soil).
0101.6.1	Identify parts of a plant.
0101.6.2	Describe the functions of plant parts.
0101.6.3	Define components of soil and how soil is formed.
0101.6.4	Identify and describe the nutritional requirements for plant growth.
0101.6.5	Describe the processes of the following plant physiologies; photosynthesis, reproduction, respiration, and transpiration.
0101.6.6	Diagram a typical plant cell and identify plant cell organelles and their functions.
0101.6.7	Identify the components and explain the functions of plant roots.
0101.6.8	Identify the components and explain the functions of plant stems.
0101.6.9	Identify the components and explain the functions of plant leaves.
0101.6.10	Identify the components and explain the functions of plant flowers.
0101.6.11	Conduct soil samples and soil tests.
0101.6.12	Interpret soil test results and determine fertilizer and applications needs.
0101.6.13	Identify agriculturally important plants by common names.
0101.7	Demonstrate understanding of power, structural, and technical systems (e.g., measurement).
0101.7.1	Identify units of weight, volume, length, and temperature.
0101.7.2	Calculate basic math practices used in Power, Structural and Technical Systems.
0101.7.3	Identify basic hand tools and demonstrate their proper uses in an agricultural setting.
0101.7.4	Add, subtract, multiply, and divide whole numbers, with and without a calculator.

0101.7.5	Use a ruler, a metric ruler, and a measuring tape to measure.
0101.7.6	Add, subtract, multiply, and divide fractions.
0101.7.7	Add, subtract, multiply, and divide decimals with and without a calculator.
0101.7.8	Convert decimals to percentages and percentages to decimals.
0101.7.9	Convert fractions to decimals and decimals to fraction.
0101.7.10	Properly and safely use hand tools.
0101.7.11	Construct a project using hand tools.
0101.8	Demonstrate knowledge of leadership development through FFA (e.g., motto, parliamentary procedure, official dress).
0101.8.1	Explain the components and importance of the Three Circle Model of Agricultural Education.
0101.8.2	Recite the FFA Creed.
0101.8.3	Recite the FFA Motto.
0101.8.4	Research the important dates and events in FFA History.
0101.8.5	Perform basic parliamentary procedure operations (make a motion, second a motion, debate a motion).
0101.8.6	Participate in FFA leadership opportunities offered at the local, state, and national level.
0101.8.7	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0101.8.8	Participate in community service and career awareness activities at the local, state, and national level.

This course focuses on the basic scientific principles and processes related to the production of plants and animals for the food and fiber systems. Topics of instruction include basic understanding of the livestock/poultry industry and its various components, career opportunities, soil science, crop science/agronomy, weed science, basic agricultural mechanics and related industry careers, environmental stewardship, entrepreneurship, and leadership/personal development. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Plant Science

0102.1	Identify plants & plant diseases.
0102.1.1	Identify plants including herbaceous plants, annual, biennial, and perennial types.
0102.1.2	Identify weed species.
0102.1.3	Demonstrate knowledge of the systematic classification of plants.
0102.1.4	Assess and identify symptoms of crop diseases.
0102.1.5	Explain the processes and benefits of crop rotation.
0102.2	Describe entomology.
0102.2.1	Identify insect pests.
0102.2.2	Explain the steps of metamorphosis.
0102.2.3	Define Integrated Pest Management.
0102.3	Demonstrate understanding of soil preparation, propagation techniques, and regulating environmental conditions in plant production systems.
0102.3.1	Prepare soil for planting, and plant or transplant seeds, bulbs, and cuttings.
0102.3.2	Plant seeds in specified areas and count the resulting plants to determine the percentage of seeds that germinated.
0102.3.3	Perform duties including propagating varieties of plant materials, collecting and germinating seeds, maintaining cuttings of plants, and controlling environmental conditions, and regulating irrigation systems.
0102.3.4	Prepare data summaries, reports, or analyses that include results, charts, or graphs to document research findings and results.
0102.3.5	Research the requirement of becoming a USDA Certified Organic crop producer.

Soil Science

0102.4	Identify components of soil (e.g., soil texture, soil horizon).
0102.4.1	Study soil characteristics to classify soils on the basis of factors such as geographic location, landscape position, or soil properties.
0102.5	Demonstrate knowledge of soil nutrients (e.g., soil pH, calculate amounts of fertilizer, eutrophication).
0102.5.1	Analyze soil to determine types or quantities of fertilizer required for maximum crop production.

0102.5.2	Conduct studies of nitrogen or alternative fertilizer application methods, quantities, or timing to ensure satisfaction of crop needs and minimization of leaching, runoff, or denitrification.
0102.5.3	Explore components of urban and suburban market gardening.
0102.6	Describe land capability use (e.g., land capability class, soil management practices).
0102.6.1	Provide information or recommendations to farmers or other landowners regarding ways in which they can best use land, promote plant growth, or avoid or correct problems such as erosion.
0102.6.2	Investigate responses of soils to specific management practices to determine the use capabilities of soils and the effects of alternative practices on soil productivity.
0102.6.3	Investigate soil problems and poor water quality to determine sources and effects.
0102.6.4	Assess comparative soil erosion from various planting or tillage systems, such as conservation tillage with mulch or ridge till systems, no-till systems, or conventional tillage systems with or without moldboard plows.

Animal Nutrition

0102.7	Determine nutritional needs of livestock (e.g., essential nutrients, protein, calculate feed, Pearson Square).
0102.7.1	Study effects of feed on quality and quantity of animal products, such as eggs and milk.
0102.7.2	Study nutritional requirements of animals and nutritive values of animal feed materials.
0102.7.3	Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs.
0102.7.4	Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production.
0102.7.5	Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements, and performance.
0102.7.6	Research the components of becoming a USDA Certified Organic livestock producer.
0102.8	Differentiate forage production (e.g., carrying capacity).
0102.8.1	Monitor pasture or grazing land use to ensure that livestock are properly fed or that conservation methods, such as rotational grazing, are used.

Small Gas Engine Maintenance and Repair

0102.9	Cycles of a small engine.
0102.9.1	Discuss the cycle of a 2-cycle engine.
0102.9.2	Discuss the cycle of a 4-stroke engine.
0102.10	Identify parts.
0102.10.1	Identify the parts of small engine components
0102.10.2	Demonstrate knowledge of the usage of a small engine parts manual.
0102.11	Demonstrate knowledge of small engine maintenance (e.g., service manuals, fluid levels).
0102.11.1	Repair and maintain gasoline engines used to power equipment such as portable saws, rototillers, lawn mowers, generators, and compressors.
0102.11.2	Adjust points, valves, carburetors, distributors, and spark plug gaps, using feeler gauges.
0102.11.3	Reassemble engines after repair or maintenance work is complete and ensure that the reassembled engine is operational.
0102.11.4	Record repairs made, time spent, and parts used.
0102.11.5	Perform routine maintenance such as cleaning and oiling parts, honing cylinders, and tuning ignition systems.
0102.11.5	Obtain problem descriptions from customers and prepare cost estimates for repairs.

0102.11.6	Operate, test and inspect engines to determine malfunctions, to locate missing and broken parts, and to verify repairs, using diagnostic instruments.
0102.11.7	Repair or replace defective parts such as magnetos, water pumps, gears, pistons, and carburetors, using hand tools.
0102.11.8	Dismantle engines, safely use hand tools, and examine parts for defects.
0102.11.9	Remove engines from equipment, and position and bolt engines to repair stands.

Welding

0102.12	Understand welding-related safety.
0102.12.1	Identify common safety hazards of welding.
0102.12.2	Identify specific PPE needs of welding.
0102.12.3	Demonstrate knowledge of a safe, properly ventilated welding area.
0102.13	Types of welding joints.
0102.13.1	Identify types of weld joints including butt, fillet, lap, etc.
0102.14	Discuss welder set-up and process.
0102.14.1	Ignite torches or start power supplies and strike arcs by touching electrodes to metals being welded, completing electrical circuits.
0102.14.2	Explain the difference between Gas Metal Arc Welding (GMAW) and Flux Core Arc Welding (FCAW).
0102.14.3	Explain electrode coding and selection.
0102.14.4	Clamp, hold, tack-weld, heat-bend, grind or bolt component parts to obtain required configurations and positions for welding.
0102.14.5	Recognize, set up, and operate hand and power tools common to the welding trade, such as shielded metal arc and gas metal arc welding equipment.
0102.14.6	Lay out, position, align, and secure parts and assemblies prior to assembly, using straightedges, combination squares, calipers, and rulers.
0102.14.7	Chip or grind off excess weld, slag, or spatter, using hand scrapers or power chippers, portable grinders, or arc-cutting equipment.
0102.14.8	Connect and turn regulator valves to activate and adjust gas flow and pressure so that desired flames are obtained.
0102.14.9	Select and install torches, torch tips, filler rods, and flux, according to welding chart specifications or types and thicknesses of metals.
0102.14.10	Remove rough spots from work pieces using portable grinders, hand files, or scrapers.
0102.14.11	Position and secure work pieces, using hoists, cranes, wire, and banding machines or hand tools.
0102.14.12	Clean or degrease parts, using wire brushes, portable grinders, or chemical baths.

Natural Resources

0102.15	Define natural resources and ecosystems.
0102.15.1	Identify the natural resources derived from West Virginia.
0102.15.2	Describe the components of a West Virginia biome.
0102.15.3	Define ecology.
0102.15.4	Identify and describe areas of forest wetlands in West Virginia.
0102.16	Recognize methods of identifying trees, wildlife, and aquatic species.
0102.16.1	Identify common tree species and other woody plants in West Virginia.
0102.16.2	Identify common WV wildlife species.
0102.16.3	Identify aquatic species including macroinvertebrates, fish, plants, invertebrates, and predator species.

0102.17	Demonstrate knowledge of forest and wildlife management.
0102.17.1	Identify ways in which forest stands may be improved and determine forest harvest timelines.
0102.17.2	Identify methods of wildlife habitat improvement.
0102.17.3	Identify forest products.
0102.17.4	Describe techniques used in the harvesting of wildlife.

Agricultural Innovation and Technology

0102.18	Technology in Agriculture.
0102.18.1	Identify emerging technology in agriculture.
0102.18.2	Identify career opportunities in technology, innovation, and entrepreneurship in agriculture.
0102.19	Agricultural Innovation & Current Issues.
0102.19.1	Identify a current question in agriculture and then develop a hypothesis, conduct research, and present findings.
0102.19.2	Identify a current issue or problem in agriculture and work as a group to find a solution to the problem.
0102.19.3	Research the components and requirements of producing, processing, and selling agricultural products from the home/farm.
0102.19.4	Design an agrotourism business.

Foundations of Agriculture, Food, and Natural Resources

0102.20	Demonstrate knowledge of leadership development through FFA.
0102.20.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0102.20.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0102.20.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialization course is for students who seek business and management techniques that will enable them to become successful in owning and operating a business in the agriculture industry. Topics covered include business organizational structures, legal and financial aspects of entrepreneurship, and marketing. Students will utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts and develop a business plan for an agricultural enterprise. Students are encouraged to become active members of FFA, the national youth organization for those enrolled in agricultural education.

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Foundations of Agriculture, Food, and Natural Resources

Demonstrate knowledge of the foundations of agriculture, food, and natural resources.	
0110.1	Demonstrate understanding of agribusiness (e.g., SAE, expenses).
0110.1.1	Students will demonstrate knowledge of time management.
0110.1.2	Students will demonstrate knowledge of goal setting.
0110.1.3	Students will demonstrate knowledge of types of business organizations.
0110.1.4	Students will demonstrate knowledge of biography/resume writing.
0110.1.5	Students will demonstrate knowledge of employability skills.
0110.1.6	Complete strengths-finder assessment.
0110.1.7	Set SMART goals for personal, school, career, and business.
0110.1.8	Maintain a personal calendar.
0110.1.9	Document daily records of time use and activities.
0110.1.10	Create a personal resume.
0110.1.11	Research different types of business organizations.
0110.1.12	Create a personal budget.
0110.1.13	Create business summary and company description components of business plan.
0110.1.14	Students will demonstrate knowledge of business licensing and permitting.
0110.1.15	Students will demonstrate knowledge of employment and business law.
0110.1.16	Students will demonstrate knowledge of state and federal taxes.
0110.1.17	Students will demonstrate knowledge of business ethics.
0110.1.18	Students will demonstrate knowledge of insurance.
0110.1.19	Students will demonstrate knowledge of the interviewing process.
0110.1.20	Communicate with local and state government officials concerning business law and issues.
0110.1.21	Complete a simulated business license application.
0110.1.22	Research various business forms, application and permits.
0110.1.23	Research various state and federal tax and business websites.
0110.1.24	Complete a simulated tax return with supporting documents.
0110.1.25	Interview an insurance agent about business and liability insurance.
0110.1.26	Research staffing and labor requirements of a business.

0110.1.27	Research various business policy and procedures manual.
0110.1.28	Conduct simulated job interview as potential candidate.
0110.1.29	Conduct simulated job interview as an employer.
0110.1.30	Role play various ethical dilemmas faced by business owners.
0110.1.31	Create organization and management structure components of business plan.
0110.1.32	Present completed business plan to a panel of student and industry representatives.

Agribusiness Entrepreneurship

0110.2	Discuss elements of entrepreneurship (e.g., invoice calculation, fixed costs).
0110.2.1	Students will demonstrate knowledge of entrepreneurship.
0110.2.2	Students will demonstrate knowledge of record keeping.
0110.2.3	Complete an entrepreneurship self-assessment.
0110.2.4	Students will demonstrate knowledge of personal finances.
0110.2.5	Students will demonstrate knowledge of business finances.
0110.2.6	Students will demonstrate knowledge of financial record keeping.
0110.2.7	Students will demonstrate knowledge of business agreements.
0110.2.8	Students will demonstrate knowledge of financial stewardship.
0110.2.9	Students will demonstrate knowledge of sustainability.
0110.2.10	Complete an asset inventory (land, buildings, equipment, etc.) and business agreements to determine what is needed to operate a business.
0110.2.11	Complete a net worth statement.
0110.2.12	Complete cash flow statement.
0110.2.13	Create a business budget including fixed and variable costs and create an enterprise budget.
0110.2.14	Utilize computer software to enter expense and income of a business.
0110.2.15	Maintain a simulated checking account ledger.
0110.2.16	Research different sources of financing and grants.
0110.2.17	Complete a loan application with supporting documentation.
0110.2.18	Calculate interest on a personal car loan and a mortgage.
0110.3	Interpret marketing principles (e.g., calculate product profit, supply and demand, value-added products, four P's of marketing).
0110.3.1	Students will demonstrate knowledge of market feasibility.
0110.3.2	Students will demonstrate knowledge of five areas of risk management.
0110.3.3	Students will demonstrate knowledge of basic economics.
0110.3.4	Complete a break-even analysis of a product.
0110.3.5	Create financial projections and business funding components of business plan.
0110.3.6	Students will demonstrate knowledge of the 4 P's of marketing.
0110.3.7	Students will demonstrate knowledge of business communication.
0110.3.8	Students will demonstrate knowledge of personal communication.
0110.3.9	Students will demonstrate knowledge of market and customer research.
0110.3.10	Students will demonstrate knowledge of value-added concepts.
0110.3.11	Students will demonstrate knowledge of niche marketing.
0110.3.12	Students will demonstrate knowledge of networking.
0110.3.13	Develop pricing strategies for products and services.
0110.3.14	Plan the delivery and distribution of products and services to customers.

0110.3.15	Research potential markets and competition for various products and services.
0110.3.16	Create and conduct customer survey for products and services.
0110.3.17	Develop advertising and promotion strategies for products and services utilizing webpage, business cards, social media, and traditional methods.
0110.3.18	Develop a support network to assist with promotion and delivery of products and services to the customer.
0110.3.19	Conduct a phone conversation with a customer.
0110.3.20	Send an e-mail to a business inquiring about products and services.
0110.3.21	Participate in a face-to-face business meeting using role play.
0110.3.22	Create market analysis, sales strategies, and service or product line components of business plan.

Foundations of Agriculture, Food, and Natural Resources

0110.4	Demonstrate knowledge of leadership development through FFA.
0110.4.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0110.4.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0110.4.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialized course is for students who seek a deeper knowledge in the area of food science technology. Topics covered include food safety, business and economics, packaging and marketing, value-added processing, quality assurance, food processing, food preparation and presentation and careers in the food science industry. Students will utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Students are encouraged to become active members of FFA, the national youth organization for those enrolled in agricultural education.

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Foundations of Agriculture, Food, and Natural Resources

0111.1	Demonstrate understanding of food products and processing (e.g., protein sources, food preservation).
0111.1.1	Demonstrate knowledge of safe practices and procedures in food science and technology.
0111.1.2	Demonstrate knowledge of national food and health and safety guidelines.
0111.1.3	Demonstrate knowledge of Safe food handling and food borne diseases.
0111.1.4	Demonstrate knowledge of avenues for food contamination (biological, chemical, and physical).
0111.1.5	Demonstrate knowledge of food borne illness prevention.
0111.1.6	Demonstrate knowledge of use of a microscope.
0111.1.7	Apply the scientific method for the improvement of food processing safety.
0111.1.8	Identify, sketch, and compare various harmful food borne microorganisms.
0111.1.9	Identify, sketch, and compare various beneficial food microorganisms.
0111.1.10	Examine the role and conduct an experiment with food preservatives.
0111.1.11	Conduct experiments involving harmful food borne microorganisms.
0111.1.12	Demonstrate how proper food handling, storage, and processing controls microorganisms.
0111.1.13	Examine the role of pesticides, chemicals, and preservatives on foods.
0111.1.14	Track the flow of plant and animal products from production source to consumer and determine possible contamination points.
0111.1.15	Conduct a food safety assessment.
0111.1.16	Demonstrate proper handwashing procedures.
0111.1.17	Demonstrate knowledge of basic economics of food science technology.
0111.1.18	Demonstrate knowledge of American agriculture history.
0111.1.19	Demonstrate knowledge of value-added food processing.
0111.1.20	Demonstrate knowledge of food advertising and marketing.
0111.1.21	Demonstrate knowledge of agriculture commodities futures market.
0111.1.22	Locate and map the major food producing areas of the world by products.
0111.1.23	Examine global supply and demand for agricultural products.
0111.1.24	Research major agriculture innovations throughout history.
0111.1.25	Chart West Virginia, US and global production figures of agricultural commodities and products.
0111.1.26	Identify and display raw agricultural commodities and their value-added products.
0111.1.27	Determine the costs of food product processing to the consumer.
0111.1.28	Examine present consumer food demands and project future demands.
0111.1.29	Create and display packaging for an agricultural product.

0111.1.30	Examine convenience food packaging.
0111.1.31	Examine and analyze marketing and advertising of agricultural products.
0111.1.32	Create advertising and marketing items for an agricultural product.
0111.1.33	Observe and research product displays, labeling and marketing promotion techniques used in retail and wholesale food sales.
0111.1.34	Demonstrate knowledge of basic food nutrition.
0111.1.35	Demonstrate knowledge of food processing methods.
0111.1.36	Demonstrate knowledge of food additives.
0111.1.37	Demonstrate knowledge of food labeling, packaging, and portioning.
0111.1.38	Demonstrate knowledge of agricultural industry standards and grading systems.
0111.1.39	Students will demonstrate knowledge of the use of biotechnology in agriculture and food production.
0111.1.40	Students will demonstrate knowledge of regulatory food agencies and issues.
0111.1.41	Analyze and discuss industry standards and grades for agricultural commodity products.
0111.1.42	Examine & discuss food labels and compare to the food nutrition pyramid.
0111.1.43	Conduct experiments to determine food contents and nutritional elements.
0111.1.44	Process butter, ice cream, and cheese.
0111.1.45	Properly process fruits, vegetables and meats through canning, freezing, dehydrating, aging, blanching, and curing.
0111.1.46	Produce food products using biotechnology (root beer, yogurt, sauerkraut, pickles, etc.).
0111.1.47	Package processed agricultural products for sale and distribution.
0111.1.48	Participate in or explore the FFA Poultry, Meats, Livestock, Dairy Products and Food Science Career Development Events.
0111.1.49	Conduct sensory analysis experiments for smell, taste and texture of food and food additives and enhancers.
0111.1.50	Analyze food labels and identify food additives and enhancers.
0111.1.51	Examine guidelines for the home processing of vegetables and meats.
0111.1.52	Conduct food product sampling and consumer evaluation activities.
0111.1.53	Debate and discuss food regulatory issues and the use of synthetic foods.
0111.1.54	Conduct and present a food and agriculture awareness campaign in your local community.
0111.1.55	Examine the World Health Organization, USDA and other governmental agencies involved with the world's food supply.
0111.1.56	Demonstrate knowledge of Safe preparation and presentation of foods.
0111.1.57	Demonstrate knowledge of cultural and ethnic foods.
0111.1.58	Demonstrate knowledge of preparing a menu.
0111.1.59	Demonstrate knowledge of organic foods.
0111.1.60	Identify community restaurants and categorize types of foods served.
0111.1.61	Identify global and national specialty food and ethnic preferences.
0111.1.62	Survey students, parents, and grandparents concerning ethnic or cultural food habits.
0111.1.63	Prepare traditional, regional American food specialties and discuss the relationship between ethnic preferences and the development of niche markets.
0111.1.64	Construct a nutritionally sound menu and prepare a food budget for a meal.
0111.1.65	Identify characteristics of organic foods.
0111.1.66	Students will demonstrate knowledge of food science technology careers.
0111.1.67	Investigate the diversity of careers in the food science, dietetics, and nutrition industries.
0111.1.68	Conduct student interest inventories.
0111.1.69	Identify advanced training and post-secondary educational opportunities in food science technology.

0111.1.70	Examine labor market information.
0111.1.71	Request post-secondary information.
0111.1.72	Demonstrate leadership skills.

Foundations of Agriculture, Food, and Natural Resources

0111.2	Demonstrate knowledge of leadership development through FFA.
0111.2.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0111.2.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0111.2.3	Participate in community service and career awareness activities at the local, state, and national level.

This course introduces the knowledge and skills for applying the physical science principles and principles of operation and maintenance to mechanical equipment, welding and fabrication, structures, plumbing, electrical wiring, power utilization, and entrepreneurship. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundations of Agriculture, Food, and Natural Resources

0112.1	Demonstrate understanding of power, structural, and technical systems (e.g., measurement).
0112.1.1	Observe and utilize all safety precautions when operating and servicing agricultural equipment.
0112.1.2	Operate, maintain, and service power equipment and machinery utilized in the agricultural industries such as tractors, skid steers, rototillers, etc.
0112.2	Demonstrate understanding of agriculture innovation and technology.
0112.2.1	Identify a current question in the power, structural and technical systems industries and then develop a hypothesis and conduct research and present findings.
0112.2.2	Identify a current issue or problem in the power, structural and technical systems industries, and work as a group to find a solution to the problem.

Measurements and Calculations

0112.3	Determine and interpret measurements (e.g., read micrometer, measuring tape).
0112.3.1	Measure and mark cutting lines on materials, using a ruler, pencil, chalk, and marking gauge.
0112.4	Calculate units of weight, volume, and temperature.
0112.4.1	Discuss how to calculate units of weight, volume, and temperature using the appropriate conversion factors and formulas.

Foundational Carpentry

0112.5	Identify tools (e.g., tool care, tool identification).
0112.5.1	Cut or saw boards, timbers, or plywood to required size, using handsaws, power saws, or woodworking machines.
0112.6	Discuss safety.
0112.6.1	Discuss safety of tool usage and proper personal protective equipment for carpentry work.

Foundational Plumbing

0112.7	Describe the plumbing process (e.g., preparing plumbing joints).
0112.7.1	Assemble or secure pipes, tubes, fittings, or related equipment.
0112.7.2	Prepare surfaces for tool use and plumbing.
0112.8	Describe plumbing with copper and plastic (e.g., types of plastic pipes, joining pipes).
0112.8.1	Properly measure, cut, and join plastic piping.

0112.8.2	Properly measure, cut, and join metal piping.
0112.8.3	Properly join fixtures.

Foundational Electrical Wiring

0112.9	Discuss basic electricity (e.g., grounding, wire selection).
0112.9.1	Measure, cut, and bend wire and conduit using measuring instruments and hand tools.
0112.9.2	Strip insulation from wire ends using wire stripping pliers and attach wires to terminals for subsequent soldering.
0112.10	Describe how to install breakers, switches, and sockets (e.g., electric connections, circuit breakers, electrical safety).
0112.10.1	Discuss safety hazards, prevention, and Personal Protective Equipment in electrical work.
0112.10.2	Layout and connect 2-way switches.
0112.10.3	Layout and connect 3-way switches.
0112.10.4	Layout and connect branch circuits.

SMAW and MIG Welding, Oxyfuel Cutting, and Brazing

0112.11	Identify types of welding joints (e.g., types of welds).
0112.11.1	Weld components in flat, vertical, or overhead positions.
0112.11.2	Cut, contour, and bevel metal plates and structural shapes to dimensions specified by blueprints, layouts, work orders, and templates using powered saws, hand shears, or chipping knives.
0112.12	Discuss welding methods (e.g., shielding gas, check valves, brazing, welder components).
0112.12.1	Operate manual or semi-automatic welding equipment to fuse metal segments using processes such as gas tungsten arc, gas metal arc, flux-cored arc, plasma arc, shielded metal arc, resistance welding, and submerged arc welding.
0112.12.2	Weld separately or in combination using aluminum, stainless steel, cast iron, and other alloys.
0112.13	Describe welder set-up and process (e.g., lighting a torch, reading a pressure gauge, electrode selection, welding arc).
0112.13.1	Demonstrate knowledge of proper PPE mandatory for welding processes.
0112.13.2	Discuss potential hazards that should be prevented and avoided in the welding and cutting workplace.
0112.13.3	Ignite torches or start power supplies and strike arcs by touching electrodes to metals being welded, completing electrical circuits.
0112.13.4	Clamp, hold, tack-weld, heat-bend, grind, or bolt component parts to obtain required configurations and positions for welding.
0112.13.5	Monitor the fitting, burning, and welding processes to avoid overheating of parts or warping, shrinking, distortion, or expansion of material.
0112.13.6	Examine workpieces for defects and measure workpieces with straightedges or templates to ensure conformance with specifications.
0112.13.7	Recognize, set up, and operate hand and power tools common to the welding trade such as shielded metal arc and gas metal arc welding equipment.
0112.13.8	Lay out, position, align, and secure parts and assemblies prior to assembly using straightedges, combination squares, calipers, and rulers.
0112.13.9	Chip or grind off excess weld, slag, or spatter, using hand scrapers or power chippers, portable grinders, or arc-cutting equipment.
0112.13.10	Prepare all material surfaces to be welded, ensuring that there is no loose or thick scale, slag, rust, moisture, grease, or other foreign matter.

0112.13.11	Select and install torches, torch tips, filler rods, and flux, according to welding chart specifications or types and thicknesses of metals.
0112.13.12	Remove rough spots from workpieces, using portable grinders, hand files, or scrapers.
0112.13.13	Position and secure workpieces, using hoists, cranes, wire, and banding machines or hand tools.
0112.13.14	Guide and direct flames or electrodes on or across workpieces to straighten, bend, melt, or build up metal.
0112.13.15	Clean or degrease parts, using wire brushes, portable grinders, or chemical baths.
0112.13.16	Preheat work pieces prior to welding or bending, using torches or heating furnaces.
0112.13.17	Light and adjust an oxyfuel tip for cutting, welding, and brazing.
0112.13.18	Properly shut down oxyfuel equipment.
0112.13.19	Perform oxyfuel cutting.
0112.13.20	Perform oxyfuel welding.
0112.13.21	Perform oxyfuel brazing.

Foundations of Agriculture, Food, and Natural Resources

0112.14	Demonstrate knowledge of leadership development through FFA.
0112.14.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0112.14.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0112.14.3	Participate in community service and career awareness activities at the local, state, and national level.

Students will use computer skills to develop simple sketches and plans, read and relate structural plans to specifications and building codes, estimate project costs, use construction/fabrication equipment and tools, and plan and design machinery, equipment, buildings, and facilities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundations of Agriculture, Food, and Natural Resources

0113.1	Demonstrate understanding of power, structural, and technical systems (e.g., measurement).
0113.1.1	Assemble and fasten materials to make frameworks or props using hand tools and wood screws, nails, dowel pins, or glue.
0113.1.2	Erect scaffolding or ladders for assembling structures above ground level.
0113.1.3	Anchor and brace forms and other structures in place using nails, bolts, anchor rods, steel cables, planks, wedges, and timbers.
0113.1.4	Erect forms, framework, scaffolds, hoists, roof supports, or chutes using hand tools, plumb rule, and level.
0113.1.5	Dig or direct digging of post holes and set poles to support structures.
0113.1.6	Students will demonstrate knowledge of fence selection.
0113.1.7	Students will demonstrate knowledge of fence layout and design.
0113.1.8	Students will demonstrate knowledge of post setting.
0113.1.9	Students will demonstrate knowledge of stretching fence.
0113.1.10	Establish the location for a fence, and gather information needed to ensure that there are no electric cables or water lines in the area.
0113.1.11	Align posts using lines or by sighting and verify vertical alignment of posts using plumb bobs or spirit levels.
0113.1.12	Measure and lay out fence lines and mark posthole positions, following instructions, drawings, or specifications.
0113.1.13	Dig postholes, using spades, posthole diggers, or power-driven augers.
0113.1.14	Set metal or wooden posts in upright positions in postholes.
0113.1.15	Discuss fencing needs with customers and estimate and quote prices
0113.1.16	Mix and pour concrete around bases of posts or tamp soil into postholes to embed posts.
0113.1.17	Make rails for fences, by sawing lumber or by cutting metal tubing to required lengths.
0113.1.18	Nail top and bottom rails to fence posts or insert them in slots on posts.
0113.1.19	Stretch wire, wire mesh, or chain link fencing between posts and attach fencing to frames.
0113.1.20	Attach fence rail supports to posts using hammers and pliers.
0113.1.21	Assemble gates and fasten gates into position, using hand tools.
0113.1.22	Complete top fence rails of metal fences by connecting tube sections, using metal sleeves.
0113.1.23	Insert metal tubing through rail supports.

0113.1.24	Attach rails or tension wire along bottoms of posts to form fencing frames.
0113.1.25	Nail pointed slats to rails to construct picket fences.
0113.1.26	Construct and repair barriers, retaining walls, trellises, and other types of fences, walls, and gates.
0113.1.27	Erect alternate panel, basket weave, and louvered fences.

Measurement and Calculation

0113.2	Determine and interpret measurements (e.g., read micrometer, measuring tape).
0113.2.1	Students will demonstrate knowledge of reading blueprints and ordering materials.
0113.2.2	Interpret specifications in blueprints, sketches, or building plans to prepare project layout and determine dimensions and materials required.
0113.3	Discuss and perform basic math (e.g., calculate linear feet, percentage, cubic yards; convert feet to inches, fractions to decimals).
0113.3.1	Select and order lumber or other required materials.
0113.3.2	Students will demonstrate knowledge of framing, squaring, and plumbing a structure.

Foundational Plumbing

0113.4	Describe the plumbing process (e.g., preparing plumbing joints).
0113.4.1	Students will demonstrate knowledge of basic tools for plumbing.
0113.4.2	Students will demonstrate knowledge of how to prepare surfaces for tool use.
0113.4.3	Prepare surfaces for tool use and plumbing.
0113.4.4	Fill pipes or plumbing fixtures with water or air and observe pressure gauges to detect and locate leaks.
0113.5	Describe plumbing with copper and plastic (e.g., flux, types of fittings).
0113.5.1	Students will demonstrate knowledge of uses of plastic pipe plumbing (black roll, PVC, Pex).
0113.5.2	Students will demonstrate knowledge of uses of metal tubing plumbing.
0113.5.3	Properly measure, cut, and join plastic piping.
0113.5.4	Properly measure, cut, and join metal piping.
0113.5.5	Properly join fixtures.
0113.6	Identify fixtures used for agricultural plumbing (e.g., flux, types of fittings).
0113.6.1	Students will demonstrate knowledge of fixtures used for agricultural plumbing.
0113.6.2	Assemble or secure pipes, tubes, fittings, or related equipment.

Foundational Electrical Wiring

0113.7	Discuss basic electricity (e.g., grounding, wire selection).
0113.7.1	Students will demonstrate knowledge of the difference between conductors and insulators.
0113.7.2	Students will demonstrate knowledge of the characteristics of series and parallel circuits.
0113.7.3	Plan layout and installation of electrical wiring, equipment, or fixtures based on job specifications and local codes.
0113.8	Identify the units of measurement used to measure electricity (e.g., electric meters, measuring units for electricity, electrical tests).
0113.8.1	Students will demonstrate knowledge of watts, voltage, and amperage.
0113.8.2	Students will demonstrate knowledge of the units of measurement used to measure electricity.
0113.8.3	Test electrical systems or continuity of circuits in electrical wiring, equipment, or fixtures using testing devices, such as ohmmeters, voltmeters, or oscilloscopes to ensure compatibility and safety of system.
0113.9	Describe how to install breakers, switches, and sockets (e.g., electrical connections, circuit breakers, electrical safety).
0113.9.1	Students will demonstrate knowledge of how to install breakers, switches, and sockets.

0113.9.2	Connect wires to circuit breakers, transformers, or other components.
0113.9.3	Repair or replace wiring, equipment, or fixtures, using hand tools or power tools.
0113.9.4	Assemble, install, test, or maintain electrical or electronic wiring, equipment, appliances, apparatus, or fixtures, using hand tools or power tools.
0113.9.5	Fasten small metal or plastic boxes to walls to house electrical switches or outlets.
0113.9.6	Place conduit, pipes, or tubing inside designated partitions, walls, or other concealed areas and pull insulated wires or cables through the conduit to complete circuits between boxes.

Foundations of Agriculture, Food, and Natural Resources

0113.10	Demonstrate knowledge of leadership development through FFA.
0113.10.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0113.10.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0113.10.3	Participate in community service and career awareness activities at the local, state, and national level.

This course builds on the principles of the previous course and provides more in-depth knowledge and skills as they relate to energy sources, lubricants, service and maintenance of machinery and equipment, and equipment operation. Students will apply principles of service and repair by troubleshooting problems and evaluating engine performance, following guidelines to service and repair power transmission systems, hydraulic systems, and entrepreneurship. Tools used with these procedures will allow students to demonstrate proper skills and safety. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

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Foundations of Agriculture, Food, and Natural Resources

0114.1	Demonstrate understanding of agribusiness (e.g., SAE, expenses).
0114.1.1	Read catalogs, microfiche viewers, or computer displays to determine replacement part stock numbers and prices.
0114.1.2	Determine replacement parts required, according to inspections of old parts, customer requests, or customers' descriptions of malfunctions.
0114.1.3	Fill customer orders from stock.
0114.1.4	Prepare sales slips or sales contracts.
0114.1.5	Discuss use and features of various parts based on knowledge of machines or equipment.
0114.1.6	Research, order, and maintain parts inventory for services and repairs.
0114.2	Demonstrate understanding of power, structural, and technical systems (e.g., measurement).
0114.2.1	Students will demonstrate knowledge of equipment safety, maintenance, and service schedules.
0114.2.2	Clean and lubricate parts.
0114.2.3	Clean, lubricate, and perform other routine maintenance work on equipment and vehicles.
0114.2.4	Schedule maintenance for equipment and keep equipment service records.
0114.2.5	Clean parts by spraying them with grease solvent or immersing them in tanks of solvent.
0114.2.6	Students will demonstrate knowledge of service manuals, troubleshooting equipment, and equipment repair procedures.
0114.2.7	Repair parts or equipment.
0114.2.8	Reassemble machines and equipment following repair; test operation; and adjust, as necessary.
0114.2.9	Safely operate, maintain, repair, and overhaul farm machinery and vehicles, such as tractors, harvesters, and irrigation systems.
0114.2.10	Examine and listen to equipment, read inspection reports, and confer with customers to locate and diagnose malfunctions.
0114.2.11	Dismantle defective machines for repair, using hand tools.
0114.2.12	Repair and replace damaged or worn parts.
0114.2.13	Dismantle and reassemble heavy equipment using hoists and hand tools.
0114.2.14	Test mechanical products and equipment after repair or assembly to ensure proper performance and compliance with manufacturers' specifications.

0114.2.15	Fit bearings to adjust, repair, or overhaul mobile mechanical, hydraulic, and pneumatic equipment.
0114.2.16	Diagnose faults or malfunctions to determine required repairs using engine diagnostic equipment such as computerized test equipment and calibration devices.
0114.2.17	Repair, rewire, and troubleshoot electrical systems.

Measurement and Calculation

0114.3	Determine and interpret measurements (e.g., read micrometer, measuring tape).
0114.3.1	Measure parts using precision measuring instruments to determine whether similar parts may be machined to required sizes.
0114.3.2	Examine parts for damage or excessive wear using micrometers and gauges.
0114.3.3	Explain how to calculate units of weight, volume, and temperature.

Foundations of Agriculture, Food, and Natural Resources

0114.4	Demonstrate knowledge of leadership development through FFA.
0114.4.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0114.4.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0114.4.3	Participate in community service and career awareness activities at the local, state, and national level.

This course is a specialized elective within the Power, Structural, and Technical Systems pathway. This course focuses on the further development of skills within physical science principles and engineering applications. Students will utilize problem-solving techniques and hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

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Foundations of Agriculture, Food, and Natural Resources

0115.1	Demonstrate understanding of agriculture innovation and technology.
0115.1.1	Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural, and technical systems.
0115.1.2	Assess and select energy sources for AFNR power, structural, and technical systems.
0115.1.3	Research and identify renewable and nonrenewable energy sources used in AFNR.
0115.1.4	Assess the environmental impacts of renewable and nonrenewable energy sources used in AFNR.
0115.1.5	Design and implement methods to evaluate the efficiency of renewable and nonrenewable energy sources in an AFNR.
0115.1.6	Compare and contrast the pathways of delivery for renewable and nonrenewable energy sources in an AFNR enterprise or business.
0115.1.7	Calculate the costs of using renewable and nonrenewable energy sources in an AFNR enterprise or business.
0115.1.8	Devise a strategy to incorporate the use of selected energy sources in an AFNR enterprise or business.
0115.1.9	Summarize methods; compare and contrast units used to benchmark energy use of AFNR structures (e.g., EUIs, BTUs, etc.).
0115.1.10	Convert energy utilized in an AFNR structure to an energy utilization index (e.g., CCR, KWH, etc., to BTU consumption per square foot, etc.).
0115.1.11	Apply energy benchmarking data to examine and select methods to conserve energy in AFNR structures.

Agriculture Innovation and Technology

0115.2	Identify emerging technology in the agricultural engineering industry.
0115.2.1	Compare and contrast applications of simple machines in AFNR-related mechanical systems.
0115.2.2	Perform mathematical calculations to determine the mechanical advantage of simple machines in AFNR-related mechanical systems.
0115.2.3	Apply the scientific method to devise strategies to improve the efficiency of the operation of AFNR-related mechanical systems.
0115.2.4	Identify the tools, machines, and equipment needed to construct and/or fabricate a project in AFNR.
0115.2.5	Calculate the maintenance and purchase cost of tools, machines, and equipment used in AFNR.
0115.2.6	Devise and document processes to safely implement and evaluate the safe use of AFNR-related tools, machinery, and equipment.
0115.2.7	Examine owner's manuals to classify the types of safety hazards associated with different mechanical systems used in AFNR (e.g., caution, warning, danger, etc.).

0115.2.8	Select, maintain, and demonstrate the proper use of tools, machines, and equipment used in different AFNR-related mechanical systems.
0115.2.9	Conduct a safety inspection of tools, machines, and equipment used in different AFNR-related mechanical systems.
0115.2.10	Use control, monitoring, geospatial, and other technologies in AFNR power, structural, and technical systems.
0115.2.11	Apply computer and other technologies (e.g., robotics, CNC, UAS, etc.) to solve problems and increase the efficiency of AFNR systems.
0115.2.12	Research and categorize computer technologies used to solve problems and increase efficiency in AFNR systems.
0115.2.13	Analyze data using computer programs and other current technologies used in AFNR systems.
0115.2.14	Solve problems and calculate changes in efficiency using computer technologies for AFNR systems.
0115.2.15	Examine and summarize the specific intent of technologies used to solve problems and increase the efficiency of AFNR systems (e.g., robotics, UAS, CNC, etc.).
0115.2.16	Calculate the change in efficiency after using technologies in AFNR systems.
0115.2.17	Solve problems and evaluate changes in efficiency and create recommendations for the use of technologies in AFNR systems.
0115.2.18	Examine and categorize electrical control system components used in AFNR systems (e.g., transistors, relays, HVAC, logic controllers, etc.).
0115.2.19	Analyze schematic drawings for electrical control systems used in the AFNR systems.
0115.2.20	Design schematic drawings for electrical control systems used in AFNR systems.
0115.2.21	Differentiate between the purpose of electrical sensors and controls used in AFNR power, structural, and technical systems.
0115.2.22	Interpret maintenance schedules for electrical control systems used in AFNR power, structural, and technical systems.
0115.2.23	Troubleshoot electrical control system performance problems found in AFNR power, structural, and technical systems.
0115.2.24	Research and summarize the importance of AFNR power, structural, and technical control systems using programmable logic controllers (PLC) and/or other computer-based systems.
0115.2.25	Assess the functions of AFNR power, structural, and technical control systems using programmable logic controls (PLC) in agricultural production and manufacturing.
0115.2.26	Develop and implement AFNR power, structural, and technical control systems using programmable logic controllers (PLC) and/or other computer-based systems.
0115.2.27	Apply geospatial technologies to solve problems and increase the efficiency of AFNR systems.
0115.2.28	Research and summarize the impact of utilizing geospatial technologies (e.g., GPS, GIS, remote sensing, telematics, etc.) in AFNR systems.
0115.2.29	Analyze and interpret trends in data collected utilizing geospatial technologies.
0115.2.30	Collect data and create maps utilizing geospatial technologies.
0115.2.31	Examine the components of precision technologies used in AFNR systems.
0115.2.32	Analyze and calculate the economic impact of utilizing precision technologies (e.g., GPS/GIS) in AFNR systems.
0115.2.33	Install, maintain, and service instrumentation and equipment used for precision technologies (e.g., GPS receivers, yield monitors, remote sensors, etc.) used in AFNR systems.

Foundations of Agriculture, Food, and Natural Resources

0115.2	Demonstrate knowledge of leadership development through FFA.
0115.2.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0115.2.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0115.2.3	Participate in community service and career awareness activities at the local, state, and national level.

[AFNR Standards – The National Council for Agricultural Education \(ffa.org\)](http://ffa.org)

This course provides instruction in the technologically advanced world of agriculture and life sciences. Current applications of biotechnology in animal science, environmental science, food science, and plant science are emphasized. Basic concepts of genetics and microbiology are applied to the agriculture industry and its success in providing food and fiber for the world. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

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Foundations of Agriculture, Food, and Natural Resources

0132.1	Demonstrate understanding of agriculture innovation and technology.
0132.1.1	Analyze physical characteristics and Expected Progeny Difference (EPD) data and formulate conclusions about animal trait inheritance and selection.
0132.1.2	Examine biotechnology practices in animal agriculture (antibiotics, growth hormones, animal health and disease prevention).
0132.1.3	Relate the concepts of dominant and recessive genes to common heritable traits in animals.
0132.1.4	Examine the reproductive processes in animals (heat, ovulation, fertilization, gestation, and parturition).
0132.1.5	Research various technological advancements in animal biotechnology (estrus synchronization, artificial insemination, cloning and embryo transfer).
0132.1.6	Examine biotechnology practices in plant agriculture (growth hormones, genetic engineering, and tissue culturing).
0132.1.7	Assess fermentation and its importance to biotechnology.
0132.1.8	Compare and contrast the processes of mitosis and meiosis.
0132.1.9	Analyze the processes of identifying a gene on a chromosome.
0132.1.10	Assess and discuss the process of polymerase chain reaction.
0132.1.11	Discuss and draw conclusions about genetic engineering and its uses.
0132.1.12	Identify regulatory agencies and regulations associated with biotechnology.
0132.1.13	Analyze the use of equipment and materials and apply rules for safety in the laboratory.
0132.1.14	Students will demonstrate knowledge of technology used to perform tasks and laboratory procedures in agricultural biotechnology.
0132.1.15	Apply principles of animal selection to evaluate various species of livestock.
0132.1.16	Examine the male and female reproductive system of an agriculture animal species.
0132.1.17	Design, conduct and evaluate tissue culture experiments with various species of plants.
0132.1.18	Apply aseptic techniques in tissue culture experiments.
0132.1.19	Conduct and evaluate a laboratory experiment in bioremediation.
0132.1.20	Perform gram staining of bacteria.
0132.1.21	Illustrate and compare various microorganisms viewed under a microscope.
0132.1.22	Design, conduct and evaluate fermentation experiments.
0132.1.23	Conduct and evaluate the process of making cheese.
0132.1.24	Conduct and evaluate experiments in food preservation and food safety.

0132.1.25	Compare and contrast the cells of plants and animals viewed under a microscope.
0132.1.26	Predict rate of inheritance by conducting simulated experiments.
0132.1.27	Extract DNA from a plant source (Banana or strawberry) and discuss structure.
0132.1.28	Conduct gel electrophoresis of DNA experiments.
0132.1.29	Conduct recombinant DNA procedures.

Foundations of Agriculture, Food, and Natural Resources

0132.2	Demonstrate knowledge of leadership development through FFA.
0132.2.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0132.2.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0132.2.3	Participate in community service and career awareness activities at the local, state, and national level.

Students enrolled in agricultural education courses have the unique opportunity for experiential and contextual learning on a grand scale. Students may select and participate in appropriate agricultural enterprises which provide an opportunity to acquire skills, earn money, and develop responsibility while also earning high school credit. This course is designed for seniors in agricultural education classes who are in their third or fourth year with satisfactory grades. Students will be placed in agricultural occupations and will receive wages, credits toward graduation, and school release time of a maximum of three hours per day. Students who wish to enroll will need approval from the program coordinator. An attendance contract will be required. This course will give students experience in a potential agricultural career.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Supervised Agricultural Experience (SAE) Program Development and Record-Keeping

0133.1	SAE Program Development and Record-Keeping.
0133.1.1	Types of SAE programs.
0133.1.2	FFA/SAE award and degree programs.
0133.1.3	SAE final records.
0133.1.4	Career opportunities in the agriculture industry.
0133.1.5	Complete a personal interest and resource inventory to identify potential enterprises and placement sites for individualized programs.
0133.1.6	Work with the teacher and employers to develop individual training plans listing competencies to be learned through agricultural cooperative education placement.
0133.1.7	Summarize financial records to determine net income from SAE.
0133.1.8	Calculate efficiency factors related to individual SAE.
0133.1.9	Develop a portfolio sustaining the completion of SAE.
0133.1.10	Complete a job application and create a letter of application.
0133.1.11	Participate in a job interview.

Workplace Skills

0133.2	Workplace Skills.
0133.2.1	Job-site ethics.
0133.2.2	Time management.
0133.2.3	Decision-making skills
0133.2.4	Problem-solving skills.
0133.2.5	Work-place safety.
0133.2.6	Demonstrate a courteous attitude to customers, employers, and fellow employees.
0133.2.7	Display willingness to learn new techniques and follow directions.
0133.2.8	Monitor the safety of the working environment.
0133.2.9	Identify the location of first aid kits, emergency phone numbers, and exits.
0133.2.10	Demonstrate the safe use of equipment.

Supervised Agricultural Experience (SAE)

Course #: 0134

Allowable Teacher Endorsement: 0200, 0201, 7720, 7800, 7801, 7802, 7803, 7804, 7805

SAE is a student-led, instructor-supervised, work-based learning experience that results in measurable outcomes within a predefined, agreed-upon set of Agriculture, Food, and Natural Resources (AFNR) Technical Standards and Career Ready Practices aligned to your career plan of study. If a student touches, prepares, sells, or communicates about anything related to AFNR, the experience will count as a legitimate SAE. SAEs are expected to relate to the concentration area in which the student seeks occupational completion status. An SAE shall fall into one of four categories:

Exploratory/Foundational: Students will learn about the 'big picture' of agriculture and its many related careers.

Research/Experimentation and Analysis: Students will conduct research or analyze information to discover new knowledge.

Ownership/Entrepreneurship: Students will plan and operate an agriculture-related business. **Placement:**

Students will work for someone else either for pay or for experience. Students conducting all types of SAEs will track hours (both paid and unpaid), progress, income, expenses, events, etc., in the Classroom 2 Career tracking system and the Agriculture Experience Tracker (AET).

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

0134.1	Exploratory/Foundational
0134.1.1	Describe career opportunities and means to achieve those opportunities in each of the AFNR career pathways.
0134.1.2	Explore and identify personal agricultural interests to create a career plan.
0134.1.3	Act as a responsible and contributing citizen and employee by developing key employability skills.
0134.1.4	Students will expand their personal financial literacy by developing a personal budget.
0134.1.5	Examine and summarize the importance of health, safety, and environmental management systems in AFNR workplaces.
0134.1.6	Analyze how issues, trends, technologies, and public policies impact systems in the AFNR career cluster.
0134.1.7	Job shadow a worker within the agricultural industry.
0134.1.8	Students will document their knowledge, skills, and plans in the Classroom 2 Career tracking system/AET.

0134.2	Research/Experimentation & Analysis
0134.2.1	Investigate materials, processes, and information to establish new knowledge or the validation of previous research.
0134.2.2	Follow the scientific process and acceptable best practices for conducting research to ensure reliability, validity, and replicability of research.
0134.2.3	Exercise safety throughout all aspects of the experimental process.
0134.2.4	Apply the methods of the scientific method to control certain variables while manipulating others to observe the outcome.
0134.2.5	Complete a Research Plan which safely meets all requirements.
0134.2.6	Define a hypothesis.
0134.2.7	Determine an appropriate experimental design, conduct the research, collect the data, draw conclusions from the data and recommend further research that can be done.

Supervised Agricultural Experience (SAE)**Course #: 0134****Allowable Teacher Endorsement:** 0200, 0201, 7720, 7800, 7801, 7802, 7803, 7804, 7805

0134.2.8	Formulate a why or how question, conduct data and collection using qualitative and/or quantitative methodologies.
0134.2.9	Conduct an analysis of data, facts, and other information to determine the answer to the analytical question.
0134.2.10	Apply the engineering design process to the invention research SAE to create a new product or service.
0134.2.11	Conduct peer reviews with the supervising agricultural education instructor or other professionals at multiple stages throughout the research cycle.
0134.2.12	Make a summary presentation of research and findings to a local committee organized by the agricultural education instructor.
0134.2.13	Document methods, procedures, results, analysis, and conclusions in the Classroom 2 Career tracking system/AET.

0134.3	Ownership/Entrepreneurship
0134.3.1	Create, own, and operate a business that provides goods and/or services.
0134.3.2	Exercise safety when operating all aspects of the business.
0134.3.3	Make operational and risk management decisions on how goods and/or services are provided.
0134.3.4	Conduct an operation of sufficient scope to develop skills and abilities aligned to the AFNR standards.
0134.3.5	Conduct an analysis of productivity and profitability at the end of each production/business cycle; make necessary changes for improvement.
0134.3.6	Become familiar with common financial tools, balance sheets, income statements, inventories, and cash flow.
0134.3.7	Design a business plan which provides for the continued growth and expansion of the operation.
0134.3.8	Review and update the business plan annually to reflect the changes in the operation.
0134.3.9	Track and document items produced, service hours worked, income, expenses, and the knowledge and skills attained within the Classroom 2 Career tracking system/AET record book.

0134.4	Placement
0134.4.1	Develop a job plan that includes considerations that promote a safe worksite and opportunities to learn on the job.
0134.4.2	Develop agriculture, food, natural resource, and employability skills and abilities outside the classroom through a hands-on job site experience.
0134.4.3	Perform an environmental safety review on yourself and your worksite.
0134.4.4	Pursue and complete the necessary safety training needed for employment in the related SAE area.
0134.4.5	Take measures to address any safety concerns identified.
0134.4.6	Perform the tasks determined by the employer which are necessary for the operation of the business.
0134.4.7	Track and document hours worked, income received, tasks completed, and the knowledge and skills attained within the Classroom 2 Career tracking system/AET record book.

NOTES: Refer to the guidance document at the link below for requirements of the ½ credit.

[Guidelines for Awarding SAE Credit Document](#)

Sources: [Educator Resources – SAE For All](#)

This course provides instruction that expands the scientific knowledge and technical skills gained in The Science of Agriculture. Topics of instruction include livestock/poultry industry and its various components, career opportunities, soil science, crop science/agronomy, weed science, agricultural machinery and related industry careers, environmental stewardship, entrepreneurship, and leadership/personal development. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Foundation of Agriculture, Food, and Natural Resources

0136.1	Demonstrate understanding of animal systems (e.g., breeds of livestock, anatomy).
0136.1.1	Research and control animal selection and breeding practices to increase production efficiency and improve animal quality.
0136.1.2	Determine genetic composition of animal populations and heritability of traits, utilizing principles of genetics.
0136.1.3	Describe the functions of major organs in the male and female reproductive systems.
0136.1.4	Select breeding animals based on characteristics of the reproductive organs.
0136.1.5	Summarize factors that lead to reproductive maturity.
0136.1.6	Evaluate and select animals for reproductive readiness.
0136.1.7	Evaluate reproductive problems that occur in animals.
0136.1.8	Explain the advantages of using genetically superior animals in the production of animals and animal products.
0136.1.9	Select a breeding system based on the principles of genetics.
0136.1.10	Explain the processes of natural and artificial breeding methods.
0136.1.11	Select animal breeding methods based on reproductive and economic efficiency.
0136.1.12	Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value.
0136.1.13	Explain the materials, methods, and processes of artificial insemination.
0136.2	Demonstrate understanding of plant systems (e.g., plant parts, processes, soil).
0136.2.1	Care for established lawns by mulching, aerating, weeding, grubbing, removing thatch, and trimming or edging around flower beds, walks, or walls.
0136.2.2	Use hand tools, such as shovels, rakes, pruning saws, saws, hedge or brush trimmers, or axes.
0136.2.3	Prune or trim trees, shrubs, or hedges, using shears, pruners, or chain saws.
0136.2.4	Mix and spray or spread fertilizers, herbicides, or insecticides onto grass, shrubs, or trees, using hand or automatic sprayers or spreaders.
0136.2.5	Water lawns, trees, or plants, using portable sprinkler systems, hoses, or watering cans.
0136.2.6	Trim or pick flowers and clean flower beds.
0136.2.7	Follow planned landscaping designs to determine where to lay sod, sow grass, or plant flowers or foliage.

0136.2.8	Plant seeds, bulbs, foliage, flowering plants, grass, ground covers, trees, or shrubs and apply mulch for protection using gardening tools.
0136.2.9	Decorate gardens with stones or plants.
0136.2.10	Attach wires from planted trees to support stakes.
0136.2.11	Fill sprayer tanks with water and chemicals, according to formulas.
0136.2.12	Mix pesticides, herbicides, or fungicides for application to trees, shrubs, lawns, or botanical crops.
0136.2.13	Cover areas to specified depths with pesticides, applying knowledge of weather conditions, droplet sizes, elevation-to-distance ratios, and obstructions.
0136.2.14	Plant, spray, weed, fertilize, and water plants, shrubs, and trees using hand tools and gardening tools.
0136.2.15	Harvest plants and transplant or pot and label them.
0136.2.16	Feel plants' leaves and note their coloring to detect the presence of insects or disease.
0136.2.17	Inspect plants to assess quality.
0136.2.18	Record information about plants and plant growth.
0136.2.19	Sell and deliver plants and flowers to customers.
0136.2.20	Regulate greenhouse conditions, and indoor and outdoor irrigation systems.

Agribusiness Entrepreneurship

0136.3	Discuss elements of entrepreneurship (e.g., invoice calculation, fixed costs).
0136.3.1	Execute supply-and-demand principles in agribusinesses.
0136.3.2	Demonstrate entrepreneurship, including idea generation, opportunity analysis and assessment.
0136.3.3	Identify components of business plans and demonstrate how to write such components using the SMART format.
0136.3.4	Identify approaches in creating mission statements for agri-businesses.
0136.3.5	Create and disseminate a mission statement for business activities.
0136.3.6	Prepare short-term, intermediate, and long-term goals and objectives that are consistent with the mission statement for an agri-business.
0136.3.7	Evaluate business goals and objectives and make revisions based on observations.
0136.4	Interpret marketing principles (e.g., calculate product profit, supply and demand, value-added products, four P's of marketing).
0136.4.1	Formulate, direct, and coordinate marketing activities to promote products and services.
0136.4.2	Identify, develop, or evaluate marketing strategy based on knowledge of establishment objectives, market characteristics, and cost and markup factors.
0136.4.3	Use sales forecasting or strategic planning to ensure the sale and profitability of products, lines, or services, analyzing business developments and monitoring market trends.
0136.4.4	Students will demonstrate knowledge of market conditions, growing conditions, production agriculture, and break-even costs.
0136.4.5	Determine types or quantities of crops or livestock to be raised, according to factors such as market conditions, federal programs or incentives, or soil conditions.
0136.4.6	Evaluate marketing or sales alternatives for farm products.
0136.4.7	Maintain financial, operational, production, or employment records for farms.
0136.4.8	Monitor activities such as irrigation, chemical application, harvesting, milking, breeding, or grading to ensure adherence to safety regulations.
0136.4.10	Prepare budgets or financial reports for farm or ranch operations.

0136.4.11	Analyze market conditions to determine acreage allocations.
0136.4.12	Buy or sell futures contracts or price farm products in advance of future sales to minimize risk or maximize profits.

Foundations of Agriculture, Food, and Natural Resources

0136.5	Demonstrate knowledge of leadership development through FFA.
0136.5.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0136.5.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0136.5.3	Participate in community service and career awareness activities at the local, state, and national level.

This course introduces students to the principles and applications of animal processing. Students will learn carcass grading, primal and retail cuts, workplace safety, how to process primal and retail cuts, and entrepreneurship. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Production and Processing of Animal Products

0139.1	Demonstrate understanding of raw materials.
0139.1.1	Identify carcasses.
0139.1.2	Demonstrate the usage of dressing percentages for each type of species.
0139.1.3	Obtain and distribute specified meat or carcasses.
0139.2	Demonstrate understanding of production processes (e.g., meat storage, safety).
0139.2.1	Wrap, weigh, label, and price cuts of meat.
0139.2.2	Prepare and place meat cuts and products in the display counter, so they will appear attractive and catch the shopper's eye.
0139.2.3	Prepare special cuts of meat ordered by customers.
0139.2.4	Cut, trim, bone, tie, and grind meats, such as beef, pork, poultry, and fish, to prepare meat in cooking form.
0139.2.5	Shape, lace, and tie roasts, using boning knife, skewer, and twine.
0139.2.6	Remove bones and cut meat into cuts in preparation for marketing.
0139.2.7	Remove parts, such as skin, feathers, scales, or bones, from carcass.
0139.2.8	Use knives, cleavers, meat saws, band saws, or other equipment to perform meat cutting and trimming.
0139.2.9	Identify various meat cutting knives and their uses.
0139.2.10	Sharpen and hone knives with a steel, stone, and sharpening machine.
0139.2.11	Disassemble, clean, assemble, and perform routine maintenance on grinders, meat band saws, meat tenderizers, meat slicers, and other equipment.
0139.2.12	Develop safety procedures and use grinders, meat band saws, meat tenderizers, meat slicers, and other equipment according to defined procedures.
0139.2.13	Clean, trim, slice, and section carcasses for future processing.
0139.2.14	Cut and trim meat to prepare for packing.
0139.2.15	Estimate requirements and order or requisition meat supplies to maintain inventories.
0139.2.16	Produce hamburger meat and meat trimmings.
0139.2.17	Separate meats and byproducts into specified containers and seal containers.
0139.2.18	Weigh meats and tag containers for weight and contents.
0139.3	Demonstrate understanding of quality control (e.g., withdrawal period, preventing spread of microorganisms).
0139.3.1	Receive, inspect, and store meat upon delivery to ensure meat quality.
0139.3.2	Inspect meat products for defects, bruises, or blemishes and remove them along with any excess fat.

0139.4	Calculate costs.
0139.4.1	Demonstrate an understanding of calculating cost per pound.
0139.4.2	Demonstrate an understanding of expenses for livestock operations.
0139.5	Identify techniques for maximizing effective manufacture and distribution of goods.
0139.5.1	Record quantity of meat received and issued to cooks and/or keep records of meat sales.

Fundamentals of Animal Processing

0139.6	Identify primal and retail cuts of meat (e.g., wholesales cuts, pork, steaks).
0139.6.1	Identify basic primal and retail cuts of beef, pork, and lamb.
0139.6.2	Process primal parts into cuts that are ready for retail use.
0139.7	Demonstrate understanding of HACCP plan (e.g., hazard analysis, types of hazards).
0139.7.1	Read and understand a HACCP plan.
0139.8	Describe USDA animal processing guideline (e.g., quality grades, yield rate factors).
0139.8.1	Discuss and communicate the USDA guidelines for commercial and custom meat processing facilities.

Agricultural Innovation and Technology

0139.9	Describe emerging technology in the animal processing and meat industry (e.g., use of vacuum packer).
0139.9.1	Identify a current question in the animal processing and meat industry and then develop a hypothesis and conduct research and present findings.
0139.9.2	Identify a current issue or problem in the animal processing and meat industry and work as a group to find a solution to the problem.
0139.10	Impact of international agriculture on U.S. animal processing.
0139.10.1	Describe the impact of international agriculture on U.S. animal processing.
0139.10.2	Define zoonotic diseases, identify examples, and describe control measures.
0139.11	Career opportunities in animal processing.
0139.11.1	Identify and describe career opportunities in animal processing and the meat industry.

Animal Processing Entrepreneurship and Financial Record Keeping

0139.12	Demonstrate understanding of entrepreneurship and financial record keeping (e.g., financial statements).
0139.12.1	Supervise other butchers or meat cutters.
0139.12.2	Negotiate with representatives from supply companies to determine order details.
0139.13	Demonstrate understanding of value-added agriculture and direct marketing.
0139.13.1	Define value added agriculture and identify examples.
0139.13.2	Define direct marketing and identify direct marketing methods.
0139.14	Demonstrate understanding of sustainability (e.g., organic foods).
0139.14.1	Define sustainability in meat production.

Foundations of Agriculture, Food, and Natural Resources

0139.15	Demonstrate knowledge of leadership development through FFA.
0139.15.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0139.15.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0139.15.3	Participate in community service and career awareness activities at the local, state, and national level.

This course is designed to be a core course in the Animal Systems Program of Study. The course will cover topics on animal restraint, animal management techniques, animal health, and welfare, balancing rations, pedigree analysis, and entrepreneurship. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Animal Health

0140.1	Identify diseases and injuries and appropriate treatment for domestic farm animals, pets, and nonfarm animals (e.g., bacterial, viral, fungal, or parasitic cause, not specific medications).
0140.1.1	Examine animals to detect illness, injury, or disease, and to check physical characteristics such as rate of weight gain.
0140.1.2	Provide medical treatment such as administering medications and vaccinations using live or species-specific models or arrange veterinarians to provide more extensive treatment.
0140.1.3	Mix feed, additives, and medications in prescribed portions and use the Pierson Square method for formulating feed rations.
0140.2	Interpret records on heats, birth intervals, pedigree, and health practices of domestic farm animals, pets, and nonfarm animals (e.g., subcutaneous injection).
0140.2.1	Keep records documenting animal health, diet, and behavior.
0140.3	Demonstrate understanding of biosecurity in the animal industry.
0140.3.1	Define quarantine.
0140.3.2	Discuss methods of biosecurity in the animal production industry.

Animal Reproduction

0140.4	Describe selection methods of domestic farm animals, pets, and nonfarm animals (e.g., birth weight, EPD, genotype vs. phenotype).
0140.4.1	Select animals to be bred, and semen specimens to be used, according to knowledge of animals, genealogies, traits, and desired offspring characteristics.
0140.5	Identify aspects of breeding, including breeding methods, used for domestic farm animals, pets, and nonfarm animals.
0140.5.1	Observe animals in heat to detect approach of estrus and exercise animals to induce or hasten estrus, if necessary.
0140.5.2	Discuss processes of artificial insemination of domestic farm animals, pets, and nonfarm animals.

Animal Observation and Training

0140.6	Understand how to observe and train animals for various situations (e.g., showing, training of livestock).
0140.6.1	Feed and water animals and clean and disinfect pens, cages, yards, and hutches.
0140.6.2	Cue or signal animals during performances.
0140.6.3	Evaluate animals to determine their temperaments, abilities, or aptitude for training.

0140.6.4	Feed or exercise animals or provide other general care, such as cleaning or maintaining holding or performance areas.
0140.6.5	Talk to or interact with animals to familiarize them to human voices or contact.
0140.6.6	Conduct training programs to develop and maintain desired animal behaviors for competition, entertainment, obedience, security, riding, and related areas.
0140.7	Describe methods utilized in animal handling and restraint (e.g., farrowing crate, squeeze chute).
0140.7.1	Utilize animal husbandry tools to restrain and control livestock.

Agricultural Innovation and Technology

0140.8	Identify emerging technology in the livestock and companion animal industry (e.g., embryo transfer, RFID).
0140.8.1	Identify a current question in the livestock and companion animal industry and then develop a hypothesis and conduct research and present findings.
0140.8.2	Identify a current issue or problem in the livestock and companion animal industry and work as a group to find a solution to the problem.
0140.9	Demonstrate understanding of the impact of international agriculture on the U.S. livestock and companion animal industry (e.g., imports, tariffs, supply, and demand).
0140.9.1	Define terminology including imports, tariffs, supply, and demand.
0140.10	Career opportunities in technology, innovation, and entrepreneurship in the livestock and companion animal industry.
0140.10.1	Recognize and describe career opportunities in the animal production industry.

Animal Systems Entrepreneurship and Record Keeping

0140.11	Describe value-added agriculture and define direct marketing.
0140.11.1	Define value-added agriculture.
0140.11.2	Define direct marketing and niche marketing
0140.11.3	Outline the components of a marketing plan.
0140.12	Exhibit understanding of animal welfare and quality assurance.
0140.12.1	Compare and contrast animal welfare and animal rights.
0140.12.2	Identify key aspects of quality assurance in the animal production industry.
0140.13	Demonstrate understanding of financial record keeping.
0140.13.1	Define financial terms including expense, asset, liability, income.

Foundations of Agriculture, Food, and Natural Resources

0140.14	Demonstrate knowledge of leadership development through FFA.
0140.14.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0140.14.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0140.14.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialization course focuses on the basic scientific principles and processes related to the aquaculture industry. Topics covered will be developing feed rations, business planning, developing marketing plans for aquaculture facilities, water quality, breeding, and management. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Foundations of Agriculture, Food, and Natural Resources

0141.1	Demonstrate understanding of animal systems (e.g., breeds of livestock, anatomy).
0141.1.1	Evaluate the water quality needs of aquatic organisms.
0141.1.2	Utilize water quality testing equipment.
0141.1.3	Test water samples.
0141.1.4	Research environmental regulations for aquaculture facilities.
0141.1.5	Monitor environments to ensure maintenance of optimum conditions for aquatic life.
0141.1.6	Identify environmental requirements of a particular species and select and oversee the preparation of sites for species cultivation.
0141.1.7	Prepare reports required by state and federal laws.
0141.1.8	Collect and record growth, production, and environmental data.
0141.1.9	Confer with biologists, fish pathologists, and other fishery personnel to obtain data concerning fish habits, diseases, food, and environmental requirements.
0141.1.10	Students will demonstrate knowledge of operations in a fish hatchery and basic fish reproduction.
0141.1.11	Devise and participate in activities to improve fish hatching and growth rates, and to prevent disease in hatcheries.
0141.1.12	Direct and monitor trapping and spawning of fish egg incubation and fry rearing, applying knowledge of management and fish culturing techniques.
0141.1.13	Coordinate the selection and maintenance of brood stock.
0141.1.14	Direct and monitor the transfer of mature fish to lakes, ponds, streams, or commercial tanks.
0141.1.15	Collect information regarding techniques for fish collection and fertilization, spawn incubation, and treatment of spawn and fry.
0141.1.16	Students will demonstrate knowledge of operations in a fish grow-out facility and managing an aquaculture facility.
0141.1.17	Grow fish and shellfish as cash crops or for release into freshwater or saltwater.
0141.1.18	Conduct and supervise stock examinations to identify diseases or parasites.
0141.1.19	Operate and maintain cultivating and harvesting equipment.

Foundations of Agriculture, Food, and Natural Resources

0141.2	Demonstrate knowledge of leadership development through FFA.
0141.2.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0141.2.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.

Aquaculture**Course #: 0141****Allowable Teacher Endorsement:** 0200, 0201, 7720, 7801

0141.2.3	Participate in community service and career awareness activities at the local, state, and national level.

This course is designed to provide students with basic leadership skills. Instructional areas include leadership styles, goal setting, time management, public speaking, job skills, and interpersonal relationships. Safety instruction is integrated into relevant activities. Teachers should provide each student with real-world learning opportunities and instruction related to the selection, development, and maintenance of individual Supervised Agricultural Experience (SAE) programs.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Nature of Leadership

0146.1	Nature of Leadership.
0146.1.1	Demonstrate an understanding of the scope of leadership.
0146.1.2	Demonstrate the ability to use the inquiry process to solve problems.
0146.1.3	Define leadership.
0146.1.4	Examine the relationship between personality traits and leadership potential.
0146.1.5	Distinguish between and elaborate on the differences between formal and informal leadership styles.
0146.1.6	Define and assess the role of charisma in leadership.
0146.1.7	Appraise emerging issues with leadership implications.

Leadership Applications

0146.2	Leadership Applications.
0146.2.1	Demonstrate knowledge, understanding, and applications of facts, concepts, principles, theories, and models as delineated in the objectives.
0146.2.2	Describe the duties of officers in an organization.
0146.2.3	Explain the use and purposes of specific parliamentary procedure motions.
0146.2.4	Categorize motions used in the conduct of business meetings.
0146.2.5	Demonstrate skills and techniques used by public speakers.
0146.2.6	Examine elements of goal setting.
0146.2.7	Characterize appropriate dress for the workplace.
0146.2.8	Explore conflict resolution.
0146.2.9	Critique personal behavior as a reflection of ethics and values.
0146.2.10	Demonstrate the proper use of parliamentary law.
0146.2.11	Deliver a prepared public speech.
0146.2.12	Deliver an extemporaneous speech.
0146.2.13	Prepare an introduction for an invited guest speaker.
0146.2.14	Become involved in a controlled debate.
0146.2.15	Conduct small group discussions on current events.
0146.2.16	Select, develop, and conduct a community service project.
0146.2.17	Select, develop, and conduct school improvement projects.
0146.2.18	Prioritize activities to make efficient use of time.
0146.2.19	Evaluate stress reduction practices.

Leadership Development**Course #: 0146****Allowable Teacher Endorsement:** 0200, 0201, 7720, 7800, 7801, 7802, 7803, 7804, 7805

0146.2.20	Create a cover letter and resume.
0146.2.21	Demonstrate proficiency in giving a personal interview.
0146.2.22	Prioritize activities to make efficient use of time.
0146.2.23	Hold a mock social gathering with adults.

This is a specialization course designed for students interested in entering the companion animal industry as a pet groomer, animal care giver and/or companion animal entrepreneur. The course will cover topics on grooming, animal restraint, developing feed rations, business planning, developing marketing plans and animal facilities as they apply to various companion animals such as dogs, cats, rodents, birds, reptiles, amphibians, and fish. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Animal Health

0149.1	Demonstrate knowledge of animal nutrition.
0149.1.1	Discuss aspects of animal nutrition and nutrients.
0149.1.2	Identify components of companion animal feeds.
0149.1.3	Explain the digestive systems of companion animals.
0149.1.4	Demonstrate an understanding of balancing rations.
0149.1.5	Feed and water companion animals according to schedules and feeding instructions; monitor food and water supplies.
0149.1.6	Mix food, liquid formulas, medications, or food supplements according to instructions, prescriptions, and knowledge of animal species.
0149.1.7	Order, unload, and store feed and supplies.
0149.1.8	Collect and record animal information such as weight, size, physical condition, treatments received, medications given and food intake.
0149.2	Demonstrate knowledge of animal care and grooming.
0149.2.1	Groom a pet and other nonfarm animal.
0149.2.2	Bath a pet and other nonfarm animal.
0149.2.3	Exercise a pet and other nonfarm animal.
0149.2.4	Train a horse.
0149.2.5	Do facility laundry and clean, organize, maintain, and disinfect animal quarters such as pens, stables, and equipment such as saddles and bridles.
0149.2.6	Perform animal grooming duties such as washing, brushing, clipping, and trimming coats, cutting nails, and cleaning ears.
0149.2.7	Exercise animals to maintain their physical and mental health.
0149.2.8	Train animals to perform certain tasks.
0149.2.9	Train horses or other equines for riding, harness, show, racing, or other work, using knowledge of breed characteristics, training methods, performance, and the peculiarities of each animal.
0149.2.10	Use oral, spur, rein, or hand commands to condition horses to carry riders or to pull horse-drawn equipment.
0149.2.11	Place tack or harnesses on horses to accustom horses to the feel of equipment.
0149.3	Demonstrate procedures of animal care facility management.

Companion Animal Care**Course #: 0149****Allowable Teacher Endorsement:** 0200, 0201, 7720, 7801

0149.3.1	Work in settings such as kennels, animal shelters, and zoos.
0149.3.2	Clean, disinfect, and repair cages, pens, or fish tanks.
0149.3.3	Keep facility records of animal received or discharged.
0149.3.4	Answer telephones and schedule appointments.
0149.3.5	Respond to questions from patrons, and provide information about animals, such as behavior, habitat, breeding habits, or facility activities.
0149.3.6	Adjust controls to regulate specified temperature and humidity of animal quarters, nurseries, or exhibit areas.
0149.3.7	Discuss with clients their pets' grooming needs.
0149.3.8	Install, maintain, and repair animal care facility equipment such as infrared lights, feeding devices, and cages.

Foundations of Agriculture, Food, and Natural Resources

0149.4	Demonstrate knowledge of leadership development through FFA.
0149.4.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0149.4.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0149.4.3	Participate in community service and career awareness activities at the local, state, and national level.

This course is designed to give students the skills and knowledge needed to enter a career in the retail industry of animal processing. This course will build upon the concepts learned in Fundamentals of Animal Processing and emphasize retail cut processing, creating value added products, working with the public, and entrepreneurship. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Production and Processing of Animal Products

0151.1	Demonstrate understanding of raw materials.
0151.1.1	Identify carcasses.
0151.1.2	Demonstrate the usage of dressing percentages for each type of species.
0151.1.3	Obtain and distribute specified meat or carcass.
0151.2	Demonstrate understanding of production processes (meat storage, safety).
0151.2.1	Wrap, weigh, label, and price cuts of meat.
0151.2.2	Prepare and place meat cuts and products in the display counter, so they will appear attractive and catch the shopper's eye.
0151.2.3	Prepare special cuts of meat ordered by customers.
0151.2.4	Cut, trim, bone, tie, and grind meats, such as beef, pork, poultry, and fish, to prepare meat in cooking form.
0151.2.5	Shape, lace, and tie roasts using boning knife, skewer, and twine.
0151.2.6	Remove bones and cut meat into cuts in preparation for marketing.
0151.2.7	Use knives, cleavers, meat saws, bandsaws, or other equipment to perform meat cutting and trimming.
0151.2.8	Clean, trim, slice, and section carcasses for future processing.
0151.2.9	Cut and trim meat to prepare for packing.
0151.2.10	Remove parts, such as skin, feathers, scales, or bones, from carcass.
0151.2.11	Estimate requirements and order or requisition meat supplies to maintain inventories.
0151.2.12	Produce hamburger meat and meat trimmings.
0151.2.13	Separate meats and byproducts into specified containers and seal containers.
0151.2.14	Weigh meats and tag containers for weight and contents.
0151.3	Demonstrate understanding of quality control (e.g., withdrawal period, preventing spread of microorganisms).
0151.3.1	Receive, inspect, and store meat upon delivery to ensure meat quality.
0151.3.2	Inspect meat products for defects, bruises, or blemishes and remove them along with any excess fat.
0151.4	Identify techniques for maximizing effective manufacture and distribution of goods.
0151.4.1	Record quantity of meat received and issued to cooks and/or keep records of meat sales.

Fundamentals of Animal Processing

0151.5	Identify primal and retail cuts of meat (e.g., wholesales cuts, pork, steaks).
0151.5.1	Identify basic primal and retail cuts of beef, pork, and lamb.
0151.5.2	Process primal parts into cuts that are ready for retail use.
0151.6	Demonstrate understanding of HACCP plan (e.g., hazard analysis, types of hazards).
0151.6.1	Conduct a hazard analysis of a meat processing facility.
0151.6.2	Prescribe hazard prevention methods during animal processing.
0151.7	Describe USDA animal processing guidelines (e.g., quality grades, yield rate factors).
0151.7.1	Use the USDA quality grading system to grade carcasses.
0151.7.2	Identify the factors in predicting yield rate.

Animal Processing Entrepreneurship and Financial Record Keeping

0151.8	Demonstrate understanding of entrepreneurship and financial record keeping (e.g., financial statements).
0151.8.1	Supervise other butchers or meat cutters.
0151.8.2	Negotiate with representatives from supply companies to determine order details.
0151.9	Demonstrate understanding of value-added agriculture and direct marketing.
0151.9.1	Define value added agriculture and identify value added products in the animal processing industry.
0151.9.2	Explain methods of direct marketing in the animal processing industry.
0151.10	Demonstrate understanding of sustainability (e.g., organic foods).
0151.10.1	Discuss methods of sustainable animal production.

Animal Slaughter

0151.11	Demonstrate understanding of animal slaughter procedures.
0151.11.1	Slaughter animals in accordance with religious law and determine that carcasses meet specified religious stipulations.
0151.11.2	Slit open, eviscerate, and trim carcasses of slaughtered animals.
0151.11.3	Sever jugular veins to drain blood and facilitate slaughtering.
0151.11.4	Shave or singe and defeather carcasses and wash them in preparation for further processing or packaging.
0151.11.5	Trim, clean, and/or cure animal hides.
0151.11.6	Shackle hind legs of animals to raise them for slaughtering or skinning.
0151.11.7	Skin sections of animals or whole animals.
0151.11.8	Trim head meat and sever or remove parts of animal heads or skulls.
0151.11.9	Saw, split, or scribe carcasses into smaller portions to facilitate handling.
0151.11.10	Stun animals prior to slaughtering.

Foundations of Agriculture, Food, and Natural Resources

0151.12	Demonstrate knowledge of leadership development through FFA.
0151.12.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0151.12.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0151.12.3	Participate in community service and career awareness activities at the local, state, and national level.

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This course is designed to give students the skills and knowledge needed to enter a career in an animal processing plant. This course will build upon the concepts learned in Fundamentals of Animal Processing and emphasize primal cut processing, workplace safety, government regulations, and entrepreneurship. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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0160.2.1	Wrap, weigh, label, and price cuts of meat.
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The Introduction to Pet Grooming, Boarding and Obedience course is an introductory course to the Pet Grooming concentration designed for students to gain basic understanding of each of these three segments of the pet industry. The performance skill sets will focus on students performing basic bathing and drying of dogs and cats.

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Pet Grooming, Boarding and Obedience

0170.1	Origin of Animal Species
0170.1.1	Investigate the history and development of domestic pets.
0170.1.2	Identify common and scientific names of pet species.
0170.1.3	Identify the parts of the external anatomy of pet species.
0170.1.4	Group pet breeds according to similarities.
0170.1.5	Identify breeds of pet species.
0170.1.6	Practice and use terminology associated with pet species.
0170.2	Pet Care and Handling
0170.2.1	Establish proper handling facilities.
0170.2.2	Maintain facilities and equipment to house animals safely.
0170.2.3	Perform a basic exam on a live animal.
0170.2.4	Practice monitoring vital signs of pet animals
0170.2.5	Perform CPR, wound care, and other emergency medical procedures.
0170.2.6	Restrain pet animals properly and safely.
0170.2.7	Restrain animals correctly for bite/scratch prevention.
0170.2.8	Record pet vaccination records at time of check in.
0170.2.9	Handle and treat older pets appropriately.
0170.3	Animal Rights and Welfare
0170.3.1	Define and describe the difference between rights and welfare.
0170.3.2	Debate the issues associated with animal welfare and animal rights.
0170.3.3	Research current pet industries and their impact on current animal practices.
0170.4	Animal Behavior
0170.4.1	Evaluate the body language of pet animals and their indicators.
0170.4.2	Train animals for various purposes.
0170.4.3	Accustom animals to human voice and contact.
0170.4.4	Feed and water animals, and clean and disinfect pens, cages, yards, and hutches.
0170.4.5	Cue or signal animals during performances.
0170.4.6	Evaluate animals to determine their temperaments, abilities, or aptitude for training.
0170.4.7	Feed or exercise animals or provide other general care, such as cleaning or maintaining holding or performance areas.
0170.4.8	Talk to or interact with animals to familiarize them to human voices or contact.
0170.4.9	Conduct training programs to develop and maintain desired animal behaviors for competition, entertainment, obedience, security, riding, and related areas.

0170.5	Pet Grooming
0170.5.1	Use bathing tub correctly.
0170.5.2	Restrain animals properly while bathing.
0170.5.3	Use proper water temperature and pressure while bathing animals.
0170.5.4	Select shampoos and conditioners according to needs of animal.
0170.5.5	Dry animals by hand.
0170.5.6	Dry animals with cage dryers.
0170.5.7	Use proper technique to dry according to coat type.

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0170.6	Demonstrate knowledge of leadership development through FFA.
0170.6.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0170.6.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0170.6.3	Participate in community service and career awareness activities at the local, state, and national level.

The Pet Grooming and Understanding Personalities course is a core course in the Pet Grooming concentration designed for students to gain a deeper understanding of the pet grooming laboratory and the anatomy of canines and felines as well as the health, nutrition, reproduction, and behavior of these animals. Students will perform more advanced grooming techniques on animals.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

0171.1	Grooming Equipment Maintenance and Use
0171.1.1	Use grooming equipment properly.
0171.1.2	Do facility laundry and clean, organize, maintain, and disinfect animal quarters, such as pens, crates, and equipment.
0171.1.3	Clean, disinfect and repair cages, pens, and crates.
0171.1.4	Answer telephones and schedule appointments.
0171.1.5	Discuss with clients their pets' grooming needs.
0171.1.6	Order, unload, and store equipment and supplies.
0171.1.7	Respond to questions from patrons, and provide information about animals, such as behavior or facility activities.

0171.2	Canine Internal Anatomy
0171.2.1	Identify internal organs and anatomy of the dog.
0171.2.2	Identify functions of organs of the body.
0171.2.3	Observe coat types of different breeds.
0171.2.4	Recognize skin conditions and treatments.
0171.2.5	Clean ears properly.
0171.2.6	Identify the anatomy of the external and inner ear.
0171.2.7	Identify the anatomy of the nail.
0171.2.8	Properly clip, file, and Dremel nails.
0171.2.9	Identify parts of the mouth and teeth.
0171.2.10	Recognize diseases of the mouth and gum disease.
0171.2.11	Brush teeth and check for gum disease.
0171.2.12	Identify the parts and function of the anal glands.

0171.3	Feline Internal Anatomy
0171.3.1	Identify internal organs.
0171.3.2	Identify functions of organs of the body.
0171.3.3	Recognize diseases of the skin and their treatments.
0171.3.4	Properly clip and file nails.
0171.3.5	Recognize diseases of the mouth and gum disease.

0171.4	Canine and Feline Disease
0171.4.1	Identify common diseases of pets and their symptoms and treatments.
0171.4.2	Identify zoonotic diseases and their symptoms.
0171.4.3	Examine animals to detect illness, injury, or disease, and to check physical characteristics.
0171.4.4	Keep records documenting animal health, diet, or behavior.
0171.4.5	Examine pet animals for internal and external parasites.
0171.4.6	Identify treatment and procedures to control parasites.
0171.4.7	Maintain proper laboratory sanitation to control disease.

0171.5	Animal Reproduction
0171.5.1	Select animals to be bred, according to knowledge of animals, genealogies, traits, and desired offspring characteristics.
0171.5.2	Describe the estrus cycle in domestic pet animals.
0171.5.3	Understand the reproductive physiology of the canine and feline.

0171.6	Animal Nutrition
0171.6.1	Identify nutrients required for a balanced diet.
0171.6.2	Order food for animals and arrange for its delivery.
0171.6.3	Identify parts and functions of the digestive system.
0171.6.4	Analyze food labels for nutritional value.
0171.6.5	Maintain growth, feeding, production, and cost records.
0171.6.6	Calculate percentage of protein in diet for a particular stage of growth.
0171.6.7	Feed and water animals according to schedules and feeding instructions.

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0171.7	Demonstrate knowledge of leadership development through FFA.
0171.7.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0171.7.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0171.7.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialization course is for students who seek business and management techniques that will enable them to become successful in owning and operating a business in the pet grooming, obedience, and boarding industries. Topics covered include business organizational structures, legal and financial aspects of entrepreneurship, and marketing. Students will utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts and develop a business plan.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

0173.1	Employment Skills
0173.1.1	Complete an entrepreneurship self-assessment.
0173.1.2	Complete strengths-finder assessment.
0173.1.3	Set SMART goals for personal, school, career, and business.
0173.1.4	Maintain a personal calendar.
0173.1.5	Document daily records of time use and activities.
0173.1.6	Create a personal resume.
0173.1.7	Research different types of business organizations.
0173.1.8	Create a personal budget.
0173.1.9	Create business summary and company description components of business plan.
0173.1.10	Develop a marketing plan for a groomer or kennel operator.
0173.1.11	Identify ways to advertise for a groomer or kennel operator.

0173.2	Business Finance
0173.2.1	Complete an asset inventory (land, buildings, equipment, etc.) and business agreements to determine what is needed to operate a business.
0173.2.2	Complete a net worth statement.
0173.2.3	Complete a cash flow statement.
0173.2.4	Create a business budget including fixed and variable costs and create an enterprise budget.
0173.2.5	Utilize computer software to enter expense and income of a business.
0173.2.6	Maintain a simulated checking account ledger.
0173.2.7	Complete a break-even analysis of a product.
0173.2.8	Research different sources of financing and grants.
0173.2.9	Complete a loan application with supporting documentation.
0173.2.10	Calculate interest on a personal car loan and a mortgage.
0173.2.11	Create financial projections and business funding components of a business plan.

0173.3	Marketing
0173.3.1	Develop pricing strategies for products and services.
0173.3.2	Plan the delivery and distribution of products and services to customers.

0173.3.3	Research potential markets and competition for various products and services.
0173.3.4	Create and conduct customer survey for products and services.
0173.3.5	Develop advertising and promotion strategies for products and services.
0173.3.6	Develop a support network to assist with promotion and delivery of products and services to the customer.
0173.3.7	Conduct a phone conversation with a customer.
0173.3.8	Send an e-mail to a business inquiring about products and services.
0173.3.9	Participate in a face-to-face business meeting using role play.
0173.3.10	Create market analysis, sales strategies, and service or product line components of a business plan.
0173.3.11	Create an advertising campaign to promote business in grooming or kennel operation.

0173.4	Business Law
0173.4.1	Communicate with local and state government officials concerning business law and issues.
0173.4.2	Complete a simulated business license application.
0173.4.3	Research various business forms, application and permits.
0173.4.4	Research various state and federal tax and business websites.
0173.4.5	Complete a simulated tax return with supporting documents.
0173.4.6	Interview an insurance agent about business and liability insurance.
0173.4.7	Research staffing and labor requirements of a business.
0173.4.8	Research various business policy and procedures manuals.
0173.4.9	Conduct simulated job interview as potential candidate.
0173.4.10	Conduct simulated job interview as an employer.
0173.4.11	Role play various ethical dilemmas faced by business owners.
0173.4.12	Create organization and management structure components of a business plan.
0173.4.13	Present completed business plan to a panel of student and industry representatives.
0173.4.14	Research West Virginia Law in relation to working with, grooming, and kenneling animals.
0173.4.15	Financial record keeping.
0173.4.16	Keep financial records such as net worth statements, inventories, financial statements, income and expense logs, and other pertinent records.
0173.4.17	Create and maintain an SAE portfolio to include financial records, resume, sample student work, and documenting pictures.
0173.4.18	Create a payroll system for a grooming or kennel operation.
0173.4.19	Develop an advertising plan.
0173.4.20	Research the need for liability insurance for a business.
0173.4.21	Understand the importance of professional advice from legal, accounting, and veterinary professionals.
0173.4.22	Estimate monthly expenses for utilities, phone, repairs/maintenance, and supplies.

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0173.5	Demonstrate knowledge of leadership development through FFA.
0173.5.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0173.5.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0173.5.3	Participate in community service and career awareness activities at the local, state, and national level.

This is the foundational course in the Forest Industry Program of Study. Learners will be exposed to a broad range of forestry topics including dendrology, wildlife, forest fire, and basic forest measurements. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Silviculture and Forest Management

0182.1	Describe the various types of forests and their potential uses.
0182.1.1	Research history of forestry in their local community and state.
0182.1.2	Create a map of the major forest regions and biomes in North America.
0182.1.3	Interview a forester who manages a national forest to determine major management practices.
0182.1.4	Research a career in the forest industry.

Forest Ecology and Protection

0182.2	Identify environmental factors important to a forest community.
0182.2.1	Research wildlife species and give an oral presentation to class.
0182.2.2	Draw forest food chains and food webs.
0182.2.3	Research invasive forest pests and determine the impact on biodiversity.
0182.2.4	Interview a wildlife biologist or DNR officer to determine major wildlife management practices.
0182.2.5	Diagram the major internal and external parts of a tree.
0182.2.6	Take a core sample from a tree and analyze the growth rings and internal parts.
0182.2.7	Identify trees based on leaf characteristics.
0182.2.8	Determine common name of common tree species.
0182.2.9	Observe a stand of trees and identify various stages of tree growth.
0182.3	Identify firefighting tools and explain principles of forest fire management.
0182.3.1	Identify tools used for forest fire prevention and suppression.
0182.3.2	Interview a forest firefighter to determine major responsibilities.

Timber Cruising

0182.4	Select and use correct timber measuring tools.
0182.4.1	Use an azimuth or quadrant compass to determine bearing.
0182.4.2	Calculate distances by pacing.
0182.4.3	Use various dendrometers to measure tree diameter.
0182.4.4	Use various hypsometers to measure tree height.

Foundations of Agriculture, Food, and Natural Resources

0182.5	Demonstrate knowledge of leadership development through FFA.
0182.5.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0182.5.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0182.5.3	Participate in community service and career awareness activities at the local, state, and national level.

This course is designed to be a basic forestry course for students interested in forestry. The course will cover topics on best management practices, timber felling basics, dendrology, tree measurement basics, water quality, forest fire, read topography maps and basic log road layout, forest hazards ID, basic forestry concepts of edge, diversity, succession and structure, forest business and economics, forest insects, forest disease, and entrepreneurship. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Chain Saws

0183.1	Identify the parts of a chain saw.
0183.1.1	Identify the main parts of a chainsaw and explain each part's role in operation.
0183.2	Demonstrate safe transportation, use, and operation of chain saws.
0183.2.1	Demonstrate proper personal protective clothing to wear when operating a chain saw and other forestry equipment.
0183.2.2	Display proper steps to safely shut off, secure, store, and transport a chain saw.
0183.2.3	Demonstrate basic techniques used to fell standing trees.
0183.3	Identify types of chains and explain uses.
0183.3.1	Discuss different types of chains and outline their specific purposes; full chisel chain, ripping chain, carbide tipped chain, etc.
0183.4	Adjust, sharpen, and identify features of a chain saw.
0183.4.1	Explain how a properly maintained chain will promote efficient cutting and improve safe usage.
0183.4.2	Demonstrate how to properly sharpen a chain.
0183.4.3	Identify and explain the features that adjust the chain tension.
0183.5	Diagnose and troubleshoot chain saw problems.
0183.5.1	Maintain and repair chain saws and other equipment, clean, oil, and grease equipment, and sharpen properly.

Silviculture and Forest Management

0183.6	Define silviculture and forest management terms.
0183.6.1	Define silviculture and explain the various practices within the industry.
0183.6.2	Define dendrology, forest regeneration, selective logging, thinning, harvesting, and clearcutting.
0183.6.3	Describe management methods that enable sustainable forest resource production.
0183.7	Describe the various types of forests and their potential uses.
0183.7.1	Identify trees native to West Virginia and explain potential uses.
0183.7.2	Classify trees into taxonomic groups based on physical characteristics.
0183.8	Identify methods of timber harvesting based on forest type.
0183.8.1	Select trees to be cut down, assessing factors such as site, terrain, and weather conditions before beginning work.

0183.8.2	Select and mark trees for thinning or logging and draw detailed plans that include access roads.
0183.8.3	Thin and space trees and control weeds and undergrowth, using manual tools and chemicals, or supervise workers performing these tasks.
0183.8.4	Provide forestry education and general information, advice, and recommendations to woodlot owners, community organizations, and the public.
0183.8.5	Perform reforestation, or forest renewal, including nursery and silviculture operations, site preparation, seeding and tree planting programs, cone collection, and tree improvement.
0183.8.6	Survey, measure, and map access roads and forest areas such as burns, cut-over areas, experimental plots, and timber sales sections.
0183.8.7	Provide information about regulations such as those concerning environmental protection, resource utilization, fire safety and accident prevention.
0183.9	Explain stand density and stocking.
0183.9.1	Discuss stand density, how it is determined, and how to manage a woodlot for optimum density.
0183.9.2	Define understocked, fully stocked, or overstocked and how tree stocking degree is determined.
0183.10	Estimate cutting ratio to determine and achieve sustained yield.
0183.10.1	Define sustained yield.
0183.10.2	Explain the factors that impact sustained yield.
0183.10.3	Define and calculate tree cutting ratio for a stand of timber.

Forest Ecology and Protection

0183.11	Identify environmental factors important to a forest community.
0183.11.1	Students will demonstrate knowledge of best management practices used in the forest industry.
0183.12	Determine tree maturity (biological and economical).
0183.12.1	Explain the tree growth process.
0183.12.2	Define dendrochronology.
0183.12.3	Explain the effects of tree maturity on timber value.
0183.12.4	Determine optimal harvest timing for major WV tree species.
0183.13	Identify leaf diseases and their causes.
0183.13.1	Inspect trees and collect samples of plants, seeds, foliage, bark, and roots to locate insect and disease damage.
0183.13.2	Describe controls and prevention of tree diseases and insect damage.
0183.14	Explain how plant genetics alters tree performance.
0183.14.1	Conduct research on how wood quality, pest & disease resistance, and tree growth rate are impacted by genetics.

Timber Cruising

0183.15	Select and use correct timber measuring tools.
0183.15.1	Identify tree and forest measurement tools.
0183.15.2	Explain and demonstrate the function of forest measurement tools.
0183.16	Define common forest measurement units.
0183.16.1	Define Diameter at Breast Height (DBH).
0183.16.2	Explain how to calculate the volume of a tree stand.
0183.16.3	Define stand density, site index, and crown width.
0183.17	Calculate basal area.

0183.17.1	Examine the cross-sectional area of a tree trunk and calculate basal area utilizing the appropriate formula.
0183.18	Determine board feet.
0183.18.1	Calculate board feet volume utilizing proper measuring tools.
0183.19	Apply techniques of timber cruising to determine stand volume.
0183.19.1	Measure timber to determine stand volume utilizing proper tools.
0183.20	Apply techniques of log scaling to determine log volume.
0183.20.1	Measure felled logs or loads of pulpwood to calculate volume, weight, dimensions, and marketable value, using measuring devices and conversion tables.

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0183.21	Demonstrate knowledge of leadership development through FFA.
0183.21.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0183.21.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0183.21.3	Participate in community service and career awareness activities at the local, state, and national level.

This course is an advanced course in the Forest Industry Program of Study. The course will allow students to cover the topics of timber management, measurement and evaluation and logging practices in depth utilizing problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Logging and Harvesting

0184.1	Demonstrate proper techniques for manually felling a tree.
0184.1.1	Demonstrate proper personal protective clothing to wear when operating a chainsaw.
0184.1.2	Demonstrate use of a chainsaw and other logging equipment.
0184.1.3	Stop saw engines, pull cutting bars from cuts, and run to safety as tree falls.
0184.1.4	Saw back-cuts, leaving sufficient sound wood to control direction of fall.
0184.1.5	Clear brush from work areas and escape routes and cut sapling and other trees from direction of falls, using axes, chainsaws, or bulldozers.
0184.1.6	Measure felled trees and cut them into specified log lengths, using chain saws and axes.
0184.1.7	Determine position, direction, and depth of cuts to be made, and placement of wedges or jacks.
0184.1.8	Control the direction of a tree's fall by scoring cutting lines with axes, sawing undercuts along scored lines with chainsaws, knocking slabs from cuts with single-bit axes, and driving wedges.
0184.1.9	Trim off the tops and limbs of trees, using chainsaws, delimbers, or axes.
0184.1.10	Insert jacks or drive wedges behind saws to prevent binding of saws and to start trees falling.
0184.1.11	Saw felled trees into lengths.
0184.1.12	Split logs, using axes, wedges, and mauls, and stack wood in ricks or cord lots.
0184.1.13	Appraise trees for certain characteristics, such as twist, rot, and heavy limb growth, and gauge amount and direction of lean, to determine how to control the direction of a tree's fall with the least damage.
0184.1.14	Tag unsafe trees with high-visibility ribbons.

Sawmill Operation

0184.2	Scale logs, identify log scale, and explain the relationship of log volume to lumber volume.
0184.2.1	Measure standing timber and logs with proper tools.
0184.2.2	Evaluate log characteristics and determine grades, using established criteria.
0184.2.3	Record data about individual trees or load volumes into tally books or hand-held collection terminals.
0184.2.4	Paint identification marks of specified colors on logs to identify grades or species, use spray cans, or call out grades to log markers.
0184.2.5	Assess logs after cutting to ensure that the quality and length are correct.
0184.2.6	Measure log lengths and mark boles for bucking into logs, according to specifications.
0184.2.7	Mark logs for identification.
0184.3	Identify lumber defects, causes, and effects.

0184.3.1	Identify logs of sub or special grade so that they can be returned to shippers, regarded, recut, or transferred for other processing.
0184.3.2	Jab logs with metal ends of scale sticks and inspect logs to ascertain characteristics or defects such as water damage, splits, knots, broken ends, rotten areas, twists, and curves.

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0184.4	Demonstrate knowledge of leadership development through FFA.
0184.4.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0184.4.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0184.4.3	Participate in community service and career awareness activities at the local, state, and national level.

This course is an advanced course in the Forest Industry Program of Study. The course will cover topics on woodlot management, forest disease and pests, and forest land management. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Logging and Harvesting

0185.1	Inspect and study harvest area.
0185.1.1	Design skid roads in compliance with WV best management practices.
0185.1.2	Reseed skid trails and log landings.
0185.1.3	Research maintenance procedures for drainage systems in controlling soil erosion.
0185.1.4	Determine proper harvesting method for woodlots based on landowner's goals.

Forest Ecology and Protection

0185.2	Identify environmental factors important to a forest community.
0185.2.1	Use soil survey data to determine site index of specific forest site.
0185.2.2	Analyze aspect and soil properties to determine tree growth patterns.
0185.2.3	Analyze and identify successional stages of a forest.
0185.2.4	Identify shade tolerant and intolerant tree species.
0185.2.5	Conduct an environmental assessment for a specific site.
0185.2.6	Analyze political, biological, economical, and sociological impacts on managing ecosystems.
0185.3	Identify leaf diseases and their causes.
0185.3.1	Observe a stand of trees to identify common forest diseases.
0185.3.2	Research methods to prevent and control forest diseases.
0185.4	Identify insects detrimental to forests.
0185.4.1	Identify damaging forest insects.
0185.4.2	Research methods to prevent and control forest insects.
0185.5	Specify integrated pest management strategies.
0185.5.1	Identify common plant and animal invasive species found in forests.
0185.5.2	Prescribe a select cut, sanitation cut, and or salvage cut on an infected area.
0185.5.3	Demonstrate the technique of girdling to remove undesirable trees.

Surveying

0185.6	Use maps, GPS, and GIS to locate boundaries and topographical information.
0185.6.1	Interpret current and historical aerial photography for land cover and land use applications.
0185.6.2	Conduct a property title search.
0185.6.3	Prepare and write a conservation plan for a specific parcel of land.

0185.6.4	Prepare and write a timber management plan for a specific woodlot.
0185.6.5	Determine location and other information from maps using Global Positioning Systems (GPS).
0185.7	Identify methods of calculating elevation and slope.
0185.7.1	Measure elevation of a given area using survey equipment.
0185.8	Identify and use measuring devices.
0185.8.1	Measure acreage on maps.

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0185.9	Demonstrate knowledge of leadership development through FFA.
0185.9.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0185.9.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0185.9.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialization course covers topics on advanced wildlife management principles, water quality, fish biology, history of fish and wildlife, habitat management, life history, and wildlife values as a natural resource. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Wildlife Management

0190.1	Demonstrate understanding of wildlife management practices (e.g., border cutting, wetland habitat, fall mast production).
0190.1.1	Discuss major types of fish and wildlife.
0190.1.2	Explain habitat management.
0190.1.3	Define and explain fish and wildlife laws and regulations.
0190.1.4	Study animals in their natural habitats, assess effects of the environment and industry on animals, interpret findings, and recommend alternative operating conditions for the industry.
0190.1.5	Inventory or estimate plant and wildlife populations.
0190.1.6	Make recommendations on management systems and planning for wildlife populations and habitats, consulting with stakeholders and the public at large to explore options.
0190.1.7	Inform and respond to the public regarding wildlife and conservation issues, such as plant identification, hunting ordinances, and nuisance wildlife.
0190.1.8	Anatomy and physiology of fish and wildlife species.
0190.1.9	Identify invasive species and name controls.
0190.1.10	Organize and conduct experimental studies with live animals in controlled or natural surroundings.
0190.1.11	Study characteristics of animals such as origin, interrelationships, classification, life histories and diseases, development, genetics, and distribution.
0190.1.12	Analyze characteristics of animals to identify and classify them.
0190.1.13	Prepare collections of preserved specimens or microscopic slides for species identification and study of development or disease.
0190.1.14	Collect and dissect animal specimens and examine specimens under a microscope.
0190.1.15	Raise specimens for study and observation or for use in experiments.

Water Management

0190.2	Exhibit knowledge of watersheds and aquatic ecosystems (i.e., wetlands, ponds, streams) including wetland functions (e.g., eutrophication, Clean Water Act, water quality).
0190.2.1	Delineate a local watershed boundary.
0190.2.2	Test water samples for various chemical parameters.
0190.2.3	Identify riparian zones and discuss the biodiversity of these sites.
0190.2.4	Explain the impact of riparian zones on water quality.

Foundations of Agriculture, Food, and Natural Resources

0190.3	Demonstrate knowledge of leadership development through FFA.
0190.3.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0190.3.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0190.3.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialization course covers topics on soil and water conservation, basic wildlife management, environmental law and regulations, basic forestry, and land management. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Soil and Land Management

0200.1	Demonstrate understanding of soil erosion and conservation (e.g., horizon, contour planting).
0200.1.1	Analyze soil profiles to determine texture, depth, permeability, internal drainage, soil color and horizons.
0200.1.2	Calculate the slope of land.
0200.1.3	Collect soil samples and conduct experiments to measure pH and amounts of available Nitrogen, Phosphorus and Potassium.
0200.1.4	Compare and contrast soil fertility from different locations such as: cropland, forest land, pasture, etc.
0200.1.5	Develop a nutrient management plan.
0200.1.6	Apply best management practices to specific sites such as agriculture, construction, log landing and oil and gas wells.
0200.2	Display knowledge of topographic and aerial maps, soil surveys, and soil test results (e.g., benchmark elevation, pH, slope).
0200.2.1	Use information to determine land use and limitations.
0200.2.2	Access and use published and on-line soil data to determine land use and limitations.
0200.2.3	Determine land capability classes and subclasses of land using soil profile observation and soil survey data.
0200.2.4	Interpret topographic maps, aerial maps, soil survey data and soil test results to determine land usage.
0200.2.5	Define basic geology.
0200.2.6	Demonstrate basic surveying.
0200.2.7	Describe land management at the local, state, and federal level.
0200.2.8	Explain management of private lands.
0200.2.9	Conduct an environmental assessment for a specific site.
0200.2.10	Research land reclamation practices for various sites: wetlands, mines and oil and gas well sites.
0200.2.11	Analyze political, biological, economical, and sociological impacts on managing ecosystems.
0200.2.12	Interpret current and historical aerial photography for land cover and land use applications.
0200.2.13	Conduct a property title search.
0200.2.14	Measure acreage on maps.
0200.2.15	Prepare and write a conservation plan for a specific parcel of land.
0200.3	Exhibit knowledge of spatial tools such as Geographic Information Systems (GIS) and Global Positioning
0200.3.1	Determine location and other information from maps using Global Positioning Systems (GPS).
0200.3.2	Measure elevation of a given area using survey equipment.

Water Management

0200.4	Demonstrate understanding of the hydrologic cycle (e.g., water holding capacity, acid rain).
0200.4.1	Analyze the hydrologic cycle.
0200.4.2	Define evaporation, transpiration, condensation, precipitation, infiltration, runoff.
0200.4.3	Explain the effects of water holding capacity on nutrient availability and soil improvement practices.
0200.5	Exhibit knowledge of watersheds and aquatic ecosystems (i.e., wetlands, ponds, streams) including wetland functions (e.g., eutrophication, Clean Water Act, water Quality).
0200.5.1	Use topographic maps to delineate the watershed of a given area, identify drainage patterns and identify stream orders.
0200.5.2	Conduct chemical water quality tests to determine temperature, turbidity, dissolved oxygen, pH, alkalinity, nitrogen levels of various water samples from a given watershed and determine land use practices in the watershed based on results.
0200.5.3	Conduct a biological stream assessment by collecting macro-invertebrates and determine the water quality of the stream based on results.
0200.5.4	Analyze a wetland to determine benefits to surrounding area and identify wetland plants and animals.
0200.5.5	Explain how Geographic Information Systems (GIS) are being used to help communities assess water quality and watershed health information.
0200.6	Recognize aspects of aquifers and groundwater protection (e.g., soil drainage, manure nutrients).
0200.6.1	Define the term aquifer and identify the different types of aquifers and their components.
0200.6.2	Discuss the importance of groundwater protection.
0200.6.3	Discuss the effects that groundwater pollution can have on animals and humans.
0200.7	Identify point and non-point source pollution (e.g., riparian buffers).
0200.7.1	Define and identify the key aspects of riparian buffers.
0200.7.2	Identify sources and controls of point source pollution.
0200.7.3	Identify sources and controls of non-point source pollution.

Forestry Management

0200.8	Define basic forestry concepts (e.g., site index, tree biology, forest measurements, tolerant tree species).
0200.8.1	Understand the basic forestry concepts: succession, forest structure, site, growing space, crown class, site index, tolerance, wildfire, aspect, and forest measurements.
0200.8.2	Know the factors affecting tree growth.
0200.8.3	Evaluate a forest stand for existing factors affecting tree growth (soil moisture and depth, aspect, slope).
0200.9	Display knowledge of dendrology (e.g., simple and compound leaves, samara).
0200.9.1	Research dendrology.
0200.9.2	Identify common WV tree species using multiple indicators (leaf margin, bark, arrangement, fruit, etc.).
0200.10	Recognize and define best management practices in forestry and state BMP regulations (e.g., prescribed burns).
0200.10.1	Know the various methods of measuring standing timber.
0200.10.2	Define and identify riparian buffers.
0200.10.3	Describe the physical properties of wildfires, sources of occurrence, control, negative impacts, and benefits.
0200.10.4	Explain the benefits of a prescribed burn and identify areas where this practice could be implemented.
0200.10.5	Identify best management practices in forestry and state BMP regulations.
0200.10.6	Know and be able to use the following tree and forest measurement tools: Biltmore stick, diameter tape, increment borer, clinometer, topographic map, compass, GPS, and soil survey map.

0200.10.7	Calculate the amount of board feet in a standing tree using tree measurements and volume tables.
0200.10.8	Read a topographical map and lay out a logging road based on the topography of a site.

Wildlife Management

0200.11	Demonstrate understanding of wildlife management practices (e.g., border cutting, wetland habitat, fall mast production).
0200.11.1	Students will demonstrate knowledge of biodiversity and wildlife management practices.
0200.11.2	Conduct a habitat assessment of a given area to determine suitability for specific species of wildlife.
0200.11.3	Identify invasive plant and animal species and their impact on the environment.
0200.11.4	Identify threatened and endangered species of wildlife and methods to protect their populations.
0200.11.5	Identify native plant and animal species and their range, habitat, and functions.

Environmental Laws and Government Agencies

0200.12	Exhibits knowledge of environmental regulations and laws (e.g., timber management, protection of imperiled species).
0200.12.1	Students will demonstrate knowledge of environmental regulations and laws and local, state, and federal agencies involved in conservation and environmental preservation.
0200.12.2	Identify environmental regulations and their impacts to agriculture, forestry, mining and the oil and gas industry.
0200.12.3	Identify regulatory agencies that govern agriculture, forestry, mining and the oil and gas industry.
0200.12.4	Apply principles of nutrient, water, and waste management to environmental problems.
0200.12.5	Research government programs that support private landowners to conduct conservation practices.

Agricultural Innovation, Technology, and Entrepreneurship

0200.13	Define and recognize aspects of sustainability (e.g., biodiesel).
0200.13.1	Define sustainability in agriculture.
0200.13.2	Present methods of emerging technology in natural resources related industries.
0200.13.3	Career opportunities in technology, innovation, and entrepreneurship in natural resources related fields.
0200.13.4	Identify grants available to support technology, innovation, and entrepreneurship in natural resources related fields.
0200.13.5	Identify a current question in the natural resources sector and then develop a hypothesis and conduct research and present findings.
0200.13.6	Identify a current issue or problem in the natural resources sector and work as a group to find a solution to the problem.
0200.14	Identify aspects of the impact of international agriculture on U.S. and global natural resources (e.g., cost and availability, entrance of new species into country).
0200.14.1	Research the impact of international agriculture on U.S. and global natural resources.

Foundations of Agriculture, Food, and Natural Resources

0200.15	Demonstrate knowledge of leadership development through FFA.
0200.15.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0200.15.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0200.15.3	Participate in community service and career awareness activities at the local, state, and national level.

Grounds Maintenance

Course #: 0201

Allowable Teacher Endorsement: 0200, 0201, 7720, 7404, 7804

This course is designed to provide students with basic knowledge, skills, and attitudes necessary for successful entry into a grounds maintenance occupation. Major instructional concepts included in this area of study are: safety principles in grounds maintenance, grounds maintenance equipment identification and use, career opportunities in grounds maintenance, lawn and landscape improvement and maintenance, and plant and soil science. Safety instruction is integrated into all activities. Teachers should provide each student with real world learning opportunities and instruction related to selection, development, and maintenance of individual Supervised Agricultural Experience (SAE) programs.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Industry, Safety, and Tools

0201.1	Industry, Safety, and Tools.
0201.1.1	Career opportunities associated with grounds maintenance.
0201.1.2	Tools and equipment associated with grounds maintenance.
0201.1.3	Grounds maintenance safety.
0201.1.4	Evaluate grounds maintenance tools, equipment and fuels for function and safety.
0201.1.5	Recognize personal safety clothing and equipment needed for grounds maintenance procedures.
0201.1.6	Utilize grounds maintenance tools and equipment safely.
0201.1.7	Perform maintenance and service operations on grounds maintenance tools and equipment.

Turf and Landscape

0201.2	Turf and Landscape.
0201.2.1	Pest management.
0201.2.2	Lawn care.
0201.2.3	Landscape maintenance.
0201.2.4	Analyze the information on pesticide labels.
0201.2.5	Identify common pests, diseases, and appropriate control techniques.
0201.2.6	Create an integrated pest management (IPM) plan for a lawn.
0201.2.7	Distinguish safe lawn mowing techniques from unsafe techniques.
0201.2.8	Properly mow a lawn.
0201.2.9	Use a lawn edger to edge a lawn.
0201.2.10	Properly aerate and dethatch turf.
0201.2.11	Irrigate lawns and landscapes.
0201.2.12	Collect soil samples and conduct tests.

This course provides instruction on the broad field of horticulture with an emphasis on the scientific and technical knowledge for a career in horticulture. Topics in this course include plant growth and development, plant nutrition, media selection, basic plant identification, pest management, chemical disposal, customer relations, career opportunities, leadership development, and entrepreneurial skills. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Plant Anatomy, Classification, and Identification

0212.1	Identify and classify plants (e.g., nomenclature, monocots).
0212.1.1	Identify crop plant families and the horticultural crops in each one.
0212.2	Identify major plant parts and functions.
0212.2.1	Discuss the functions of major plant parts such as root systems, phloem, node, etc.
0212.3	Demonstrate understanding of plant life cycles.
0212.3.1	Define and discuss examples of perennial, biennial, and annual plants.
0212.3.2	Explain the process of pollination.
0212.3.3	Explain seed vigor.

Plant Propagation, Growth, and Nutrition

0212.4	Demonstrate understanding of photosynthesis and respiration (e.g., transpiration, function of leaves).
0212.4.1	Analyze plant cells under a microscope.
0212.4.2	Conduct plant growth, photosynthesis/respiration, and hormone experiments.
0212.5	Demonstrate understanding of plant hormones.
0212.5.1	Identify and describe naturally occurring plant hormones.
0212.5.2	Describe synthetic plant growth regulators (e.g., ethylene, PGR)
0212.6	Identify essential nutrients for plant growth and development (e.g., macro/micronutrients, phosphorous, nitrogen).
0212.6.1	Conduct plant nutrition experiments.
0212.6.2	Explain the effects of soil pH and cation exchange capacity.
0212.7	Identify soil types, properties, and pH and the impact on the horticulture plant production (e.g., soil triangle, aeration, pH).
0212.7.1	Collect soil and plant tissue samples for testing and interpret the test results.
0212.8	Demonstrate understanding of synthetic fertilizer formulations and application (e.g., amounts to apply, inorganic).
0212.8.1	Conduct experiments on plant growth comparing use of synthetic fertilizer with compost and/or organic fertilizers.
0212.8.2	Convert nutrient recommendations (from soil sample test results) into application rates for both synthetic and organic fertility amendments.

0212.9	Demonstrate understanding of organic matter (e.g., manure, organic).
0212.9.1	Explain the role of organic matter in nutrient storage and plant nutrition.
0212.10	Demonstrate understanding of propagation techniques (e.g., sexual, and asexual, seed germination).
0212.10.1	Conduct experiments associated with seed germination rates, viability, and vigor.
0212.10.2	Propagate various plants by the asexual methods of cutting, division, separation, layering, budding and grafting.
0212.10.3	Aseptically propagate plants using micro propagation techniques.

Plant Pests and Pest Management

0212.11	Identify plant pests, disorders, and diseases (e.g., aphids, crop scouting, damping off, leaf disease).
0212.11.1	Collect and identify major insect species (pest and beneficial) that impact horticultural crops.
0212.11.2	Collect diseased horticultural plants and identify the disease.
0212.12	Identify pest control strategies associated with integrated pest management (e.g., ladybugs, selective, post emergent, days to harvest).
0212.12.1	Collect and identify major weed species in horticultural crops, their life cycle, and primary means of propagation/reproduction.

Plant Production Schedule and Season Extension

0212.13	Identify crops that can be produced in high tunnels.
0212.13.1	Grow appropriate crops in a season extension structure.
0212.13.2	Observe and record environmental conditions during germination, growth, and development of a crop.
0212.13.3	Monitor the progress of planting and determine the need to adjust environmental conditions.
0212.14	Describe low-cost season extension practices and systems (e.g., cold frames, hoop houses).
0212.14.1	Construct a season extension structure.
0212.15	Demonstrate understanding of planning and scheduling various crops based on hardiness zone (e.g., hardiness zone map, soil test).
0212.15.1	Prepare and implement a plant production schedule based on predicted environmental conditions (plant hardiness zone map).
0212.15.2	Create a planting schedule of a crop based on days to germination, maturity, season, and market demands.

Agricultural Innovation and Technology

0212.16	Identify emerging technology in the various plant systems industries (e.g., hybrids, biotechnology).
0212.16.1	Identify a current question in the plant systems industries and then develop a hypothesis and conduct research and present findings.
0212.16.2	Identify a current issue or problem in plant systems industries and work as a group to find a solution to the problem.
0212.17	Identify career opportunities in plant systems industries (e.g., floriculture, landscape, propagator).
0212.17.1	Identify and explain career opportunities in technology and innovation within plant system industries.
0212.17.2	Identify and explain career opportunities in plant systems entrepreneurship.

Plant Systems Entrepreneurship and Financial Record Keeping

0212.18	Demonstrate understanding of entrepreneurship and financial record keeping (e.g., calculate profit, crop insurance).
0212.18.1	Identify entrepreneurial opportunities in plant systems.

0212.18.2	Prepare and maintain financial records for a horticultural entrepreneurship.
0212.19	Demonstrate understanding of value-added agriculture and direct marketing.
0212.19.1	Define value-added agriculture and identify examples.
0212.19.2	Discuss supply & demand.
0212.19.3	Develop a business plan for a horticultural business.
0212.20	Demonstrate understanding of sustainability.
0212.20.1	Define sustainability.
0212.20.2	Explain a sustainable environmental future.

Foundations of Agriculture, Food, and Natural Resources

0212.21	Demonstrate knowledge of leadership development through FFA.
0212.21.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0212.21.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0212.21.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialization course covers topics on floral design, business planning, market plan development, and entrepreneurship. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Foundations of Agriculture, Food, and Natural Resources

0213.1	Demonstrate understanding of agribusiness (e.g., creating & designing floral arrangements, operating a floral shop & floral retail).
0213.1.1	Designing live, dried, or artificial flowers and foliage.
0213.1.2	Cutting live, dried, or artificial flowers and foliage.
0213.1.3	Arranging live, dried, or artificial flowers and foliage.
0213.1.4	Floral design concepts.
0213.1.5	Tools and equipment used in floral design.
0213.1.6	Water plants, and cut, condition, and clean flowers and foliage for storage.
0213.1.7	Select flora and foliage for arrangements, working with numerous combinations to synthesize and develop new creations.
0213.1.8	Wrap and price completed arrangements.
0213.1.9	Trim material and arrange bouquets, wreaths, terrariums, and other items using trimmers, shapers, wire, pins, floral tape, foam, and other materials.
0213.1.10	Decorate or supervise the decoration of buildings, halls, churches, or other facilities for parties, weddings, and other occasions.
0213.1.11	Grow flowers for use in arrangements or for sale in shops.
0213.1.12	Organizing a floral shop to operate effectively and efficiently.
0213.1.13	Perform general cleaning duties in the store to ensure the shop is clean and tidy.
0213.1.14	Unpack stock as it comes into the shop.
0213.1.15	Conduct classes or demonstrations, or train other workers.
0213.1.16	Marketing floral products.
0213.1.17	Retail selling of floral products.
0213.1.18	Confer with clients regarding price and type of arrangement desired and the date, time, and place of delivery.
0213.1.19	Order and purchase flowers and supplies from wholesalers and growers.
0213.1.20	Plan arrangement according to client's requirements, utilizing knowledge of design and properties of materials, or select appropriate design pattern.
0213.1.21	Perform office and retail service duties such as keeping financial records, serving customers, answering telephones, selling giftware items, and receiving payment.
0213.1.22	Inform customers about the care, maintenance, and handling of various flowers and foliage, indoor plants, and other items.

Foundations of Agriculture, Food, and Natural Resources

0213.2	Demonstrate knowledge of leadership development through FFA.
0213.2.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0213.2.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0213.2.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialization course covers instruction that expands the scientific knowledge and skills to include more advanced scientific computations and communication skills needed in the horticulture industry. Topics include greenhouse plant production and management, bedding plant production, watering systems light effects, career planning, leadership development and entrepreneurial skills. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Plant Propagation, Growth, and Nutrition

0214.1	Demonstrate understanding of propagation techniques (e.g., sexual, and asexual, seed germination).
0214.1.1	Propagate horticultural plants.
0214.1.2	Cultivate horticultural plants.
0214.1.3	Harvest horticultural plants.
0214.1.4	Grow plants hydroponically.
0214.1.5	Exercise proper horticultural plant handling and storage.
0214.1.6	Determine plant growing conditions, such as greenhouses, hydroponics, or natural settings, and set planting and care schedules.
0214.1.7	Prepare soil for planting, and plant or transplant seeds, bulbs, and cuttings.
0214.1.8	Cut and prune trees, shrubs, flowers, and plants.

Plant Pests and Pest Management

0214.2	Identify plant pests, disorders, and diseases (e.g., aphids, crop scouting, damping off, leaf disease).
0214.2.1	Identify plants and problems including diseases, weeds, and insect pests.
0214.3	Identify pest control strategies associated with integrated pest management (e.g., ladybug, selective, post emergent, days to harvest).
0214.3.1	Exercise safe pesticide use.
0214.3.2	Apply pesticides and fertilizers to plants.

Foundations of Agriculture, Food, and Natural Resources

0214.4	Demonstrate understanding of power, structural, and technical systems (e.g., measurement).
0214.4.1	Identify tools and equipment used in greenhouse and nursery management and production.
0214.4.2	Position and regulate plant irrigation systems, and program environmental and irrigation control computers.
0214.4.3	Inspect facilities and equipment for signs of disrepair and perform necessary maintenance work.
0214.4.4	Construct structures and accessories such as greenhouses and benches.
0214.4.5	Position and regulate plant irrigation systems, and program environmental and irrigation control computers.

Foundations of Agriculture, Food, and Natural Resources

0214.5	Demonstrate understanding of agribusiness (e.g., SAE, expenses).
0214.5.1	Plan, operate, and manage a greenhouse or nursery business.
0214.5.2	Manage nurseries that grow horticultural plants for sale to retail customers, for display or exhibition, or for research.
0214.5.3	Tour work areas to observe work being done, to inspect crops, and to evaluate plant and soil conditions.
0214.5.4	Assign work schedules and duties to nursery and greenhouse staff and supervise their work.
0214.5.5	Explain and enforce safety regulations and policies.
0214.5.6	Provide information to customers on the care of trees, shrubs, flowers, plants, and lawns.

Plant Systems Entrepreneurship and Financial Record Keeping

0214.6	Demonstrate understanding of entrepreneurship and financial record keeping (e.g., calculate profit, crop insurance).
0214.6.1	Select and purchase seeds, plant nutrients, disease control chemicals, and garden and lawn care equipment.
0214.6.2	Coordinate clerical, recordkeeping, inventory, requisitioning, and marketing activities.
0214.6.3	Determine types and quantities of horticultural plants to be grown, based on budgets, projected sales volumes, and/or executive directives.

Foundations of Agriculture, Food, and Natural Resources

0214.7	Demonstrate knowledge of leadership development through FFA.
0214.7.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0214.7.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0214.7.3	Participate in community service and career awareness activities at the local, state, and national level.

This specialization course covers topics on plant nutrition, site preparation, plant selection, harvesting, equipment, value-added agriculture, insect and disease identification and control, food safety, soil management, entrepreneurship, and animal control. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

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Foundations of Agriculture, Food, and Natural Resources

0220.1	Demonstrate understanding of agribusiness (e.g., SAE, expenses).
0220.1.1	Conduct plant care, observations, and record keeping.
0220.1.2	Promote clean work areas.
0220.1.3	Sell and deliver plants and flowers to customers.
0220.1.4	Record information about crops, such as pesticide use, yields, or costs.
0220.2	Demonstrate understanding of power, structural, and technical systems (e.g., measurement).
0220.2.1	Plant, spray, weed, fertilize, and water plants, shrubs, and trees, using hand tools and gardening tools.
0220.2.2	Identify and utilize tools and equipment used in fruit and vegetable production.
0220.2.3	Demonstrate tool and equipment repair and maintenance.
0220.2.4	Repair and maintain farm vehicles, implements, and mechanical equipment.
0220.2.5	Operate tractors and other machinery and equipment to fertilize, cultivate, harvest, and spray fields and plants.
0220.2.6	Haul and spread topsoil, fertilizer, peat moss, and other materials to condition soil, using wheelbarrows or carts and shovels.
0220.2.7	Explain the functions of different irrigation systems.
0220.2.8	Set up and operate irrigation equipment.
0220.2.9	Maintain and repair irrigation and climate control systems.

Plant Pests and Pest Management

0220.3	Identify plant pests, disorders, and disease (e.g., aphids, crop scouting, damping off, leaf disease).
0220.3.1	Identify plants, pests, and weeds to determine the selection and application of pesticides and fertilizers.
0220.3.2	Apply pesticides, herbicides, or fertilizers to crops.
0220.3.3	Feel plants’ leaves and note their coloring to detect the presence of insects or disease.
0220.3.4	Fertilizer and pesticide application and safety.

Plant Production Schedule and Season Extension

0220.4	Demonstrate understanding of planning and scheduling various crops based on hardiness zones (e.g., hardiness zone map, soil test).
0220.4.1	Planting, cultivating, irrigating, and harvesting fruits, vegetables, trees, and shrubs.
0220.4.2	Dig, cut, and transplant seedlings, cuttings, trees, and shrubs.
0220.4.3	Harvest fruit and vegetables by hand.

Fruit and Vegetable Production**Course #: 0220****Allowable Teacher Endorsement:** 0200, 0201, 7720, 7804

0220.4.4	Harvest plants, and transplant or pot and label them.
0220.4.5	Conduct crop grading and sorting.
0220.4.6	Inspect plants and bud ties to assess quality.
0220.4.7	Move containerized shrubs, plants, and trees, using wheelbarrows or tractors.
0220.4.8	Record information about plants and plant growth.
0220.4.9	Participate in the inspection, grading, sorting, storage, and post-harvest treatment of crops.
0220.4.10	Dig, rake, and screen soil; and fill cold frames and hot beds in preparation for planting.
0220.4.11	Fruit and vegetable production structures.

Foundations of Agriculture, Food, and Natural Resources

0220.5	Demonstrate knowledge of leadership development through FFA.
0220.5.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0220.5.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0220.5.3	Participate in community service and career awareness activities at the local, state, and national level.

This is a specialization course designed for students interested in entering the livestock industry as a herd manager or livestock entrepreneur. The course will cover topics on nutrient management, farm planning, business planning, developing marketing plans, developing feed rations, forages, grassland management, embryo transfer and animal facilities as they apply to various livestock such as cattle, swine, sheep, goats, poultry, and horses. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Animal Health

0230.1	Demonstrate knowledge of animal nutrition.
0230.1.1	Discuss aspects of animal nutrition and nutrients.
0230.1.2	Identify components of livestock feeds.
0230.1.3	Discuss the various digestive systems of livestock.
0230.1.4	Demonstrate an understanding of balancing feed rations.
0230.1.5	Feed and water livestock; and monitor food and water supplies.
0230.1.6	Order food for animals and arrange for its delivery.
0230.1.7	Maintain growth, feeding, production, and cost records.
0230.2	Demonstrate knowledge of livestock care and management.
0230.2.1	Demonstrate knowledge of the usage of livestock facilities and equipment.
0230.2.2	Perform livestock grooming.
0230.2.3	Inspect, maintain, and repair equipment, machinery, buildings, pens, yards, and fences.
0230.2.4	Move equipment, poultry, or livestock from one location to another, manually or using trucks or carts.
0230.2.5	Clean stalls, pens, and equipment, using disinfectant solutions, brushes, shovels, water hoses, and/or pumps.
0230.2.6	Mark livestock to identify ownership and grade, using brands, tags, paint, or tattoos.
0230.2.7	Herd livestock to pastures for grazing or to scales, trucks, or other enclosures.
0230.2.8	Adjust controls to maintain specific building temperatures required for animals' health and safety.
0230.2.9	Brand, tattoo, or tag animals in order to allow animal identification.
0230.2.10	Perform procedures such as animal dehorning or castration.
0230.2.11	Organize or conduct animal shows.
0230.2.12	Shift animals between grazing areas to ensure that they have sufficient access to food.
0230.2.13	Milk animals such as cows and goats, by hand or using milking machines.
0230.2.14	Segregate animals according to weight, age, color, and physical condition.
0230.2.15	Groom, clip, trim, and/or castrate animals; dock ears and tails; and/or shear coats to collect hair.
0230.2.16	Spray livestock with disinfectants and insecticides; or dip or bathe animals.
0230.2.17	Collect, inspect, and place eggs in incubators; operate machines for egg washing, candling, and grading; and pack eggs in cartons.

0230.2.18	Trim and shear poultry beaks, toes, and wings using debeaking machines, heated hand shears, or hot wires.

Animal Reproduction

0230.3	Demonstrate understanding of livestock reproduction.
0230.3.1	Demonstrate a knowledge of livestock reproduction organs and systems.
0230.3.2	Explain the estrous cycle.
0230.3.3	Discuss phases of reproductive development.
0230.3.4	Identify and explain livestock artificial insemination procedures/equipment and other reproduction technology.
0230.3.5	Evaluate breeding animals.
0230.3.6	Prepare containers of semen for freezing and storage or shipment, placing them in dry ice or liquid nitrogen.
0230.3.7	Maintain logs of semen specimens used and animals bred.
0230.3.8	Measure specified amounts of semen into calibrated syringes and insert syringes into inseminating guns.
0230.3.9	Inject prepared animal semen into female animals for breeding purposes, by inserting nozzle of syringe into vagina and depressing syringe plunger.
0230.3.10	Examine semen microscopically to assess and record density and motility of gametes, and dilute semen with prescribed diluents according to formulas.
0230.3.11	Perform duties related to livestock reproduction, such as breeding animals within appropriate timeframes, performing artificial inseminations, and helping with animal births.

Foundations of Agriculture, Food, and Natural Resources

0230.4	Demonstrate knowledge of leadership development through FFA.
0230.4.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0230.4.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0230.4.3	Participate in community service and career awareness activities at the local, state, and national level.

Supervised Agricultural Experience (SAE) 2

Course #: 0234

Allowable Teacher Endorsement: 0200, 0201, 7720, 7800

SAE is a student-led, instructor-supervised, work-based learning experience that results in measurable outcomes within a predefined, agreed-upon set of Agriculture, Food, and Natural Resources (AFNR) Technical Standards and Career Ready Practices aligned to your career plan of study. If a student touches, prepares, sells, or communicates about anything related to AFNR, the experience will count as a legitimate SAE. SAEs are expected to relate to the concentration area in which the student seeks occupational completion status. An SAE shall fall into one of four categories:

Exploratory/Foundational: Students will learn about the 'big picture' of agriculture and its many related careers.

Research/Experimentation and Analysis: Students will conduct research or analyze information to discover new knowledge.

Ownership/Entrepreneurship: Students will plan and operate an agriculture-related business. **Placement:**

Students will work for someone else either for pay or for experience. Students conducting all types of SAEs will track hours (both paid and unpaid), progress, income, expenses, events, etc., in the Classroom 2 Career tracking system/Agriculture Experience Tracker (AET).

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

0234.1	Exploratory/Foundational
0234.1.1	Describe career opportunities and means to achieve those opportunities in each of the AFNR career pathways.
0234.1.2	Explore and identify personal agricultural interests to create a career plan.
0234.1.3	Act as a responsible and contributing citizen and employee by developing key employability skills.
0234.1.4	Students will expand their personal financial literacy by developing a personal budget.
0234.1.5	Examine and summarize the importance of health, safety, and environmental management systems in AFNR workplaces.
0234.1.6	Analyze how issues, trends, technologies, and public policies impact systems in the AFNR career cluster.
0234.1.7	Job shadow a worker within the agricultural industry.
0234.1.8	Students will document their knowledge, skills, and plans in the Classroom 2 Career tracking system/AET.

0234.2	Research/Experimentation & Analysis
0234.2.1	Investigate materials, processes, and information to establish new knowledge or the validation of previous research.
0234.2.2	Follow the scientific process and acceptable best practices for conducting research to ensure reliability, validity, and replicability of research.
0234.2.3	Exercise safety throughout all aspects of the experimental process.
0234.2.4	Apply the methods of the scientific method to control certain variables while manipulating others to observe the outcome.
0234.2.5	Complete a Research Plan which safely meets all requirements.
0234.2.6	Define a hypothesis.
0234.2.7	Determine an appropriate experimental design, conduct the research, collect the data, draw conclusions from the data and recommend further research that can be done.

Supervised Agricultural Experience (SAE) 2**Course #: 0234****Allowable Teacher Endorsement:** 0200, 0201, 7720, 7800

0234.2.8	Formulate a why or how question, conduct data and collection using qualitative and/or quantitative methodologies.
0234.2.9	Conduct an analysis of data, facts, and other information to determine the answer to the analytical question.
0234.2.10	Apply the engineering design process to the invention research SAE to create a new product or service.
0234.2.11	Conduct peer reviews with the supervising agricultural education instructor or other professionals at multiple stages throughout the research cycle.
0234.2.12	Make a summary presentation of research and findings to a local committee organized by the agricultural education instructor.
0234.2.13	Document methods, procedures, results, analysis, and conclusions in the Classroom 2 Career tracking system/AET.

0234.3	Ownership/Entrepreneurship
0234.3.1	Create, own, and operate a business that provides goods and/or services.
0234.3.2	Exercise safety when operating all aspects of the business.
0234.3.3	Make operational and risk management decisions on how goods and/or services are provided.
0234.3.4	Conduct an operation of sufficient scope to develop skills and abilities aligned to the AFNR standards.
0234.3.5	Conduct an analysis of productivity and profitability at the end of each production/business cycle; make necessary changes for improvement.
0234.3.6	Become familiar with common financial tools, balance sheets, income statements, inventories, and cash flow.
0234.3.7	Design a business plan which provides for the continued growth and expansion of the operation.
0234.3.8	Review and update the business plan annually to reflect the changes in the operation.
0234.3.9	Track and document items produced, service hours worked, income, expenses, and the knowledge and skills attained within the Classroom 2 Career tracking system/AET record book.

0234.4	Placement
0234.4.1	Develop a job plan that includes considerations that promote a safe worksite and opportunities to learn on the job.
0234.4.2	Develop agriculture, food, natural resource, and employability skills and abilities outside the classroom through a hands-on job site experience.
0234.4.3	Perform an environmental safety review on yourself and your worksite.
0234.4.4	Pursue and complete the necessary safety training needed for employment in the related SAE area.
0234.4.5	Take measures to address any safety concerns identified.
0234.4.6	Perform the tasks determined by the employer which are necessary for the operation of the business.
0234.4.7	Track and document hours worked, income received, tasks completed, and the knowledge and skills attained within the Classroom 2 Career tracking system/AET record book.

NOTES: Refer to the guidance document at the link below for requirements of the ½ credit.

[Guidelines for Awarding SAE Credit Document](#)

Sources: [Educator Resources – SAE For All](#)

This specialization course covers topics on lawn care and turf production, golf course management, irrigation systems, turf equipment and maintenance, landscape design, landscape plants, landscape maintenance, plant pruning, marketing, and entrepreneurship. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundations of Agriculture, food, And Natural Resources

0240.1	Demonstrate understanding of plant systems (e.g., plant parts, processes, soil).
0240.1.1	Plant and establish turf.
0240.1.2	Utilize tools and equipment used in turf and landscape installation.
0240.1.3	Install various landscaping materials.
0240.1.4	Conduct landscape design projects.
0240.1.5	Follow planned landscaping designs to determine where to lay sod, sow grass, or plant flowers or foliage.
0240.1.6	Plant seeds, bulbs, foliage, flowering plants, grass, ground covers, trees, or shrubs and apply mulch for protection, using gardening tools.
0240.1.7	Decorate gardens with stones or plants.
0240.1.8	Haul or spread topsoil or spread straw over seeded soil to hold soil in place.
0240.1.9	Plan or cultivate lawns or gardens.
0240.2	Demonstrate understanding of power, structural, and technical systems (e.g., measurement).
0240.2.1	Attach wires from planted trees to support stakes.
0240.2.2	Install rock gardens, ponds, decks, drainage systems, irrigation systems, retaining walls, fences, planters, or playground equipment.
0240.2.3	Build forms and mix and pour cement to form garden borders.
0240.2.4	Explain the function and parts of irrigation systems.
0240.2.5	Use irrigation methods to adjust the amount of water consumption and to prevent waste.
0240.2.6	Maintain irrigation systems, including winterizing the systems and starting them up in spring.
0240.2.7	Identify tools and equipment used in turf and landscape maintenance.
0240.2.8	Conduct lawn care and maintenance.
0240.2.9	Operate vehicles and powered equipment, such as mowers, tractors, twin- axle vehicles, snow blowers, chain saws, electric clippers, sod cutters, and pruning saws.
0240.2.10	Mow or edge lawns, using power mowers or edgers.
0240.2.11	Shovel snow from walks, driveways, or parking lots and spread salt in those areas.
0240.2.12	Care for established lawns by mulching, aerating, weeding, grubbing, removing thatch, or trimming or edging around flower beds, walks, or walls.
0240.2.13	Use hand tools, such as shovels, rakes, pruning saws, saws, hedge or brush trimmers, or axes.
0240.2.14	Prune or trim trees, shrubs, or hedges, using shears, pruners, or chain saws.
0240.2.15	Gather and remove litter.

Turf and Landscape Systems**Course #: 0240****Allowable Teacher Endorsement:** 0200, 0201, 7404, 7720, 7804

0240.2.16	Maintain or repair tools, equipment, or structures, such as buildings, greenhouses, fences, or benches, using hand or power tools.
0240.2.17	Provide proper upkeep of sidewalks, driveways, parking lots, fountains, planters, burial sites, or other ground features.
0240.2.18	Water lawns, trees, or plants, using portable sprinkler systems, hoses, or watering cans.
0240.2.19	Trim or pick flowers and clean flower beds.
0240.2.20	Rake, mulch, and compost leaves.
0240.2.21	Care for natural turf fields, making sure the underlying soil has the required composition to allow proper drainage and to support the grasses used on the fields.
0240.2.22	Advise customers on plant selection or care.
0240.2.23	Mark design boundaries and paint natural or artificial turf fields with team logos or names before events.

Plant Pests and Pest Management

0240.3	Identify pest control strategies associated with integrated pest management (e.g., ladybug, selective, post-emergent, days to harvest).
0240.3.1	Pesticide use and safety.
0240.3.2	Mix and spray or spread fertilizers, herbicides, or insecticides onto grass, shrubs, or trees, using hand or automatic sprayers or spreaders.

Foundations of Agriculture, Food, and Natural Resources

0240.4	Demonstrate knowledge of leadership development through FFA.
0240.4.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
0240.4.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
0240.4.3	Participate in community service and career awareness activities at the local, state, and national level.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

Exploratory Wood Shop introduces middle school students to the basics of woodworking through fun, hands-on projects. Students will learn how to safely measure, cut, assemble, and finish simple wood items using hand and small power tools. The course encourages creativity, teamwork, and an appreciation for the skilled trades, while helping students explore potential careers in carpentry, construction, and engineering.

Career Opportunities Relate to Building Construction

0260.1	Identify a variety of careers related to building construction and the training necessary to be successful.
0260.1.1	Explore careers in construction related careers.
0260.1.2	Understand the education and credentials required for different trades.
0260.2	Develop appropriate attitudes and behaviors required to succeed in construction careers.
0260.2.1	Demonstrate teamwork and communication skills.
0260.2.2	Explore traits such as dependability, problem-solving, and time management.
0260.3	Identify sources of information about construction careers.
0260.3.1	Research industry associations, apprenticeships, and CTE pathways.
0260.3.2	Utilize online tools, school resources, and guest speakers.
0260.4	Develop employability readiness skills.
0260.4.1	Create sample resumes of practice mock interviews.
0260.4.2	Demonstrate professionalism and initiative.
0260.5	Identify and develop teamwork and problem-solving skills.
0260.5.1	Understand the importance of teamwork in the workplace.
0260.5.2	Engage in group projects that require planning and collaboration.
0260.6	Reflect on personal strengths and interests.
0260.6.1	Match interests with potential careers.
0260.6.2	Identify personality traits and skills relevant to construction fields.

Math and Measurement Skills

0260.7	Perform basic math operations.
0260.7.1	Add, subtract, multiply, and divide whole numbers, fractions, and decimals.
0260.7.2	Solve word problems related to construction.
0260.8	Convert and apply numerical values.
0260.8.1	Convert between decimals, percentages, and fractions.
0260.8.2	Apply conversions to material calculations.
0260.9	Measure accurately in construction context.
0260.9.1	Use rulers, tape measures, and other tools to measure length, area, and volume.
0260.9.2	Interpret dimensions from drawings and plans.

Construction Materials, Fasteners, and Adhesives.

0260.10	Identify and evaluate construction materials.
0260.10.1	Explore types of wood, concrete, insulation, drywall, and composites.
0260.10.2	Discuss applications based on material properties.
0260.11	Identify and evaluate fasteners.
0260.11.1	Learn to properly use nails, screws, bolts, nuts, washers, and anchors.
0260.11.2	Match fasteners to correct materials and tools.
0260.12	Identify and evaluate adhesives.
0260.12.1	Identify common adhesives like wood glue, construction adhesive, and epoxies.
0260.12.2	Understand safety precautions and application methods.

Introduction to Blueprints.

0260.13	Learn how to read drawings that use scale.
0260.13.1	Use a scale ruler and understand how ratios work in scaled drawings.
0260.13.2	Use scale to plan the size and layout of a woodworking project.
0260.14	Understand the important parts of an architectural drawing.
0260.14.1	Recognize common lines, symbols, and dimensions, and notes.
0260.14.2	Learn how to read floor plans, side views (elevations), and close-up drawings (details).
0260.15	Reading and Using Construction Plans.
0260.15.1	Read a simple set of plans and figure out what they show.
0260.15.2	Identify the most important parts needed to build something from the plans.

Construction Industry Safety.

0260.16	Recognize and apply general construction safety practices.
0260.16.1	Follow site-specific safety rules.
0260.16.2	Identify hazards and apply accident prevention strategies.
0260.17	Use personal protective equipment (PPE) correctly.
0260.17.1	Identify types of PPE such as goggles, gloves, and ear protection.
0260.17.2	Wear PPE as required for specific tasks.
0260.17.3	Maintain and properly store PPE.
0260.18	Apply proper material handling and lifting techniques.
0260.18.1	Lift and carry materials safely.
0260.18.2	Use assistive devices when needed.
0260.19	Demonstrate safe use of fall protection.
0260.19.1	Understand harnesses, guardrails, and tie-off systems.
0260.19.2	Recognize fall hazards.
0260.20	Safely use ladders and scaffolding.
0260.20.1	Choose the correct ladder or scaffold.
0260.20.2	Follow setup, positioning, and usage protocols.
0260.21	Identify and use fire safety practices.
0260.21.1	Locate fire extinguishers and understand fire response plans.
0260.21.2	Demonstrate proper storage of flammable materials.
0260.22	Apply electrical safety knowledge.
0260.22.1	Recognize electrical hazards.
0260.22.2	Safely use power cords and connections.
0260.23	Recognize and respond to potential hazards.
0260.23.1	Recognize common causes of accidents.
0260.23.2	Understand procedures for handling accidents and emergencies.
0260.23.3	Identify accident reporting procedures and responsible agencies.
0260.23	Apply 6S principles to keep the work safe, clean, and organized.
0260.23.1	Implement sorting, organizing, and cleaning routines to improve efficiency and reduce clutter.
0260.23.2	Follow consistent procedures to maintain order and safety in the shop environment.
0260.23.3	Identify and correct potential hazards through regular inspection and workspace upkeep.

Hand Tools

0260.24	Select proper hand tools and describe care and maintenance.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

0260.24.1	Identify tools such as handsaws, chisels, planes, hammers, tape measures, and files.
0260.24.2	Identify layout tools like squares, marking gauges, and compasses.
0260.24.3	Clean, sharpen, and store tools correctly.
0260.25	Demonstrate adjustments and use of tool attachments.
0260.25.2	Install blades, bits, or other accessories.
0260.25.2	Adjust tools for accuracy and safety.
0260.26	Practice safe hand tool usage.
0260.26.1	Demonstrate proper grip and positioning.
0260.26.2	Use PPE and follow teacher instructions.
0260.27	Perform a project using hand tools.
0260.27.1	Plan and complete a small build using correct tool techniques.
0260.27.2	Follow design plans and safety procedures.

Power Tools (Portable and Stationary)

0260.28	Select appropriate power tools for tasks.
0260.28.1	Identify machines like the drill press, scroll saw, band saw, sanders, and routers.
0260.28.2	Understand the parts and purposes of each machine.
0260.28.3	Match tool functions to project needs.
0260.29	Safely install blades, bits, and attachments.
0260.29.1	Change blades/bits with the correct tools.
0260.29.2	Inspect for wear and damage.
0260.30	Adjust power tools correctly.
0260.30.1	Set depth, angle, and speed controls as needed.
0260.30.2	Use clamps or guides for accuracy.
0260.31	Maintain power tools and equipment.
0260.31.1	Clean and store equipment after use.
0260.31.2	Check cords, guards, and switches.
0260.31.3	Learn basic cleaning and maintenance of tools.
0260.31.4	Store tools correctly and safely after use.
0260.32	Demonstrate safe practices using power tools.
0260.32.1	Follow safety rules, PPE, and teacher supervision.
0260.32.2	Complete cuts, bores, and sanding tasks.

Finishing Process

0260.33	Explore different types of finishes.
0260.33.1	Identify options like stains, sealers, paints, and natural finishes.
0260.33.2	Discuss characteristics and uses for each finish.
0260.34	Use safe application methods.
0260.34.1	Apply finishes using wipe, brush, or spray techniques.
0260.34.2	Follow proper safety and clean-up procedures.
0260.35	Apply finishing techniques to projects.
0260.35.1	Use finishing techniques on student projects.
0260.35.2	Assess finish quality and durability.

Exploratory Wood Shop

Course #: 0260

Allowable Teacher Endorsement:

Certified Teacher with appropriate grade level endorsement(s)

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

Exploratory Aviation is a course designed to introduce students to the foundational concepts of aviation and aerospace. Students explore the science of flight, aircraft and rocket systems, weather and safety, and the future of aviation technology. The course encourages schools to use locally available resources, ranging from simple classroom materials to drones or model aircraft, to engage students in hands-on discovery. With an emphasis on curiosity and a lifelong interest in flight, this course supports early exploration of aviation careers and may include opportunities such as completing the FFA's TRUST (The Recreational UAS Safety Test). Rather than prescribing lessons, the course focuses on inspiring the next generation of aviators, engineers, and innovators through meaningful, place-based learning.

Fundamentals of Flight

0263.1	Investigate and model the four forces of flight using hands-on activities and simulations.
0263.1.1	Describe how lift, weight, thrust, and drag interact to enable or inhibit flight.
0263.1.2	Explain how changes in these forces affect flight performance and stability.
0263.2	Compare the design and function of aircraft and rockets in overcoming gravity and achieving controlled movement.
0263.2.1	Identify key components of aircraft and rockets and their roles in flight.
0263.2.2	Compare how aircraft and rockets are engineered for different environments (atmosphere vs. space).
0263.2.3	Analyze how propulsion and control systems affect maneuverability and stability.

Structure and Function of Aircraft Systems

0263.3	Identify and describe the major structural components of aircraft and rockets.
0263.3.1	Label and describe the functions of fuselage, wings, empennage, and control surfaces.
0263.3.2	Explain how structural design supports flight performance and safety.
0263.4	Construct and test simple flight models to explore design and performance concepts.
0263.4.1	Build and test models such as paper airplanes, stomp rockets, and/or gliders.
0263.4.2	Evaluate how design changes affect flight behavior and stability.

Weather and Environmental Conditions Impact on Flight

0263.5	Interpret basic weather data and predict its effects on flight.
0263.5.1	Identify weather conditions that affect flight (e.g., wind, fog, storms).
0263.5.2	Interpret data from simple weather instruments (e.g., wind vanes, anemometers).
0263.6	Apply safety considerations to plan a simulated flight or drone operation.
0263.6.1	Explain how pilots and drone operators use weather data to make decisions.
0263.6.2	Demonstrate awareness of basic aviation safety protocols.

Innovation and the Future of Flight

0263.7	Explore how new technologies are shaping the future of flight.
0263.7.1	Describe innovations such as electric propulsion, autonomous systems, and sustainable fuels.
0263.7.2	Discuss the potential benefits and challenges of these technologies.
0263.8	Design a concept for a future aircraft, drone, or aerospace solution.
0263.8.1	Brainstorm and sketch ideas for solving real-world aviation problems.
0263.8.2	Present a concept that addresses efficiency, safety, or environmental impact.

Careers in Aviation

0263.9	Research and present on a career in aviation or aerospace.
0263.9.1	Identify various aviation careers and the skills they require.
0263.9.2	Summarize the education and training pathways for selected careers.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

0263.10	Reflect on personal interests and how they connect to aviation roles.
0263.10.1	Assess personal strengths and interests related to aviation.
0263.10.2	Explore how early experiences can lead to future career opportunities.

Aviation Design Teams

0263.11	Complete a hands-on project or challenge that demonstrates understanding of flight concepts.
0263.11.1	Design and test a model or simulation that applies flight principles.
0263.11.2	Collaborate to solve a flight-related challenge using available materials.
0263.12	Demonstrate safe and responsible drone or model aircraft operation.
0263.12.1	Practice safe handling and operation of drones or flight models.
0263.12.2	Complete the FAA TRUST test (optional) to demonstrate understanding of recreational drone safety.

This course will build on the knowledge and skills learned in American Sign Language 1 and 2. It is designed for students to learn complex American Sign Language (ASL) vocabulary. Students will refine all grammatical aspects of ASL. They will communicate in ASL, demonstrating a wide range of skills in receptive, expressive, and interactive skills. The Code of Professional Conduct Tenets for sign language interpreters will be used to guide students. Students will learn more about the Deaf Community and Deaf culture through Deaf language models. Required Completer NOCTI- #3033 Workplace Readiness. Students are also encouraged to take the EIPA or other approved certification test for WV Paraprofessional Educational Interpreter.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities, ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Communication

0304.1	Basic Communication
0304.1.1	Communicate in American Sign Language (ASL) on a wide range of topics.
0304.1.2	Incorporate and understand appropriate handshapes, palm orientations, location, movement, and non-manual behaviors in signing.
0304.1.3	Use and comprehend fingerspelling and numbers.
0304.1.4	Incorporate an increased ASL lexicon into everyday language use.
0304.2	ASL Vocabulary
0304.2.1	Expand ASL vocabulary both expressively and receptively.
0304.2.2	Ask and answer questions on complex topics using advanced ASL vocabulary.
0304.3	Expressive ASL
0304.3.1	Present information and/or stories/poems on complex topics from a signed, oral, or written source correctly.
0304.3.2	Give detailed directions, commands, requests, and instructions.
0304.3.3	Communicate the need for clarification on topics to confirm understanding.
0304.3.4	Produce signs that are clear, fluent, and accurate.
0304.3.5	Fingerspell clearly and fluently.
0304.3.6	Mark sentence and topic boundaries by pausing appropriately.
0304.3.7	Express advanced needs, likes, and dislikes with supporting details.
0304.3.8	Incorporate facial expressions, body language, and non-manual markers appropriately.
0304.3.9	Demonstrate cultural nuances of meaning in expressive products of various literary categories.
0304.3.10	Dramatize stories commonly known by members of the Deaf Community (ABC, numbers, or classifier stories).

Receptive ASL

0304.4	Receptive ASL
0304.4.1	Recognize the manual ASL alphabet.
0304.4.2	Recognize complex words, phrases, and sentences in ASL.
0304.4.3	Comprehend main ideas and themes using vocabulary on various topics.
0304.4.4	Follow detailed directions, commands, and instructions.
0304.4.5	Understand extended stories, poems, and informational texts.

0304.4.6	Differentiate between similar descriptions of people, ideas, objects, and emotions based on detailed signed descriptions.
0304.4.7	Show understanding of the cultural nuances of meaning in ASL.

Interactive ASL

0304.5	Interactive ASL
0304.5.1	Have lengthy conversations about a variety of topics.
0304.5.2	Request and provide detailed information on a variety of topics.
0304.5.3	Comprehensively ask and answer questions on various topics.
0304.5.4	Analyze the main plot, characterization, and setting in ASL literature.
0304.5.5	Have in-depth discussions on opinions and preferences about personal experiences.
0304.5.6	Create and present ABC, number, or classifier stories.
0304.6	Deaf Culture
0304.6.1	Propose solutions to issues and problems that are of concern to members of the Deaf Community.
0304.6.2	Examine ASL literary examples, including visual elements of ASL expansion.
0304.6.3	Describe contributions made by individuals contributing to Deaf heritage.
0304.6.4	Research the significance of ASL, objects, images, products, and symbols of Deaf culture.
0304.6.5	Identify organizations and their roles in the Deaf Community.
0304.6.6	Conceptualize and debate topics pertinent to Deaf culture.
0304.6.7	Study Deaf humor, literature, and cultural arts of the Deaf Community.
0304.6.8	Discover cross-cultural relevance of common issues in both the hearing and Deaf cultures.
0304.6.9	Apply knowledge gained on the communication of Deaf individuals to experiences in interactions within the community.
0304.7	ASL Comparisons
0304.7.1	Compare and contrast figurative language and idioms of both ASL and English.
0304.7.2	Explore the syntactical and linguistic similarities and differences between ASL and English.
0304.7.3	Compare the word order patterns used in ASL with the grammatical rules used in English.
0304.7.4	Identify formal and informal forms of ASL and English.
0304.7.5	Communicate with inflections for questions, negatives, and statements in ASL while comparing this to the inflectional patterns in English.
0304.7.6	Utilize critical elements of ASL that must be mastered to convey meaning.
0304.7.7	Demonstrate the difference between auditory language and ASL, including homophones.

Behavior

0304.8	Non-manual Behaviors
0304.8.1	Use appropriate facial expressions in interpreting.
0304.8.2	Demonstrate proper body language in interpreting.
0304.8.3	Clearly show spatial organization in interpreting.
0304.8.4	Incorporate all essential non-manual markers into interpreting.
0304.9	Community
0304.9.1	Use ASL within and beyond the school setting (club activities, "silent dinners," etc.)
0304.9.2	Show evidence of becoming life-long learners by using ASL for personal enjoyment, enrichment, and career development.
0304.9.3	Locate resources for the Deaf.
0304.9.4	Present ASL and Deaf awareness information.
0304.9.5	Identify opportunities to use ASL for enjoyment.

0304.9.6	Discuss deafness-related careers.
0304.9.7	View Deaf cultural events and social activities.
0304.9.8	Research deafness-related careers.
0304.9.9	Identify career opportunities and limitations while reviewing legislation affecting career choices and accommodations.
0304.9.10	Experience interpreting opportunities (job shadowing, interviewing an interpreter, etc.).
0304.9.11	Interview members of the Deaf Community.
0304.10	Professionalism
0304.10.1	Learn and adhere to the interpreter's professional tenets, conduct, and considerations.
0304.10.2	Follow the proper dress code for interpreting.
0304.10.3	Understand the interpreter's responsibilities.
0304.10.4	Practice ethical interpreter decision-making.
0304.10.5	Discuss sign language interpreter assessments and levels.
0304.10.6	Self-analyze linguistic growth through recorded video segments.
0304.11	History of the Profession
0304.11.1	Examine the history of the establishment of the Registry of Interpreters for the Deaf (RID).
0304.11.2	Research certification of sign language interpreters.
0304.11.3	Recognize sign language interpreter assessments and levels.

ASL Foundations

0304.12	ASL Foundations
0304.12.1	Utilize and interpret ASL classifiers handshapes.
0304.12.2	Use ASL affirmation and negation in interpreting.
0304.12.3	Apply directionality of verbs in ASL interpreting.
0304.12.4	Utilize time-markers appropriately.
0304.12.5	Incorporate plurals in interpreting.
0304.12.6	Map signing space.
0304.12.7	Accurately use pronouns.
0304.12.8	Include non-manual sign modifications (mouth movements, eyebrows, eye gaze, etc.).
0304.12.9	Identify the five parameters of ASL.

Legal

0304.13	Legal Aspects
0304.13.1	Discuss content knowledge of significant laws pertaining to interpreters.
0304.13.2	Understand laws related to the interpreting profession.
0304.14	Connections
0304.14.1	Add further knowledge of other disciplines using ASL.
0304.14.2	Use technology to obtain information and resources pertaining to the Deaf Community.
0304.14.3	Examine resources and information pertaining to the interpreting professions.
0304.14.4	Identify issues from different perspectives of members of the Deaf Community (i.e., using topics found in Deaf publications such as WVAD Newsletter, Deaf President Now, other state and federal legislation, etc.).
0304.14.5	Analyze the appropriate technology available to the Deaf Community in cross-cultural settings.
0304.14.6	Understand the significant details on topics from other classes or from Deaf culture as presented on video or live presentations.
0304.15	Career Readiness
0304.15.1	Predict future advances in products or procedures that will affect the Deaf and/or ASL interpreting.

0304.15.2	Discuss career plans that lead to certification, licensure, or continued postsecondary learning using ASL, including assessments: EIPA for WV Educational Interpreter Certification, SLPI, ASLPI, VQAS, NIC, and industry groups NAD, RID, etc.
0304.15.3	Identify entrepreneurial practices and business skills for self-employment using ASL.
0304.15.4	Begin a portfolio demonstrating evidence of competencies in the skills and knowledge needed for ASL translating and/or interpreting.
0304.15.5	Identify industry experts for collaboration on specific technical knowledge and skills in ASL interpreting.

This course is designed to focus on sign language interpreting. Students will learn the professional aspects of interpreting (ethics, career options, billing practices, etc.). Extensive interpreting practice will be provided. Students will observe and actively participate in work-based integration through actual interpreting experiences. The Code of Professional Conduct for sign language interpreters will be practiced. Students will use ASL both within and beyond the school setting. Required Completer NOCTI- #3033 Workplace Readiness. Students are also encouraged to take the EIPA or other approved certification test for WV Paraprofessional Educational Interpreter.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Communication

0305.1	Basic Communication
0305.1.1	Communicate in American Sign Language (ASL) on a wide range of varied topics.
0305.1.2	Incorporate and understand appropriate handshapes, palm orientations, location, movement, and non-manual behaviors in signing.
0305.1.3	Use and comprehend complex fingerspelling and number systems.
0305.1.4	Incorporate a broad ASL lexicon into everyday language use.
0305.2	ASL Vocabulary
0305.2.1	Expand ASL vocabulary into new topics both expressively and receptively.
0305.2.2	Ask and answer questions on in-depth topics using advanced ASL vocabulary.
0305.3	Expressive ASL
0305.3.1	Present information and/or stories/poems on complex topics from a signed, oral, or written source correctly and fluently.
0305.3.2	Give detailed directions, commands, requests, and instructions.
0305.3.3	Communicate the need for clarification on topics to confirm understanding.
0305.3.4	Produce signs that are clear, fluent, and accurate.
0305.3.5	Fingerspell clearly and fluently.
0305.3.6	Mark sentence and topic boundaries by pausing appropriately.
0305.3.7	Express advanced needs, likes, and dislikes with supporting details.
0305.3.8	Incorporate facial expressions, body language, and non-manual markers appropriately at all times.
0305.3.9	Demonstrate cultural nuances of meaning in expressive products of various literary categories.

Receptive ASL

0305.4	Receptive ASL
0305.4.1	Recognize technical words, phrases, and sentences in ASL.
0305.4.2	Comprehend main ideas and themes using advanced genre-specific ASL on various topics.
0305.4.3	Exhibit knowledge of detailed directions, commands, and instructions.
0305.4.4	Understand elaborate stories, poems, and informational texts.
0305.4.5	Differentiate between similarly detailed descriptions of people, ideas, objects, and emotions based on detailed signed descriptions.
0305.4.6	Clearly demonstrate understanding of cultural nuances of meaning in ASL.

Interactive ASL

0305.5	Interactive ASL
0305.5.1	Have lengthy conversations on information about a variety of topics.
0305.5.2	Request and provide elaborate information on a variety of topics.
0305.5.3	Comprehensively ask and answer detailed questions on various topics.
0305.5.4	Analyze the main plot, characterization, and setting in ASL literature.
0305.5.5	Have in-depth discussions on opinions and preferences about personal experiences and other topics.
0305.6	Deaf Culture
0305.6.1	Advocate for the Deaf Community in a professional manner.
0305.6.2	Have an in-depth understanding of the cultural norms of Deaf culture and the Deaf Community.
0305.6.3	Research and present a current event from the Deaf Community or Deaf culture.
0305.6.4	Explore the membership of the Deaf Community.
0305.6.5	Identify organizations and their roles in the Deaf Community.
0305.6.6	Conceptualize and debate topics pertinent to Deaf culture.
0305.6.7	Study Deaf humor, literature, and cultural arts of the Deaf Community.
0305.7	ASL Comparisons
0305.7.1	Compare, contrast, and discuss figurative language and idioms of both ASL and English.
0305.7.2	Summarize the syntactical and linguistic similarities and differences between ASL and English.
0305.7.3	Communicate with inflections of questions, negatives, and statements in ASL while comparing this to the inflectional patterns in English.
0305.7.4	Utilize critical elements of ASL that must be mastered to convey meaning.
0305.7.5	Analyze and debate topics pertinent to ASL.
0305.7.6	Summarize the syntactical and linguistic similarities and differences between ASL and English.
0305.7.7	Communicate with inflections of questions, negatives, and statements in ASL while comparing this to the inflectional patterns in English.
0305.7.8	Utilize critical elements of ASL that must be mastered to convey meaning.

Behavior

0305.8	Non-manual Behaviors
0305.8.1	Use appropriate facial expressions in all interpreting.
0305.8.2	Demonstrate proper body language in all interpreting.
0305.8.3	Clearly show spatial organization in all interpreting.
0305.8.4	Incorporate all essential non-manual markers in all interpreting.
0305.9	Community
0305.9.1	Use ASL within and beyond the school setting (club activities, "silent dinners," etc.).
0305.9.2	Show evidence of becoming life-long learners by using ASL for personal enjoyment, enrichment, and career development.
0305.9.3	Locate resources for the Deaf and recognize the potential of ASL.
0305.9.4	Present ASL and Deaf awareness information.
0305.9.5	Create opportunities to use ASL for enjoyment.
0305.9.6	Research deafness-related careers.
0305.9.7	Attend or view Deaf cultural events and social activities.
0305.9.8	Expand knowledge of career opportunities and limitations while reviewing legislation affecting career choices and accommodations.
0305.9.9	Experience interpreting opportunities (job shadowing, interviewing an interpreter, etc.).
0305.9.10	Interview members of the Deaf Community.

0305.9.11	Exchange information related to important issues of the school and community.
0305.10	Professionalism
0305.10.1	Adhere to interpreter professional tenets, conduct, and considerations.
0305.10.2	Follow the proper dress code while interpreting.
0305.10.3	Understand interpreter roles and responsibilities.
0305.10.4	Practice ethical interpreter decision-making.
0305.10.5	Distinguish sign language interpreter assessments and levels.
0305.10.6	Self-analyze linguistic growth through recorded video segments.
0305.10.7	Develop independent approaches to interpreting, such as being able to work with little supervision.
0305.10.8	Create and sustain constructive and cooperative working relationships with others.

ASL Foundations

0305.11	ASL Foundations
0305.11.1	Demonstrate and interpret ASL classifier handshapes.
0305.11.2	Use ASL affirmation and negation in all interpreting.
0305.11.3	Apply directionality of verbs in all ASL interpreting.
0305.11.4	Utilize time-markers appropriately.
0305.11.5	Differentiate between singular and plural in interpreting.
0305.11.6	Map signing space using discourse mapping.
0305.11.7	Accurately use pronouns.
0305.11.8	Include non-manual sign modifications (mouth movements, eyebrows, eye-gaze, etc.).
0305.11.9	Utilize the five parameters of ASL.
0305.11.10	Understand the structure and content of ASL, including meaning, mark, and articulation.

Legal

0305.12	Legal Aspects
0305.12.1	Demonstrate content knowledge of significant laws pertaining to interpreters.
0305.12.2	Apply laws to the interpreting profession.
0305.12.3	Analyze social and legislative issues affecting the Deaf Community.
0305.13	Connections
0305.13.1	Reinforce and add further knowledge of other disciplines using ASL.
0305.13.2	Analyze resources and information pertaining to the interpreting profession.
0305.13.3	Discuss issues from different perspectives of members of the Deaf Community (i.e., using topics found in Deaf publications such as WVAD Newsletter, Deaf President Now, other state and federal legislation, etc.).
0305.13.4	Analyze the appropriate technology available to the Deaf Community in a cross-cultural setting.
0305.13.5	Articulate the significant details on topics from other classes or from Deaf culture as presented on video or live presentations.
0305.14	Career Readiness
0305.14.1	Create personalized career plans that lead to certification, licensure, or continued postsecondary learning using ASL, including assessments needed to obtain specific interpreter certifications.
0305.14.2	Incorporate entrepreneurial practices and business skills in a simulated workplace using ASL.
0305.14.3	Complete a personalized portfolio demonstrating evidence of competencies in the skills and knowledge needed for ASL translating and/or interpreting.
0305.14.4	Collaborate with industry experts on specific technical knowledge and skills in ASL interpreting.
0305.14.5	Innovate or create services and/or products specific to ASL translating or interpreting businesses for projected future needs in the Deaf world.

0305.15	Interpreting
0305.15.1	Access communication to make adjustments in approaches to interpreting.
0305.15.2	Self-monitor the interpretation during and after the task.
0305.15.3	Concentrate and stay undistracted during interpreting for an extended period of time.
0305.15.4	Use the appropriate lag time while interpreting.
0305.15.5	Interpret both expressively and receptively in a way others will understand.
0305.15.6	Maintain composure and control emotions even in difficult interpreting situations.
0305.15.7	Show respect and a good work ethic in all interpreting assignments.
0305.15.8	Adhere to standards of confidentiality in all interpreting assignments.
0305.15.9	Demonstrate respect for consumers and all others involved in the interpreting assignments.

In this comprehensive course, students will learn about career exploration, focusing on service personnel careers, first aid/CPR training, OSHA guidelines, personal protective equipment (PPE) usage, and safety protocols. Students will analyze career options, define service personnel roles, and explore local district opportunities and state regulations. They will attain certifications in first aid/CPR and OSHA standards, understanding infection control, hazard recognition, and workplace safety procedures.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Career Exploration

0310.1	Analyze career exploration.
0310.1.1	Define school service personnel per Policy 5314, Service Personnel Classification, Competency Testing, and Professional Learning.
0310.1.2	Complete an initial interest survey to explore potential careers based on your interests, skills, and/or work values.
0310.1.3	Use ONET and/or the Occupational Outlook Handbook to investigate service personnel classifications outside of the school system.

Service Personnel Careers

0310.2	Identify service personnel careers and job requirements.
0310.2.1	Outline the service personnel classifications as defined in W. Va. Code §18A-4-8.
0310.2.2	Demonstrate an understanding of the state code requirements for employment terms, such as yearly/12-month, exceeds 200-day, and five-day work week.
0310.2.3	Explain the basic requirements to hold a classification as defined by state code.
0310.2.4	Identify service personnel careers in your local district.
0310.2.5	Explore the eight service personnel classification categories using the West Virginia Service Personnel Sway.
0310.2.6	Discover the sample job descriptions for each of the classification titles within each of the categories.
0310.2.7	Explore assessment guides and additional resources for service personnel classifications.
0310.2.8	Differentiate between full time and substitute positions.
0310.3	Discuss district service personnel policies.
0310.3.1	Explore your district's service personnel employee handbook or the equivalent.
0310.3.2	Investigate your district's service personnel employee evaluation.

First Aid/Cardiopulmonary Resuscitation (CPR)

0310.4	Attain First Aid/CPR card.
0310.4.1	Access nationally recognized First Aid and CPR standards.
0310.4.2	Explain the principles of infection control.
0310.4.3	Demonstrate an understanding of the importance of proper handwashing, according to the Centers for Disease Control (CDC).
0310.4.4	Apply skills to obtain <i>CPR and First Aid</i> training and/or certification.

Introduction Occupational Safety and Health Administration (OSHA)

0310.5	Attain OSHA 10-Hour card.
0310.5.1	Define “standard” as used by the Occupational Safety and Health Administration (OSHA).
0310.5.2	Describe the various hazards covered by OSHA standards.
0310.5.3	Recognize and correct the type of floor openings, wall openings, and holes.
0310.5.4	Recognize the General Duty Clause.
0310.5.5	Anticipate and recognize industrial health and hygiene risks.
0310.5.6	Identify general safety procedures related to combustible and flammable liquids.
0310.5.7	Recognize electrical hazards.
0310.5.8	Describe proper materials handling and storage.
0310.5.9	Recognize safeguards that protect works against mechanical hazards.
0310.5.10	Investigate the priorities and steps in an OSHA inspection.
0310.5.11	Describe the rights of employees and employers regarding OSHA standards.
0310.5.12	Describe methods of obtaining further information on workplace safety.
0310.5.13	Earn <i>Intro to OSHA</i> credential and <i>OSHA 10-Hour</i> card

Personal Protective Equipment (PPE)

0310.6	Explain the importance of Personal Protective Equipment.
0310.6.1	Demonstrate an understanding of PPE general guidelines as defined by OSHA.
0310.6.2	Recognize what kind of PPE is necessary and how to use it properly.
0310.6.3	Describe how to put on, adjust, wear, and take off PPE.
0310.6.4	Explain the limitations of PPE in protecting the wearer from workplace hazards.

Safety Procedures and Protocols

0310.7	Discuss the importance of maintaining a secure and hazard-free school environment.
0310.7.1	Outline the steps involved in responding to various emergency situations, such as fires or lockdowns.
0310.7.2	Practice following safety protocols and procedures during emergency simulations.

This course provides a comprehensive overview of key topics in educational administration and support services, focusing on educational policies and procedures, service personnel testing and classifications, school nutrition, unions, and grievances. Students will discover educational laws and regulations such as IDEA, FERPA, and Title IX, alongside understanding mandated reporting responsibilities. They will explore service personnel classifications, evaluations, and the testing process, as well as WVBE requirements. Additionally, the course covers nutrition principles, food safety practices, and attaining a Food Handler card. Understanding union structures, benefits, and membership procedures, as well as grievance procedures outlined in W. Va. Code §6C-2, are also emphasized.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Educational Policies and Procedures

0311.1	Explain educational laws and regulations.
0311.1.1	Demonstrate an understanding of relevant laws and regulations that impact education and student welfare (e.g., IDEA, FERPA, ESSA, ESEA, ADA, Title IX, Section 504).
0311.1.2	Identify persons designated as mandated reporters under W. Va. Code §49-2-803.

Service Personnel Testing and classifications.

0311.2	Discuss Service Personnel as defined in Policy 5314, Service Personnel Classification, Competency Testing, and Professional Learning.
0311.2.1	Explore additional West Virginia Board of Education (WVBE) requirements to hold a service personnel classification.
0311.2.2	Demonstrate an understanding of the requirements for service personnel employee evaluations.
0311.2.3	Demonstrate an understanding of the service personnel testing process.
0311.2.4	Investigate how education equivalency can be used to earn a higher wage.

School Nutrition

0311.3	Discuss nutrition and balanced meals.
0311.3.1	Explain the importance of nutritionally balanced meals and snacks.
0311.3.2	Describe the purpose of Policy 4321.1.
0311.3.3	Explain the statutory regulations set forth by USDA and the federal government regarding the operation of federally funded child nutrition programs.
0311.3.4	Describe the Smart Snacks in School nutrition standards.
0311.3.5	Develop a weekly school menu for breakfast and lunch that complies with both state and federal regulations.
0311.4	Attain Food Handler card.
0311.4.1	Explain how food becomes unsafe and your role in keeping food safe.
0311.4.2	Discuss how, when, and where to wash your hands and other hand care guidelines.
0311.4.3	Identify the important practices for good personal hygiene.
0311.4.4	Identify when food is mostly to become unsafe due to time and temperature.
0311.4.5	Properly calibrate a thermometer and measure the temperature of food.
0311.4.6	Identify holding and labeling time and temperature control (TCS) food for storage.

0311.4.7	Describe how to prevent cross-contamination during food preparation and storing utensils.
0311.4.8	Explain what to do for people who have food allergies.
0311.4.9	Explain how and when to clean, sanitize, and handle cleaning tools and supplies.
0311.4.10	Demonstrate how to handle garbage.
0311.4.11	Identify common pests in food environments.
0311.4.12	Discuss how to prep food safely.
0311.4.13	Explain how to be sure the food you receive is safe.
0311.4.14	Identify safe ways to thaw, cook, cool, and reheat TCS food.
0311.4.15	Demonstrate the correct way to wash dishes.
0311.4.16	Earn food handler credential.

Unions

0311.5	Explain the purpose and benefits of unions.
0311.5.1	Identify the purpose of West Virginia School Service Personnel Association (WVSSPA).
0311.5.2	Explain the benefits of being an association member.
0311.5.3	Discuss the procedures and requirements of membership.

Grievances

0311.6	Discuss grievance procedures as outlined in W. Va. Code §6C-2.
0311.6.1	Explain the purpose of a grievance.
0311.6.2	Discuss the general grievance procedures for school service personnel.
0311.6.3	Explain the procedures to file an appeal.

In this comprehensive course, students will examine the critical aspects of professionalism and ethical behavior within educational settings, as well as engage in practical workplace exploration and job shadowing experiences. Through an in-depth examination of policies such as Policy 5902 and the employee code of conduct, learners will grasp the significance of maintaining quality education and the specific obligations outlined for West Virginia school employees. They will analyze incidents of misconduct and understand the impact on students, while also exploring organizational structures and methods of socialization within employment settings. The course will further entail hands-on job shadowing experiences, where students will explore various school service personnel positions, evaluate competencies, and reflect on personal observations to inform potential career pathways. Through reflection and analysis, students will synthesize their experiences, identify key skills and interests, and develop strategies for pursuing fulfilling careers within the educational sector.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Professionalism and Ethical Behavior

0312.1	Discuss Policy 5902 regarding employee code of conduct.
0312.1.1	Discuss the purpose behind the employee code of conduct and its importance in maintaining quality education.
0312.1.2	Explain how this policy complements other relevant policies regarding school personnel and student conduct.
0312.1.3	Analyze specific obligations outlined for West Virginia school employees.
0312.1.4	Adhere to professional codes of conduct and ethical guidelines in all interactions within the school community.
0312.1.5	Analyze the requirements for addressing incidents of misconduct and their impact on students.
0312.1.6	Explain the importance of the requirement for county boards of education to provide professional development for all employees regarding the policy.
0312.1.7	Explain the need for professional development for county superintendents and principals regarding the policy.
0312.2	Demonstrate professional and ethical behavior.
0312.2.1	Uphold confidentiality standards when handling sensitive information about students or staff.
0312.2.2	Demonstrate integrity and honesty in dealing with colleagues, students, and parents.

Workplace Exploration

0312.3	Explore workplace dynamics and classifications.
0312.3.1	Discuss methods of socialization to various employment settings within the chosen specialization field.
0312.3.2	Examine organizational structures including policies and procedures of county boards of education.
0312.3.3	Identify conceptual frameworks applied in various school settings.
0312.3.4	Examine methods of giving and receiving supervision.

Job Shadowing Experience

0312.4	Explore various school service personnel positions and their contributions to the educational environment.
0312.4.1	Explore positions within your local school district and select five service personnel classification categories that interest you the most.
0312.4.2	Describe requirements and competencies for each chosen category.
0312.4.3	Contact professionals in each field to schedule job shadowing opportunities.
0312.4.4	Evaluate schedules and availability to coordinate suitable dates and times for each job shadowing session.
0312.4.5	Participate in a job-shadow experience for a minimum of 10 hours in each of the selected service personnel classification categories. (Total of 50 hours)
0312.4.6	Take notes on key tasks, responsibilities, and interactions observed during each job shadowing experience.
0312.4.7	Interview professionals to gain insights into the educational background, required skills, and challenges associated with each school service personnel classification.
0312.4.8	Participate in hands-on activities or projects assigned by professionals during the job shadowing sessions.
0312.4.9	Reflect on each job shadowing experience by journaling about personal observations, lessons learned, and potential career interests within each area.

Reflection and Analysis

0312.5	Reflect on job shadowing experiences and analyze the skills, knowledge, and personal attributes required for each career field.
0312.5.1	Review and organize journal entries from the job shadowing experiences to identify common themes, skills, and interests across different school service personnel career areas.
0312.5.2	Participate in group discussions to share insights and reflections from the job shadowing experiences.
0312.5.3	Complete written reflections or reports summarizing key takeaways, challenges encountered, and personal growth during the job shadowing activities.
0312.5.4	Discuss observations, insights, and potential career pathways within school service personnel positions.
0312.5.5	Research additional information about specific school service personnel careers of interest, including educational requirements, certification/licensure, and professional development opportunities.
0312.5.6	Incorporate into your portfolio, a detailed account of career exploration, including job shadowing reflections, networking experiences, and future career plans within school service personnel positions.
0312.5.7	Participate in mock interview sessions to practice answering common interview questions and showcasing relevant skills and experiences for school service personal positions.

This course equips students with essential skills for workplace assessment, technical proficiency, self-reflection, and competency testing. Technical competencies are honed through the demonstration of knowledge and skills in at least two service personnel classification categories, alongside participation in a minimum of 50 hours of work-based field experience per category. Emphasis is placed on maintaining meticulous records, assessing field experiences, and researching career interests. Self-reflection exercises encourage students to assess their strengths and weaknesses, while competency testing ensures mastery of chosen classifications through adherence to standards and completion of tests.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Workplace Assessment

0313.1	Conduct comprehensive workplace skill assessment.
0313.1.1	Choose specific skills and tasks to guide the work-based field experience.
0313.1.2	Create a work-based field experience training plan.
0313.1.3	Maintain complete and accurate records for the work-based field experience.
0313.1.4	Assess and report on the work-based field experience.
0313.1.5	Research and evaluate a job in a chosen career interest field.

Technical Skills

0313.2	Demonstrate knowledge and technical skills required for a minimum of two different service personnel classification categories.
0313.2.1	Demonstrate knowledge of selected job requirements.
0313.2.2	Apply skills to obtain training and/or certification in selected categories.
0313.2.3	Participate in a work-based field experience for a minimum of 50 hours for each selected category for a total of 100 hours. (Students must be supervised at all times, 100% of hours. Prior to participating in the field experience, students must earn a 100% on all safety tests required for the selected category.)

Self-Reflection

0313.3	Complete a self-reflection for the work-based field experience.
0313.3.1	Assess the job tasks required for the selected service personnel classifications.
0313.3.2	Identify strengths and weaknesses of the field experience.
0313.3.3	Complete a follow-up career interest survey.

Competency Testing

0313.4	Complete service personnel competency testing service.
0313.4.1	Review the standards for the selected classification.
0313.4.2	Demonstrate an understanding of the written and performance requirements for the competency test.
0313.4.3	Complete the competency test for selected service personnel classification(s).

This course is designed to cultivate student understanding in key areas including advertising, promotion, marketing, communication techniques, economic principles, and market planning strategies. Through engaging projects and practical applications, students will gain insights and skills essential for success in the field of marketing. Preparing students for the challenges and opportunities of today's rapidly evolving marketplace, emphasis is placed on activities including exploring current trends, gathering information, analyzing data, and executing marketing activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advertising, Promotion, and Marketing

0422.1	Explain the concept and purpose of advertising and cooperative advertising.
0422.1.1	Evaluate the role of advertising and promotion in a business organization including strategies and techniques for promoting products, services, and organizations.
0422.1.2	Explain the types of promotion (i.e., institutional, product, service, etc.).
0422.1.3	Define advertising as a marketing communication tool used to promote products, services, or ideas to target audiences.
0422.1.4	Explore the historical evolution of advertising from traditional media channels to digital platforms and emerging technologies.
0422.1.5	Explore the role of creativity and messaging in advertising campaigns, including the use of storytelling, humor, emotion, and persuasion techniques.
0422.1.6	Describe current issues/trends in marketing.
0422.1.7	Understand the primary purpose of cooperative advertising.
0422.1.8	Identify the key stakeholders involved in cooperative advertising and understand their roles (e.g., manufacturers, retailers, advertising agencies, and consumers).
0422.2	List forms of advertising media and the advantages and disadvantages of each.
0422.2.1	Examine various advertising strategies and tactics used by marketers, including print ads, broadcast commercials, digital display ads, social media advertising, and influencer partnerships.
0422.2.2	Compare and contrast various media and promotional devices used by businesses to promote their products and services.
0422.3	Characterize how merchandising impacts a retailer's perceived image and/or brand.
0422.3.1	Identify a company's brand promise.
0422.3.2	Determine ways of reinforcing the company's image through employee performance.
0422.3.3	Explain the primary objectives of advertising, including building brand awareness, influencing consumer behavior, generating sales leads, and fostering brand loyalty.
0422.3.4	Describe factors used by marketers to position products/services.
0422.3.5	Describe the role of customer's voice in branding.
0422.4	Demonstrate an understanding of the concept of the marketing mix and segmentation.
0422.4.1	Explain how organizations adapt to today's market.
0422.4.2	Explain the nature and scope of the product/service management function.
0422.4.3	Explain the nature of marketing research.
0422.4.4	Identify the elements of the promotional mix.

0422.4.5	Understand the role of advertising within the marketing mix, including its interaction with other elements such as product, price, place, and promotion.
0422.4.6	Understand the importance of target audience segmentation in advertising, including demographic, psychographic, and behavioral factors.
0422.5	Understand marketing's role and function in businesses.
0422.5.1	Describe marketing functions, strategies, and related activities.
0422.5.2	Understand the concept of customer "buzz" and its significance in marketing strategies.
0422.5.3	Describe data-collection methods (e.g., observations, mail, diaries, telephone, Internet, discussion groups, interviews, scanners, tracking tools).
0422.5.4	Evaluate questionnaire design (e.g., types of questions, question-wording, routing, sequencing, length, layout).
0422.5.5	Assess the appropriateness of marketing research for the problem/issue (e.g., research methods, sources of information, timeliness of information, etc.).
0422.5.6	Apply basic marketing concepts to solve marketing challenges.

Communications

0422.6	Apply effective verbal and telephone communications, including proper grammar and vocabulary.
0422.6.1	Respond to customer inquiries.
0422.6.2	Adapt communication to the cultural and social differences among target audiences.
0422.6.3	Engage in role-playing scenarios and simulations to practice effective verbal and telephone communication skills, including handling customer inquiries, objections, and sales transactions with confidence and professionalism.
0422.6.4	Define and articulate the key components of effective communication, including clarity, active listening, empathy, professionalism, and adaptability to diverse customer needs and preferences.
0422.7	Prepare basic written reports and product presentations.
0422.7.1	Prepare persuasive messages/letters/reports.
0422.7.2	Understand the formats and structures of written reports and product presentations commonly used in marketing, including executive summaries, introductions, body content, conclusions, and visual aids.
0422.7.3	Develop an understanding of the purpose, audience, and objectives of written reports and product presentations in retailing, facilitating sales and marketing efforts.
0422.7.4	Create visual aids and graphics, such as charts, graphs, tables, and images, to enhance the clarity and visual appeal of their reports and presentations, effectively illustrating key points and data trends.
0422.7.6	Practice presentation delivery skills, including public speaking, voice modulation, eye contact, and body language, to engage and captivate the audience during product presentations and enhance communication effectiveness.
0422.7.7	Participate in rehearsals and mock presentations to refine presentation skills, timing, transitions, and responsiveness to audience feedback, ensuring readiness and confidence in delivering impactful product presentations in real-world settings.
0422.8	Follow oral and written directions.
0422.8.1	Recognize the significance of following oral and written directions in the marketing industry for project execution, client satisfaction, and team collaboration.
0422.8.2	Develop active listening skills to accurately comprehend oral directions provided by instructors, supervisors, clients, and team members during marketing activities.
0422.8.3	Enhance reading comprehension abilities to effectively interpret written directions, briefs, memos, emails, project plans, and marketing strategies.

0422.8.4	Practice clear and concise communication when conveying marketing instructions, requirements, and expectations to team members and stakeholders.
0422.8.5	Demonstrate adaptability to varied oral and written instructions encountered in diverse marketing contexts, campaigns, projects, and client needs.
0422.8.6	Follow established workflows, processes, and procedures outlined in marketing plans, project briefs, style guides, and organizational standards.
0422.8.7	Collaborate effectively with team members to ensure alignment in understanding and execution of marketing directives, tasks, and deliverables.
0422.9	Describe forms of nonverbal communication.
0422.9.1	Recognize the significance of nonverbal communication in marketing contexts for conveying messages, building relationships, and influencing consumer behavior.
0422.9.2	Define nonverbal communication and distinguish it from verbal communication, highlighting its role in conveying meaning through gestures, facial expressions, body language, posture, and gestures, appearance, and other visual cues.
0422.9.3	Explore cultural and contextual differences in nonverbal communication, recognizing how cultural norms, values, and social contexts influence the interpretation of nonverbal cues in marketing messages.
0422.9.4	Understand the significance of body language and gestures in nonverbal communication, including their impact on perceptions of credibility, trustworthiness, and rapport in marketing interactions.
0422.9.5	Analyze facial expressions and emotions as nonverbal cues that convey feelings, attitudes, and reactions in marketing communications, branding, advertising, and consumer engagement.
0422.9.6	Explore nonverbal elements in visual media, including photography, video, graphic design, and advertising visuals, and analyze how they contribute to conveying brand identity, values, and messages.
0422.9.7	Practice and develop nonverbal communication skills through role-playing exercises, simulations, and practical applications in marketing presentations, negotiations, sales interactions, and customer service.

Economics

0422.10	Display knowledge of basic economic concepts, including supply and demand.
0422.10.1	Explain forces that are driving market changes (e.g., globalization, consumer demands, spending trends, and industry structure changes).
0422.10.2	Explain the nature and scope of channel management and channel distribution.
0422.10.3	Determine the relationship between government and business.
0422.11	Distinguish between consumer wants and needs.
0422.11.1	Identify and define consumer needs.
0422.11.2	Recognize consumer wants.
0422.11.3	Develop a marketing strategy based on customer wants and needs.
0422.12	Explain the concept of opportunity cost.
0422.12.1	Identify key elements in opportunity cost (e.g., production, returns, and revenue).
0422.12.2	Explain how total revenue and marginal revenue are used to determine the amount of output that will generate the most profit.
0422.12.3	Compare and contrast the nature of product bundling.
0422.13	Describe the concept of global opportunities related to goods and services.
0422.13.1	Discuss the global environment in which businesses operate.
0422.13.2	Explain the nature of global trade.
0422.13.3	Discuss the impact of cultural and social environments on global trade.
0422.14	Define characteristics of economies related to government involvement.

0422.14.1	Acquire knowledge of the impact of government on business activities to make informed economic decisions.
0422.14.2	Explain the importance of taxes in a market economy.
0422.14.3	Identify ways that tax monies are used by the different levels of government.

Customer Service, Sales, Selling

0422.15	Explain the importance of positive customer relations.
0422.15.1	Demonstrate a customer service mindset.
0422.15.2	Explain the nature and scope of the selling function.
0422.16	Determine the customer/client needs and buying motives.
0422.16.1	Explain factors that influence customer/client/business buying behavior.
0422.16.2	Demonstrate connections between company actions and results (e.g., influencing consumer buying behavior, gaining market share).
0422.17	Contrast sales approaches (e.g., greeting).
0422.17.1	Explain the nature and scope of the selling function.
0422.17.2	Explain the role of customer service as a component of selling relationships.
0422.17.3	Explain company selling policies.

Retail-Related Mathematics

0422.18	Solve addition, subtraction, multiplication, division, fractions, decimals, and percentage problems pertaining to business/retailing.
0422.18.1	Apply addition, subtraction, multiplication, and division to solve practical business and retailing scenarios, such as calculating total sales revenue, determining profit margins, and managing inventory levels.
0422.18.2	Demonstrate solving fraction problems commonly encountered in business and retail settings, such as calculating discounts, markup percentages, and sales tax rates.
0422.18.3	Demonstrate calculating percentages and apply them to various business and retail situations, including computing discounts, markups, sales growth rates, and profit margins.
0422.18.4	Analyze different pricing strategies used in business and retail, such as cost-based pricing, competitive pricing, and value-based pricing, using mathematical concepts like percentages and markup.
0422.19	Make change with or without change indication.
0422.19.1	Develop the skills necessary to accurately calculate and provide change for transactions in various retail settings.
0422.19.2	Make change for different transaction amounts, considering factors such as rounding, minimizing the number of coins and bills used, and ensuring accuracy in calculations.
0422.20	Calculate amount of purchases, discounts, and special charges for purchases.
0422.20.1	Explain the nature and scope of the pricing function
0422.20.2	Describe the role of business ethics and legal considerations in pricing.

Professionalism in Retail Merchandising

0422.21	Define personality traits and skills important to retailing (e.g., creativity, organizational skills).
0422.21.1	Acquire self-development skills to enhance relationships and improve efficiency in the work environment.
0422.21.2	Explain the need for innovation skills.
0422.21.3	Demonstrate problem-solving skills and make decisions.
0422.21.4	Engage in role-playing exercises, simulations, and interactive activities to practice and reinforce key retailing skills, such as customer interactions, sales presentations, product demonstrations, and conflict resolution scenarios.

Entrepreneurship

0422.22	Explain franchising and other types of business ownership (e.g., partnership, corporation).
0422.22.1	Discuss common contemporary business models (e.g., manufacturer, distributor, direct sales, franchising, retail, freemium, subscription, advertising-based).
0422.22.2	Define various business ownership structures, including franchising, partnerships, and corporations, and distinguish between their characteristics, legal frameworks, and operational implications.
0422.22.3	Explore different franchising models, such as product distribution franchising, business format franchising, and master franchising, understanding their respective roles, responsibilities, and contractual arrangements.
0422.22.4	Examine partnership structures, including general partnerships, limited partnerships, and limited liability partnerships, analyzing their key features, governance mechanisms, and liability implications for partners.
0422.22.5	Understand various types of corporate entities, such as sole proprietorships, limited liability companies (LLCs), S corporations, and C corporations, and evaluate their advantages, disadvantages, and regulatory requirements.
0422.22.6	Evaluate the suitability of different business ownership models for marketing strategy development, considering factors such as brand control, investment requirements, risk management, and scalability.
0422.23	Display understanding of trademarks, patents, and copyrights.
0422.23.1	Define and differentiate trademarks, patents, and copyrights as forms of intellectual property protection (e.g., inventions, innovations, processes, and designs).
0422.23.2	Identify the key components and characteristics of trademarks, patents, and copyrights, including their purpose, duration, and scope of protection.
0422.23.3	Explain the purpose and function of trademarks, patents, and copyrights in protecting intellectual property rights, including preventing unauthorized use, promoting innovation, and fostering creativity.
0422.23.4	Understand the automatic nature of copyright protection, registration options, and enforcement mechanisms.
0422.23.5	Explain the legal framework and governing laws related to trademarks, patents, and copyrights, including national and international regulations.
0422.23.6	Define trademarks and explain their role in protecting brand identities, logos, slogans, and distinctive symbols.
0422.23.7	Understand the process of trademark registration, including eligibility criteria, application procedures, and maintenance requirements.
0422.23.8	Identify the types of actions that constitute infringement of trademarks, patents, and copyrights.
0422.23.9	Understand the legal remedies and enforcement mechanisms available to owners of intellectual property rights.

This course explores marketing, guiding students through essential concepts and skills vital for success in the field. Through interactive discussions and practical application, students gain insights into various marketing functions, product/service management strategies, and techniques for enhancing brand recognition and profitability. With a focus on retail marketing, corporate branding, ROI analysis, marketing research, and market planning, students will develop a comprehensive understanding of strategic marketing approaches. Special attention is given to exploring merchandising strategies and navigating the retail marketing environment, along with the integration of economic and financial concepts for students to develop an understanding of the skills needed to excel in today's ever-evolving business and marketing landscape.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advertising, Promotion, and Marketing

0425.1	Characterize how merchandising impacts a retailer's perceived image and/or brand.
0425.1.1	Identify the company's unique selling proposition.
0425.1.2	Build product/service brand.
0425.1.3	Understand the use of direct marketing to attract attention and to build a brand (mail, online, email, websites, blogging, RSS feeds, podcasts, webcasts, social bookmarking/tagging, video/images, mobile marketing, search engine optimization).
0425.2	Demonstrate an understanding of the concept of the marketing mix and segmentation.
0425.2.1	Select a target market appropriate for the product/business to obtain the best return on marketing investment (ROMI) or (ROI).
0425.2.2	Explain the concept of market and market identification.
0425.2.3	Identify market segments.
0425.2.4	Develop customer profile.
0425.2.5	Conduct SWOT analysis for use in the marketing planning process.
0425.3	Employ marketing information to plan marketing activities.
0425.3.1	Explain the nature of marketing planning.
0425.3.2	Explain marketing metrics.
0425.3.3	Develop a marketing budget.
0425.3.4	Develop marketing plan.
0425.3.5	Explain strategies for linking performance measures to financial outcomes.
0425.4	Generate product ideas to contribute to ongoing business success.
0425.4.1	Identify product opportunities.
0425.4.2	Apply the Design Thinking Process.
0425.4.3	Determine the initial feasibility of the product idea.
0425.4.4	Create processes for ongoing opportunity recognition.
0425.4.5	Describe the uses of grades and standards in marketing.

Communications

0425.5	Prepare basic written reports and product presentations.
0425.5.1	Explain the concept of "product/service" in marketing communications.

0425.5.2	Describe services offered by the marketing-communications industry.
0425.5.3	Practice delivery of the presentation to ensure clarity, confidence, and effective timing, rehearsing transitions, pacing, and non-verbal communication.
0425.5.4	Outline the basic structure of product presentations, including an introduction, overview of products or services, features and benefits, customer testimonials, visual aids, and a call to action to encourage purchasing decisions.
0425.5.5	Gather and analyze relevant data, information, and market research findings to support the content and recommendations presented in written reports and product presentations, ensuring accuracy, credibility, and relevance.
0425.5.6	Utilize visual aids, multimedia tools, and presentation software to enhance the visual appeal and effectiveness of product presentations, incorporating images, graphics, charts, videos, and animations as appropriate.
0425.5.7	Develop a compelling narrative and messaging strategy for written reports and product presentations, highlighting key selling points, unique value propositions, and competitive advantages to capture audience attention and generate interest.
0425.5.8	Integrate brand identity, messaging, and visual elements into written reports and product presentations, ensuring alignment with brand values, positioning, and guidelines to maintain brand consistency and authenticity.

Merchandising

0425.6	Participate in executing effective in-store and window displays, and floor sets.
0425.6.1	Define and differentiate between in-store displays, window displays, and floor sets, understanding their respective roles in showcasing products, promoting seasonal themes, and maximizing retail space utilization.
0425.6.2	Identify key components of effective displays, including focal points, product placement, signage, lighting, props, storytelling elements, and thematic consistency, to create visually compelling and cohesive retail environments.
0425.6.3	Document and showcase success stories, best practices, and innovative displays through photography, case studies, or portfolio presentations, highlighting achievements and contributions to the overall retail experience and business objectives.
0425.6.4	Develop strategies to position products/services.
0425.7	Explain the use and effect of visual merchandising and store layout.
0425.7.1	Define visual merchandising and understand its role in retail environments to attract customers and enhance the overall shopping experience.
0425.7.2	Recognize and describe the key elements of visual merchandising, including signage, product placement, lighting, color schemes, and store layout.
0425.7.3	Describe the objectives of visual merchandising, such as increasing sales, promoting brand identity, highlighting product features, and creating a cohesive store ambiance.
0425.7.4	Explain the principles of effective store layout design, including traffic flow, zoning, focal points, sightlines, and accessibility for different customer demographics.
0425.7.5	Understand the psychological influences behind store layout decisions, including the impact on consumer perceptions of space, product accessibility, and navigation ease.
0425.8	Explain the role of wholesalers and distributors.
0425.8.1	Explain the nature of channel strategies.
0425.8.2	Assess the impact of push and pull strategies on channel management.
0425.8.3	Develop alternative strategies for supply chain disruptions.

0425.8.4	Evaluate vendors' services.
0425.9	Explain functions of maintenance and cleanliness.
0425.9.1	Explore the functions of cleanliness, such as maintaining a safe and hygienic environment, preserving the quality of products or materials, and enhancing the overall aesthetics of a space.
0425.9.2	Understand the importance of maintenance in prolonging the lifespan of equipment, reducing downtime, minimizing repair costs, and ensuring operational efficiency.
0425.9.3	Demonstrate effective cleaning techniques for different surfaces, equipment, and environments, including using appropriate cleaning agents, tools, and methods.

Technology in Retail Marketing

0425.10	Describe benefits of technology in retailing.
0425.10.1	Maintain databases of information for marketing communications.
0425.10.2	Use analytical tracking tools for marketing communications.
0425.10.3	Describe the use of technology in the product/service management function.
0425.11	Describe digital pricing and inventory systems.
0425.11.1	Explore the inventory management features of digital systems, including real-time inventory tracking, stock level alerts, automatic reorder points, and inventory optimization algorithms.
0425.11.2	Understand how digital pricing and inventory systems integrate with pricing strategies, such as cost-based pricing, competitive pricing, value-based pricing, and dynamic pricing models.
0425.11.3	Explain how digital pricing and inventory systems utilize data analytics to analyze sales trends, forecast demand, optimize pricing strategies, and identify opportunities for inventory management improvements.
0425.12	Compare advantages and disadvantages of electronic payment to the retail establishment.
0425.12.1	Compare and Contrast POS systems to multiple payment options, including mobile payments and digital wallets.
0425.12.2	Explain compliance with regulations such as GDPR, CCPA, and PCI DSS for data privacy and security.
0425.12.3	Identify strategies to protect digital customer data (e.g., information about customers, customers' credit-card numbers, passwords, customer transactions).
0425.13	Characterize how technological changes impact a retailer's perceived image and/or brand.
0425.13.1	Explain equity positioning.
0425.13.2	Evaluate the effectiveness of marketing-communications services.
0425.14	Describe various forms of digital retail technology (e.g., rewards programs, loyalty cards).
0425.14.1	Describe referral programs that can be used to build brand/promote products.
0425.14.2	Develop referral program to build brand/promote products.
0425.14.3	Describe how digital pricing and inventory systems integrate with customer relationship management (CRM) platforms to personalize pricing, track customer preferences, and improve customer satisfaction.

Customer Service, Sales, Selling

0425.15	Determine the customer/client needs and buying motives.
0425.15.1	Identify and analyze internal and external factors that influence consumer buying decisions, such as personal preferences, social influences, cultural factors, and marketing stimuli.
0425.15.2	Explore various theories and models of consumer behavior to understand the psychological processes underlying consumer decision-making.
0425.15.3	Explain key factors in building a clientele.
0425.15.4	Conduct customer-satisfaction studies.
0425.15.5	Manage marketing information to guide and assess promotional activities.

0425.16	Demonstrate an understanding of the buying process.
0425.16.1	Define the buying process and identify its key stages, including problem recognition, information search, evaluation of alternatives, purchase decision, and post-purchase evaluation.
0425.16.2	Understand the concept of buyer personas and learn how to develop detailed profiles of target customers, including demographics, psychographics, behaviors, and purchasing preferences.
0425.16.3	Discuss motivational theories that impact buying behavior.
0425.17	Demonstrate product knowledge.
0425.17.1	Identify the impact of product life cycles on marketing decisions.
0425.17.2	Explain warranties and guarantees.
0425.17.3	Analyze product information to identify product features and benefits.
0425.18	Close the sale and provide customer maintenance activities.
0425.18.1	Understand the steps involved in closing a sale, including identifying buying signals, overcoming objections, and finalizing the transaction.
0425.19	Interpret business policies to customers/clients and handle customer complaints and issues.
0425.19.1	Maintain composure when receiving/delivering bad news.
0425.19.2	Resolve problems with workflow.
0425.19.3	Foster client-agency relationship.
0425.19.4	Build rapport with suppliers.

Retail-Related Mathematics

0425.20	Calculate amount of purchases, discounts, and special charges for purchases.
0425.20.1	Analyze methods and metrics used to measure the effectiveness of advertising campaigns, including reach, frequency, engagement, conversion rates, and return on investment (ROI).
0425.20.2	Determine cost of product (breakeven, ROI, markup).
0425.20.3	Calculate break-even point.
0425.20.4	Develop pricing policies and trading terms.
0425.21	Complete sale transactions, including cash, charge cards, and sales tax.
0425.21.1	Understand the essential components of a sale transaction, including identifying the buyer, itemizing the products or services purchased, determining the total cost, and processing payment.
0425.21.2	Differentiate between various payment methods commonly used in retail transactions, including cash, credit cards, debit cards, and mobile payments.
0425.21.3	Calculate sales tax based on the applicable tax rate and apply it to the total purchase amount accurately.
0425.22	Apply the concepts of commission sales and sales quotas
0425.22.1	Define commission sales and explain how they differ from fixed salary or wage-based compensation models.
0425.22.2	Understand various types of commission structures, including straight commission, base salary plus commission, and tiered commission systems.
0425.22.3	Calculate commission earnings based on different commission rates and sales performance.
0425.22.4	Analyze how commission-based compensation structures incentivize sales representatives and influence their motivation and performance.
0425.23	Identify various measures used by retailers (e.g., conversion, UPT).
0425.23.1	Describe the need for marketing data.
0425.23.2	Identify data monitored for marketing decision making.
0425.23.3	Define and differentiate between common retail performance measures, such as conversion rate, units per transaction (UPT), average transaction value (ATV), and sales per square foot.

0425.23.4	Understand the importance of retail metrics in evaluating business performance, identifying strengths and weaknesses, and making data-driven decisions to optimize operations.
0425.23.5	Explore additional retail metrics used to assess performance, such as gross margin, inventory turnover ratio, customer retention rate, and basket size, understanding their relevance in different operational contexts.
0425.23.6	Apply retail metrics in making informed decisions, such as setting sales targets, optimizing pricing strategies, allocating resources effectively, and evaluating marketing initiatives.

Professionalism in Retail Merchandising

0425.24	Demonstrate team and interpersonal relationships.
0425.24.1	Recognize and identify the importance of teamwork in the marketing environment.
0425.25	Identify leadership traits.
0425.25.1	Understand the fundamental principles of leadership in marketing, including vision setting, decision-making, delegation, motivation, and team management.
0425.25.2	Recognize and identify effective leadership traits and qualities exhibited by successful marketing leaders, such as communication skills, strategic thinking, emotional intelligence, adaptability, and resilience.
0425.25.3	Identify role models and inspirational figures in the marketing industry who exemplify strong leadership qualities, innovative thinking, and impactful contributions to the field.
0425.25.4	Explore leadership theories, models, and frameworks relevant to marketing contexts, including transformational leadership, servant leadership, situational leadership, and adaptive leadership, to gain insights into effective leadership approaches.

Cross-media marketing is a dynamic course that focuses on a deep understanding of various marketing channels and platforms to effectively engage with diverse audiences. This course aims to equip students with the knowledge and skills necessary to develop and implement cross-media marketing strategies across multiple channels, including traditional, digital, and emerging platforms. Students will learn how to integrate messaging, content, and branding seamlessly across different media to create cohesive and impactful marketing campaigns.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advertising, Promotion, and Marketing

0426.1	Explain the concept and purpose of advertising and cooperative advertising.
0426.1.1	Identify key marketing channels and platforms, including traditional, digital, and emerging media.
0426.2	List forms of advertising media and the advantages and disadvantages of each.
0426.2.1	Discuss the nature of digital marketing.
0426.2.2	Explain ethical considerations in digital marketing.
0426.2.3	Explain the nature of online advertising (e.g., email, search, social media, display, mobile, etc.).
0426.2.4	Explain the role of business websites in digital marketing.
0426.2.5	Discuss the use of search engine optimization tactics for digital marketing.
0426.2.6	Develop content for use in marketing communications to create interest in product/business/idea.
0426.2.7	Demonstrate an understanding of how a website presence can be used to promote business/product.
0426.2.8	Plan marketing communications to maximize effectiveness and to minimize costs.
0426.3	Apply knowledge of advertising in social media.
0426.3.1	Use analytics tracking tools for marketing communication.
0426.3.2	Explain the use of social media for digital marketing.
0426.3.3	Identify social media platforms.
0426.3.4	Differentiate among social media platform-specific strategies in digital marketing efforts (e.g., frequency, timing, content, engagement).
0426.3.5	Discuss best practices for using social media in digital marketing efforts.
0426.3.6	Quantify the contribution of social media (metrics and goals, finding what is good, measuring and adjusting on the fly, reporting, and sharing insights).
0426.3.7	Demonstrate ethics to digital communications.
0426.3.8	Identify trends in the social-media space.
0426.3.9	Track trends (e.g., social, buying, social media, advertising agency).
0426.3.10	Explain considerations in developing viral marketing campaigns.
0426.3.11	Explain the use of celebrities/influencers.
0426.4	Characterize how merchandising impacts a retailer's perceived image and/or brand.
0426.4.1	Manage online brand and reputation.
0426.5	Demonstrate an understanding of the concept of the marketing mix and segmentation.
0426.5.1	Implement and monitor promotional activities to maximize return on promotional efforts.
0426.5.2	Develop integrated cross-media marketing strategies to reach target audiences effectively.
0426.5.3	Create compelling content tailored to specific media channels and audience segments.
0426.6	Discuss technology in marketing.

0426.6.1	Explain ways that technology impacts marketing communications.
0426.6.2	Compare the capabilities of short messaging service (SMS) with multimedia messaging services (MMS).
0426.6.3	Explain the capabilities of tools used in website creation.
0426.6.4	Discuss considerations in using mobile technology for promotional activities.
0426.6.5	Demonstrate effective use of audiovisual aids.
0426.6.6	Integrate software applications to prepare promotional materials.
0426.6.7	Explain how to effectively incorporate video into multimedia.
0426.6.8	Evaluate the impact of mobile device capabilities and usage patterns on social-media effectiveness.
0426.6.9	Explain security considerations in marketing communications.
0426.6.10	Evaluate marketing communications data security.
0426.6.11	Identify strategies for protecting the business's digital assets (e.g., website, social media, email).
0426.6.12	Monitor the production of marketing communications materials.
0426.6.13	Create direct marketing materials to attract attention (mail, online, email, websites, blogging, RSS feeds, podcasts, webcasts, social bookmarking/tagging, video/images, mobile marketing, search engine optimization).
0426.7	Understand Design Principles to be able to communicate needs to designers.
0426.7.1	Describe the use of color in advertisements.
0426.7.2	Describe the elements of design.
0426.7.3	Explain the use of illustrations in advertisements.
0426.7.4	Discuss the nature of typography.
0426.7.5	Explain type of styles used in advertisements.
0426.7.6	Describe effective advertising layouts.
0426.7.7	Identify types of drawing media.
0426.7.8	Explain the impact of color harmonies on composition.
0426.7.9	Describe digital color concepts.

Communications

0426.8	Apply effective verbal and telephone communications, including proper grammar and vocabulary.
0426.8.1	Explain the nature of communications plans.
0426.8.2	Develop communications plan.
0426.9	Prepare basic written reports and product presentations.
0426.9.1	Develop compelling narratives for their reports and presentations, telling a cohesive story that engages the audience, communicates key messages effectively, and persuades stakeholders to take desired actions.
0426.9.2	Incorporate persuasive language and storytelling techniques into pitches to evoke emotion, capture attention, and leave a lasting impression on the audience, compelling them to take action.
0426.9.3	Develop engaging sales presentations and videos to effectively showcase product/service features, benefits, and value propositions, aiming to drive customer engagement, generate leads, and ultimately increase sales conversions.
0426.9.4	Develop engaging and interactive content strategies tailored to each digital media channel, fostering meaningful interactions, discussions, and user-generated content that resonate with target audiences and encourage participation and sharing.
0426.10	Follow oral and written directions.
0426.10.1	Conduct creative briefing.
0426.10.2	Conduct marketing communications planning meetings.

Technology in Retail Marketing

0426.11	Describe benefits of technology in retailing.
0426.11.1	Explore emerging trends and technologies shaping the future of cross-media marketing.
0426.11.2	Differentiate e-commerce platforms with user-friendly interfaces and secure payment gateways.
0426.11.3	Evaluate features such as product recommendations, reviews, and wish lists to enhance the online shopping experience.
0426.11.4	Evaluate digital marketing efforts.
0426.13	Characterize how technological changes impact a retailer's perceived image and/or brand.
0426.13.1	Summarize omnichannel marketing strategies to provide a seamless shopping experience across online and offline channels.
0426.13.2	Ensure consistency in branding, messaging, and promotions across all retail touchpoints.
0426.13.3	Utilize social media platforms for brand awareness, customer engagement, and influencer collaborations.
0426.13.4	Implement social listening tools to monitor brand mentions, sentiment, and trends in real-time.
0426.14	Describe various forms of digital retail technology (e.g., rewards programs, loyalty cards).
0426.14.1	Utilize technology platforms to manage and track customer loyalty points, rewards, and incentives.
0426.14.2	Leverage customer data from loyalty programs to personalize marketing communications and offers.
0426.14.3	Evaluate the media's contribution to the campaign's effectiveness.
0426.15	Compare advantages and disadvantages of "brick and mortar" versus online businesses.
0426.15.1	Assess the market reach and accessibility of brick-and-mortar businesses in comparison to online businesses, considering geographical constraints and target audience demographics.
0426.15.2	Explore consumer behavior patterns and preferences to shopping experiences offered by brick-and-mortar stores and online platforms.
0426.15.3	Compare sales and revenue models between brick-and-mortar businesses and online businesses, including transactional fees, pricing strategies, and profit margins.
0426.15.4	Assess the scalability and growth potential of brick-and-mortar businesses versus online businesses in terms of expanding market reach, product offerings, and customer base.
0426.15.5	Analyze the competitive landscape for brick-and-mortar businesses and online businesses, including market saturation, industry trends, and competitive advantages.
0426.15.6	Evaluate the customer experience and satisfaction levels associated with brick-and-mortar shopping versus online shopping, considering factors such as convenience, personalization, and service quality.
0426.15.7	Explore opportunities for integrating brick-and-mortar and online business models to create hybrid retail experiences that leverage the strengths of both channels.

Customer Service, Sales, Selling

0426.16	Determine the customer/client needs and buying motives.
0426.16.1	Analyze audience behavior and preferences across different media channels.
0426.16.2	Utilize analytics and metrics to measure the effectiveness of cross-media marketing campaigns.

Professionalism in Retail Merchandising

0426.17	Define personality traits and skills important to retailing (e.g., creativity, organizational skills).
0426.17.1	Discuss career opportunities in digital marketing.
0426.17.2	Describe certifications available in digital marketing.

Entrepreneurship

0426.18	Display understanding of trademarks, patents, and copyrights.
0426.18.1	Apply the principles and concepts of trademarks, patents, and copyrights to business practices, including branding strategies, product development, licensing agreements, and contract negotiations.
0426.18.2	Explore the patent application process, including the criteria for patentability, the different types of patents (e.g., utility patents, design patents), and the examination and approval process by patent offices.

The Marketing Internship Experience course offers students the opportunity to gain hands-on, practical experience in the field of marketing. Through structured internships or simulated work experiences with local businesses or organizations, students will immerse themselves in real-world marketing tasks and projects under the guidance of industry professionals. This course is designed to provide students with valuable insights into marketing strategies, consumer behavior, and the day-to-day operations of marketing departments, while also fostering critical thinking, problem-solving skills, and professional development.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Communications

0428.1	Apply effective verbal and telephone communications, including proper grammar and vocabulary.
0428.1.1	Utilize positive language and tone in verbal and telephone communications, expressing appreciation, empathy, and reassurance to build rapport, enhance customer experiences, and foster goodwill.
0428.1.2	Provide clear and concise information to customers regarding product features, pricing, availability, promotions, and store policies, addressing questions or concerns promptly and accurately.
0428.1.3	Adapt communication style, tone, and language to the preferences and communication styles of diverse customers, demonstrating cultural sensitivity, empathy, and respect for individual differences.
0428.2	Prepare basic written reports and product presentations.
0428.2.1	Demonstrate effective writing skills by using clear, concise language, proper grammar, spelling, punctuation, and formatting conventions in written reports and product presentations to ensure clarity and professionalism.
0428.3	Follow oral and written directions.
0428.3.1	Adapt to changes and updates in oral and written directions, remaining flexible and responsive to evolving circumstances, priorities, and operational needs in the retail environment.
0428.3.2	Prioritize and manage tasks effectively based on the urgency, importance, and deadlines specified in oral and written directions, allocating time, resources, and effort accordingly to meet performance expectations and deliver results.
0428.3.3	Document compliance with oral and written directions by maintaining accurate records, logs, or checklists of tasks completed, actions taken, and outcomes achieved, ensuring accountability and traceability of actions performed.
0428.3.4	Monitor performance against oral and written directions, assessing effectiveness, efficiency, and alignment with established goals and standards, and making adjustments or improvements as needed to optimize outcomes and performance.
0428.4	Describe forms of nonverbal communication.
0428.4.1	Utilize positive nonverbal cues, such as smiling, maintaining eye contact, and using appropriate gestures and facial expressions, to convey warmth, sincerity, and engagement in verbal and telephone interactions.

Merchandising

0428.5	Participate in executing effective in-store and window displays, and floor sets.

0428.5.1	Collaborate with team members, supervisors, and merchandising specialists on conceptualizing and designing in-store displays, window displays, and floor sets, incorporating input, feedback, and creative ideas from diverse perspectives.
0428.5.2	Implement visual merchandising principles and techniques, such as balance, proportion, color theory, focal points, sight lines, and product grouping, to create visually appealing and harmonious displays that capture attention and drive traffic.
0428.5.3	Utilize props, fixtures, display materials, and merchandising tools effectively to enhance the presentation of products, highlight features and benefits, and create immersive and interactive shopping experiences for customers.
0428.5.4	Maximize retail space and optimize traffic flow by strategically positioning in-store displays, window displays, and floor sets to guide customer navigation, encourage exploration, and stimulate impulse purchases.
0428.5.5	Adapt in-store displays, window displays, and floor sets to seasonal holidays, festivals, and promotional campaigns, incorporating relevant themes, colors, decorations, and merchandise assortments to capitalize on seasonal trends and consumer demand.
0428.5.6	Evaluate the effectiveness and performance of in-store displays, window displays, and floor sets based on key performance indicators (KPIs) such as foot traffic, dwell time, conversion rates, and sales lift, identifying opportunities for improvement and innovation.
0428.5.7	Analyze the target audience demographics, psychographics, and shopping behavior to tailor in-store displays, window displays, and floor sets to resonate with customer preferences, lifestyles, and purchasing motivations.
0428.6	Explain the use and effect of visual merchandising and store layout.
0428.6.1	Evaluate different store layout strategies, such as grid layout, free-flow layout, racetrack layout, and boutique layout, based on their suitability for specific retail contexts and target markets.
0428.6.3	Implement current trends and innovations in visual merchandising, such as digital signage, interactive displays, sensory marketing, and experiential retail concepts.
0428.7	Use safety precautions when setting up displays.
0428.7.1	Identify potential safety hazards associated with setting up displays in retail environments, including heavy lifting, use of equipment, tripping hazards, and electrical risks.
0428.7.2	Understand the importance of using appropriate personal protective equipment, such as gloves, safety goggles, and closed-toe shoes, to mitigate potential hazards during display setup.
0428.7.3	Practice safe use of equipment and tools commonly used in display setups.
0428.7.4	Collaborate effectively with team members to ensure that safety precautions are communicated and followed during display setup tasks, fostering a culture of safety in the workplace.
0428.8	Operate point-of-sale terminal/calculator.
0428.8.1	Understand the functions of the POS software, including ringing up sales, processing payments, applying discounts or coupons, and generating receipts.
0428.8.2	Navigate the user interface of the POS terminal efficiently, including accessing different menus, inputting product information, and navigating between transaction screens.
0428.8.3	Understand the importance of maintaining security measures when operating the POS terminal, including logging in securely, protecting customer data, and preventing unauthorized access.
0428.9	Receive incoming stock and verify invoice accuracy.
0428.9.1	Understand the procedures and protocols for receiving incoming stock shipments in a retail or warehouse environment.
0428.9.2	Identify and interpret stock-receiving documentation, including invoices, packing slips, purchase orders, and delivery manifests.

0428.9.3	Utilize inventory management systems or software to record stock receipts, update inventory levels, and reconcile discrepancies between received stock and purchase orders.
0428.9.4	Understand the importance of effective communication with suppliers or delivery personnel during the stock-receiving process, clarifying any discrepancies or issues promptly.
0428.10	Process returned, unwanted, or damaged inventory.
0428.10.1	Demonstrate how to process returns and exchanges using the POS terminal, including refunding payments, updating inventory records, and printing return receipts.
0428.10.2	Identify stock-receiving transactions, including recording received quantities, documenting any discrepancies or damages, and filing receiving paperwork for future reference.
0428.10.3	Describe how to process returned, unwanted, or damaged inventory by following established procedures, including inspecting items for damage, verifying return eligibility, updating inventory records, and coordinating with relevant stakeholders for resolution.

Technology in Retail Marketing

0428.11	Describe digital pricing and inventory systems.
0428.11.1	Explore the functionalities and components of digital pricing systems, including dynamic pricing algorithms, competitor price tracking, and price optimization tools.
0428.11.2	Examine inventory management systems, such as electronic data interchange (EDI), barcode scanning, and real-time inventory tracking software.
0428.12	Compare advantages and disadvantages of electronic payment to the retail establishment.
0428.12.1	Analyze the advantages and disadvantages of electronic payment methods for retail establishments.
0428.13	Characterize how technological changes impact a retailer's perceived image and/or brand.
0428.13.1	Analyze how advancements in technology, such as digital signage, interactive displays, mobile apps, and augmented reality experiences, shape consumers' perceptions of a retailer's innovation, modernity, and customer-centricity.
0428.14	Describe various forms of digital retail technology (e.g., rewards programs, loyalty cards).
0428.14.1	Examine a range of digital retail technologies, including rewards programs, loyalty cards, mobile apps, beacon technology, geolocation services, and personalized recommendation engines.

Customer Service, Sales, Selling

0428.15	Explain the importance of positive customer relations.
0428.15.1	Develop rapport with customers.
0428.15.2	Reinforce service orientation through communication.
0428.16	Determine the customer/client needs and buying motives.
0428.16.1	Develop tailored marketing strategies and value propositions that resonate with target audiences.
0428.16.2	Apply understanding of customer needs and motives to identify market opportunities, anticipate customer preferences, and develop customer-centric marketing strategies.
0428.17	Demonstrate an understanding of the buying process.
0428.17.1	Evaluate marketing strategies and tactics designed to influence each stage of the buying process, such as advertising, content marketing, social proof, pricing strategies, and post-purchase support.
0428.17.2	Apply consumer insights gained from studying the buying process to develop marketing campaigns, messaging strategies, and customer experiences that resonate with target audiences and drive desired action.
0428.18	Demonstrate product knowledge.
0428.18.1	Convey product knowledge to enhance sales effectiveness, customer satisfaction, and brand credibility in marketing scenarios.

0428.19	Contrast sales approaches (e.g., greeting).
0428.19.1	Apply various sales approaches in different sales scenarios to meet the needs and preferences of diverse customers.
0428.20	Close the sale and provide customer maintenance activities.
0428.20.1	Demonstrate effective closing techniques, such as summarizing benefits, offering incentives, and asking for the sale, to persuade customers to make a purchase decision.
0428.20	Interpret business policies to customers/clients and handle customer complaints and issues.
0428.20.1	Apply conflict resolution skills to manage customer complaints and issues, including active listening, problem-solving, and negotiation techniques.

Retail-Related Mathematics

0428.21	Make change with or without change indication.
0428.21.1	Process cash payments from customers by accurately counting cash tendered, providing change when necessary, and issuing receipts or invoices documenting the transaction details, adhering to cash handling procedures and security protocols.
0428.22	Calculate amount of purchases, discounts, and special charges for purchases.
0428.23.1	Account for any special charges, surcharges, service fees, or add-ons included in the purchase transaction, such as warranty fees, installation charges, expedited shipping fees, or customizations requested by the customer.
0428.24	Complete sale transactions, including cash, charge cards, and sales tax.
0428.24.1	Identify upselling and cross-selling opportunities during the sales transaction process, suggesting complementary products, accessories, or upgrades to enhance the customer experience and increase sales revenue.
0428.25	Apply the concepts of commission sales and sales quotas.
0428.25.3	Analyze key sales performance metrics, such as conversion rates, average order value (AOV), customer lifetime value (CLV), sales pipeline velocity, and sales cycle length, to evaluate individual and team sales effectiveness.
0428.25.4	Set personal sales objectives and targets aligned with organizational sales goals, leveraging performance data, market insights, and customer feedback to establish achievable but challenging sales benchmarks.
0428.25.5	Adapt to changing market dynamics, customer preferences, competitive landscapes, and industry trends by adjusting sales approaches, value propositions, and product positioning strategies to remain competitive and relevant in the marketplace.
0428.26	Identify various measures used by retailers (e.g., conversion, UPT).
0428.26.1	Develop an understanding of key performance indicators (KPIs) commonly used by retailers to measure and assess the effectiveness of sales, operations, and customer engagement strategies.
0428.26.2	Explain units per transaction (UPT) as a metric used to measure the average number of items or units sold per customer transaction, recognizing its role in assessing product assortment effectiveness and upselling opportunities.
0428.26.3	Understand customer traffic count as a measure of the total number of visitors or foot traffic entering a retail store or location, analyzing trends, patterns, and peak traffic periods to optimize staffing levels, operational workflows, and customer service delivery.
0428.27	Open/close out register/terminal.
0428.27.1	Verify the contents of the cash drawer, including currency denominations, coins, checks, vouchers, and other forms of payment, ensuring accuracy and completeness before beginning transactions.

0428.27.2	Count the starting cash provided for the register/terminal, verifying the amount against the predetermined starting cash amount or float established by the organization, recording any discrepancies or discrepancies according to company policy.
0428.27.3	Initiate the opening procedures for the register/terminal, including logging into the system, initializing the cash register software, and performing any required system checks or updates before commencing operations.
0428.28	Calculate price changes.
0428.28.1	Analyze the impact of price changes on sales revenue, profitability, and customer perceptions.

Professionalism in Retail Merchandising

0428.29	Abide by OSHA and other legal standards.
0428.29.1	Gain a comprehensive understanding of Occupational Safety and Health Administration (OSHA) regulations relevant to the specific industry and workplace environment.
0428.29.2	Ensure that workplace equipment, machinery, tools, and facilities meet OSHA and legal standards for design, installation, operation, maintenance, and safety features.
0428.29.3	Demonstrate ethical conduct and commitment to legal compliance with OSHA and other regulatory standards, fostering a safe, healthy, and supportive work environment for all employees.
0428.30	Define personality traits and skills important to retailing (e.g., creativity, organizational skills).
0428.30.1	Explain employment opportunities in marketing.
0428.30.2	Participate in career planning to enhance job success potential.
0428.30.3	Demonstrate Personality Traits Relevant to Retailing including customer service orientation, adaptability, empathy, patience, enthusiasm, teamwork, resilience, and integrity.
0428.30.4	Demonstrate the application of personality traits and skills important to retailing in real-world retail settings, such as customer interactions, sales floor management, merchandising displays, promotional events, and inventory control processes.
0428.31	Promote a positive company image.
0428.31.1	Establish and maintain a positive brand reputation by highlighting the company's values, mission, and commitment to excellence in all marketing communications.
0428.31.2	Emphasize product quality, innovation, and differentiation to position the company as a leader in its industry, showcasing its commitment to excellence and continuous improvement.
0428.31.3	Prioritize customer experience by delivering seamless, personalized interactions, exceptional service, and innovative solutions that exceed customer expectations and reinforce a positive company image.
0428.32	Describe the appropriate professional appearance.
0428.32.1	Dress appropriately for various marketing settings and occasions, including client meetings, presentations, networking events, trade shows, and business conferences, adapting attire to suit the context and audience.
0428.33	Respect and understand the importance of diversity and appropriate behavior.
0428.33.1	Understand the importance of diversity in marketing for fostering creativity, innovation, empathy, cultural competence, and relevance in addressing diverse consumer needs and preferences.
0428.33.2	Recognize and mitigate unconscious biases in marketing strategies, messaging, and decision-making processes to ensure inclusivity, fairness, and representation of diverse audiences and communities.
0428.33.3	Appreciate the importance of cultural sensitivity and awareness in marketing communications, recognizing and respecting cultural differences, traditions, values, and norms among diverse target audiences.
0428.34	Exhibit business ethics and maintain confidentiality.

0428.34.1	Adhere to legal and regulatory standards, industry codes of conduct, and professional ethics guidelines governing marketing practices, advertising standards, consumer protection laws, and data privacy regulations.
0428.34.2	Handle sensitive information and confidential materials responsibly, exercising discretion, professionalism, and confidentiality protocols to prevent unauthorized access, disclosure, or misuse of sensitive data.
0428.35	Abide by policies and procedures.
0428.35.1	Adhere to the organization's code of conduct, professional ethics, and values, demonstrating integrity, honesty, and accountability in all marketing initiatives and interactions.
0428.35.2	Follow advertising guidelines and standards set forth by regulatory authorities, industry associations, and advertising self-regulatory bodies to ensure compliance with truth-in-advertising principles, fair competition, and consumer protection laws.
0428.35.3	Follow brand guidelines and visual identity standards established by the organization, ensuring consistency, coherence, and alignment with the brand's image, values, and messaging across all marketing channels and materials.
0428.36	Demonstrate team and interpersonal relationships.
0428.36.1	Cultivate positive work relationships with colleagues, supervisors, stakeholders, and cross-functional teams by demonstrating professionalism, reliability, and a willingness to collaborate and contribute to shared goals.
0428.36.2	Encourage collaboration and idea sharing among team members through brainstorming sessions, workshops, and collaborative platforms that facilitate the exchange of insights, perspectives, and creative solutions.
0428.36.3	Demonstrate adaptability and flexibility in team dynamics and project assignments, accommodating diverse work styles, preferences, and strengths to optimize team performance and effectiveness.
0428.37	Identify leadership traits.
0428.37.1	Lead by example in demonstrating positive team and interpersonal relationships, modeling effective communication, collaboration, and interpersonal skills that inspire trust, respect, and professionalism among team members.
0428.37.2	Embrace strategic thinking and long-term vision in marketing leadership, demonstrating the ability to analyze market trends, consumer insights, competitive landscapes, and emerging opportunities to drive growth and innovation.
0428.37.3	Promote a culture of innovation and creativity within marketing teams by encouraging experimentation, risk-taking, and out-of-the-box thinking, fostering an environment conducive to breakthrough ideas and transformative initiatives.
0428.37.4	Adapt to change, uncertainty, and challenges in marketing leadership roles with resilience, agility, and adaptability, navigating complex environments, overcoming obstacles, and driving organizational agility and resilience.

Entrepreneurship

0428.38	State the advantages and disadvantages of small business ownership.
0428.38.1	Develop an understanding of the unique dynamics, challenges, and opportunities associated with small business ownership in various industries and market environments.
0428.38.2	Explore entrepreneurial opportunities offered by small business ownership, including the ability to capitalize on niche markets, fulfill unmet consumer needs, and adapt quickly to changing market trends and customer preferences.

0428.38.3	Understand the financial rewards and risks inherent in small business ownership, including the potential for profitability, return on investment, business growth, as well as financial uncertainties, cash flow challenges, and investment risks.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Overview of Marketing

0434.1	Overview of Marketing.
0434.1.1	Discover the field of sports, entertainment, and recreation (SER) marketing.
0434.1.2	Recognize trends in sports, entertainment, and recreation as an industry in the local, state, national, and international arenas.
0434.1.3	Characterize marketing.
0434.1.4	Produce a chart of the marketing functions.
0434.1.5	Determine the elements of the marketing mix.
0434.1.6	Assess the importance of the marketing concept.
0434.1.7	Recognize the use of marketing positioning.
0434.1.8	Distinguish types of segmentation.
0434.1.9	Examine the concept of a target market.
0434.1.10	Compare types of marketing segmentation.

Promotion

0434.2	Promotion.
0434.2.1	Examine the four elements of promotion.
0434.2.2	Recognize components of the promotional mix.
0434.2.3	Develop a logo and slogan and its relationship with a trademark.
0434.2.4	Compare the types of advertising media.
0434.2.5	Examine sales promotion strategies.
0434.2.6	Develop sales promotion strategies.
0434.2.7	Recognize publicity and its role in creating a positive public image with SER marketing.
0434.2.8	Construct a press release.
0434.2.9	Determine the role of selling in the sports, entertainment, and recreation industry.
0434.2.10	Point out the steps of personal selling.

Sponsorship and Endorsements

0434.3	Sponsorship and Endorsements.
0434.3.1	Analyze reasons for SER sponsorships and endorsements.
0434.3.2	Compare reasons for athletic and celebrity sponsorships and endorsements.
0434.3.3	Critique the advantages, disadvantages, and legal issues of sponsorship and endorsements.

Legal and Ethical Issues

0434.4	Legal and Ethical Issues.
0434.4.1	Differentiate how laws impact the sports, entertainment, and recreation industries.
0434.4.2	Examine the relevance of contracts in the SER industry.
0434.4.3	Research salary caps within the sports industry.
0434.4.4	Recognize legal implications of copyright and privacy related to the entertainment industry.

0434.4.5	Examine legal implications of licensing of trademarked products in the SER industry.
0434.4.6	Characterize ethics.
0434.4.7	Access the impact of unethical behavior within the sports and entertainment industry.

Risk Management

0434.5	Risk Management.
0434.5.1	Classify risks.
0434.5.2	Analyze the importance of security and insurance.
0434.5.3	Examine methods to prevent, reduce, control, or transfer risks.

Production Management

0434.6	Production Management.
0434.6.1	Recognize the relationship between branding and merchandising in the SER industry.
0434.6.2	Determine merchandising opportunities for a SER event.
0434.6.3	Compare food and beverage opportunities that exist within the SER industry.

Career Development

0434.7	Career Development.
0434.7.1	Research sports, entertainment, and recreation career opportunities at mentorship, internship, entry, mid-management, and upper-management levels.
0434.7.2	Research the education and training needs for a sports, entertainment, and recreation job/career.
0434.7.3	Compare career and technical programs, colleges, and universities in West Virginia offering a postsecondary degree in the sports, entertainment, and recreation industry.

Tourism Marketing Strategies is a comprehensive course designed to explore the multifaceted world of marketing within the tourism industry. This course delves into the principles, tools, and strategies essential for promoting destinations, attractions, and tourism-related services effectively. Through a blend of theory, case studies, and practical applications, students will gain a deep understanding of the dynamic nature of tourism marketing in the contemporary landscape.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Ethical Standards in Tourism Marketing:

0437.1	Cultural Sensitivity and Respect:
0437.1.1	Ability to recognize and respect diverse cultural norms, values, and practices within various tourist destinations.
0437.1.2	Demonstrate sensitivity in marketing strategies to avoid cultural appropriation or insensitivity.
0437.2	Sustainable Tourism Promotion:
0437.2.1	Understand the principles of sustainable tourism and integrate them into marketing strategies.
0437.2.2	Ability to highlight environmentally friendly practices, conservation efforts, and community involvement in promotional materials.
0437.3	Transparency and Honesty:
0437.3.1	Emphasize truthful and transparent communication in marketing materials, avoiding misleading or deceptive practices.
0437.3.2	Ability to clearly communicate the true nature of services, experiences, and potential impacts to tourists and stakeholders.
0437.4	Responsible Tourism Advocacy:
0437.4.1	Promote responsible traveler behavior, advocating for the preservation of natural and cultural resources.
0437.4.2	Ability to educate tourists about responsible practices and their role in preserving destinations.
0437.5	Community Engagement and Empowerment:
0437.5.1	Engage with local communities to understand their needs, involve them in tourism initiatives, and empower them through sustainable tourism practices.
0437.5.2	Ability to create marketing strategies that benefit both tourists and local communities while respecting community wishes and autonomy.
0437.6	Stakeholder Collaboration:
0437.6.1	Collaborate effectively with various stakeholders (local governments, businesses, NGOs) to develop and implement ethical marketing campaigns.
0437.6.2	Demonstrate the ability to navigate differing perspectives and interests to create mutually beneficial outcomes.
0437.7	Monitoring and Compliance:
0437.7.1	Implement systems to monitor the impact of marketing efforts on local communities and environments.
0437.7.2	Ensure compliance with ethical guidelines, codes of conduct, and industry standards in all marketing activities.

Market Analysis Standards:

0437.8	Data Collection and Analysis:
0437.8.1	Proficiency in gathering relevant data using qualitative and quantitative methods for tourism market research.
0437.8.2	Ability to employ statistical tools and software to analyze tourism data effectively.
0437.9	Market Segmentation:
0437.9.1	Identify and segment diverse tourist markets based on demographics, psychographics, behavior, and geographic factors.
0437.9.2	Tailor marketing strategies to address the specific needs and preferences of each market segment.
0437.10	Trend Identification and Forecasting:
0437.10.1	Analyze industry trends, emerging consumer behaviors, and technological advancements impacting the tourism sector.
0437.10.2	Forecast future trends and their potential impact on tourism marketing strategies.
0437.11	Competitive Analysis:
0437.11.1	Conduct thorough competitive analyses to understand the strengths, weaknesses, opportunities, and threats posed by competitors in the tourism market.
0437.11.2	Develop strategies to differentiate offerings and gain a competitive advantage.
0437.12	Consumer Behavior Understanding:
0437.12.1	Interpret consumer motivations, decision-making processes, and factors influencing travel choices within different tourist segments.
0437.12.2	Apply psychological and sociological concepts to understand and predict tourist behavior.
0437.13	Market Opportunity Identification:
0437.13.1	Identify untapped market opportunities within the tourism industry based on market gaps, changing consumer needs, or emerging destinations.
0437.13.2	Develop strategies to capitalize on these opportunities effectively.
0437.14	Risk Assessment and Mitigation:
0437.14.1	Assess potential risks in the tourism market, such as economic fluctuations, geopolitical issues, or health crises, and develop contingency plans.
0437.14.2	Implement strategies to mitigate risks and adapt marketing approaches accordingly.
0437.15	Market Research Presentation and Communication:
0437.15.1	Present market research findings effectively through reports, presentations, and visual aids to stakeholders, demonstrating the ability to communicate complex data in an understandable manner.
0437.15.2	Engage in effective communication with industry professionals, conveying insights and recommendations based on market analyses.

Strategic Planning Standards:

0437.16	Market Assessment and Opportunity Identification:
0437.16.1	Evaluate market conditions, trends, and competitive landscapes to identify opportunities and challenges within the tourism industry.
0437.16.2	Recognize emerging trends and assess their potential impact on strategic planning.
0437.17	Goal Setting and Objective Alignment:
0437.17.1	Define clear, measurable, and achievable goals for tourism marketing campaigns or initiatives.
0437.17.2	Align marketing objectives with broader organizational or destination-specific goals.
0437.18	SWOT Analysis and Strategy Formulation:

0437.18.1	Conduct SWOT (Strengths, Weaknesses, Opportunities, Threats) analyses to inform strategic decision-making in tourism marketing.
0437.18.2	Formulate marketing strategies that leverage strengths, mitigate weaknesses, capitalize on opportunities, and address threats.
0437.19	Target Market Strategy Development:
0437.19.1	Identify and prioritize target markets based on market segmentation analyses and consumer behavior insights.
0437.19.2	Develop targeted marketing strategies tailored to each segment's preferences, needs, and behaviors.
0437.20	Budgeting and Resource Allocation:
0437.20.1	Create realistic budgets for tourism marketing initiatives, allocating resources effectively to maximize ROI.
0437.20.2	Optimize resource allocation across various marketing channels and campaigns.
0437.21	Campaign Planning and Execution:
0437.21.1	Develop comprehensive marketing plans encompassing promotional strategies, messaging, channels, and timelines.
0437.21.2	Coordinate and execute marketing campaigns effectively, monitoring progress and adjusting as needed.
0437.22	Integration of Digital Marketing Tools:
0437.22.1	Utilize a range of digital marketing tools and platforms (SEO, social media, content marketing, PPC) to enhance tourism marketing efforts.
0437.22.2	Integrate technology-driven strategies for maximum reach and engagement with target audiences.
0437.23	Performance Measurement and Analysis:
0437.23.1	Establish key performance indicators (KPIs) to measure the effectiveness of tourism marketing strategies.
0437.23.2	Analyze performance metrics and use data-driven insights to optimize and refine future strategic plans.
0437.24	Adaptability and Flexibility:
0437.24.1	Demonstrate flexibility in strategic planning, adapting approaches based on changing market conditions, consumer behaviors, or unforeseen circumstances.
0437.24.2	Ability to pivot strategies quickly and effectively in response to new information or challenges.

Technology and Innovation Standards:

0437.25	Digital Marketing Proficiency:
0437.25.1	Proficiently use digital marketing tools and platforms (SEO, SEM, social media, email marketing) specific to the tourism industry.
0437.25.2	Ability to craft and implement effective digital marketing campaigns to reach target audiences.
0437.26	Content Creation and Curation:
0437.26.1	Create compelling and relevant content for various digital channels, including websites, social media, blogs, and videos, catering to the needs and preferences of tourists.
0437.26.2	Curate user-generated content and engage with user communities to enhance brand visibility and authenticity.
0437.27	Data Analytics and Interpretation:
0437.27.1	Utilize data analytics tools to track and analyze digital marketing performance metrics (CTR, conversion rates, engagement) and derive actionable insights.
0437.27.2	Interpret data to optimize marketing strategies, personalize experiences, and drive decision-making.
0437.28	Adoption of Emerging Technologies:
0437.28.1	Stay updated with emerging technologies relevant to the tourism industry (AR/VR, AI, IoT) and understand their potential applications in marketing.

0437.28.2	Evaluate and experiment with innovative technologies to enhance tourist experiences and marketing campaigns.
0437.29	Mobile and Location-Based Marketing:
0437.29.1	Develop strategies for mobile-centric marketing, including location-based services, mobile apps, and responsive design, to target tourists on-the-go effectively.
0437.29.2	Implement mobile-first approaches for seamless user experiences across devices.
0437.30	Personalization and Customer Relationship Management (CRM):
0437.30.1	Implement CRM systems to manage customer data and personalize marketing communications and offerings based on individual preferences and behaviors.
0437.30.2	Utilize technology to create personalized experiences that cater to diverse customer segments.
0437.31	E-commerce Integration and Transactional Capabilities:
0437.31.1	Integrate e-commerce functionalities into tourism marketing strategies, facilitating online bookings, ticket sales, and seamless transactions.
0437.31.2	Ensure user-friendly and secure e-commerce platforms for tourists to complete transactions easily.
0437.32	Continuous Learning and Adaptation:
0437.32.1	Embrace a culture of continuous learning and adaptation to stay abreast of evolving technologies and trends in digital marketing within the tourism sector.
0437.32.2	Experiment with new tools and methodologies to enhance marketing effectiveness and efficiency.

Course description

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Understanding Adventure Tourism

0438.1	Conceptual Understanding
0438.1.1	Develop a clear conceptual understanding of adventure tourism and its significance in the tourism industry.
0438.1.2	Define the key components and characteristics of adventure tourism.
0438.1.3	Explain the historical development and evolution of adventure tourism.
0438.2	Adventure Tourism Products and Services
0438.2.1	Identify and categorize different adventure tourism products and services.
0438.2.2	Distinguish between adventure activities, tours, and experiences.
0438.2.3	Explore a variety of adventure tourism offerings globally.
0438.3	Market Analysis
0438.3.1	Analyze the market trends and dynamics specific to adventure tourism.
0438.3.2	Identify target markets for adventure tourism.
0438.3.3	Evaluate consumer preferences and behavior in adventure travel.
0438.4	Adventure Tourism Trends and Innovations
0438.4.1	Stay updated on current trends and innovations in adventure tourism.
0438.4.2	Research and analyze emerging trends.
0438.4.3	Explore technological advancements impacting adventure tourism.
0438.5	Consumer Motivations and Expectations
0438.5.1	Gain insights into the motivations and expectations of adventure tourism consumers.
0438.5.2	Conduct surveys and interviews to understand consumer preferences.
0438.5.3	Align adventure offerings with consumer expectations.

Adventure Destination Analysis

0438.6	Economic Impact
0438.6.1	Assess the economic impact of adventure tourism on the destination.
0438.6.2	Analyze direct and indirect economic contributions.
0438.6.3	Evaluate employment and income generation.
0438.7	Geographical Assessment
0438.7.1	Evaluate the geographical features that make an adventure destination suitable for tourism.
0438.7.2	Analyze topography, climate, and natural landscapes.
0438.7.3	Identify geographic factors influencing adventure activities.
0438.8	Infrastructure and Accessibility
0438.8.1	Analyze the existing infrastructure and accessibility of adventure destinations.
0438.8.2	Evaluate transportation options and connectivity.
0438.8.3	Assess the availability of accommodation, facilities, and services.
0438.9	Adventure Activity Suitability

0438.9.1	Determine the suitability of adventure activities based on destination characteristics.
0438.9.2	Match destination features with adventure offerings.
0438.9.3	Assess the variety and quality of adventure experiences available.
0438.10	Market Demand and Trends
0438.10.1	Assess the regulatory environment governing adventure tourism in the destination.
0438.10.2	Identify legal requirements and restrictions.
0438.10.3	Analyze the impact of regulations on tourism operations.

Adventure Activity Planning

0438.11	Activity Identification and Selection
0438.11.1	Identify and select suitable adventure activities for specific destinations.
0438.11.2	Assess the natural and cultural characteristics influencing activity selection.
0438.11.3	Match activities with the preferences and expectations of target participants.
0438.12	Regulatory Compliance
0438.12.1	Ensure compliance with local regulations and permits for adventure activities.
0438.12.2	Understand and navigate legal requirements.
0438.12.3	Obtain necessary permits and approvals.
0438.13	Equipment and Gear Selection
0438.13.1	Select appropriate equipment and gear for each adventure activity.
0438.13.2	Match equipment to the requirements of the activity and environmental conditions.
0438.13.3	Ensure the safety and functionality of all gear.
0438.14	Logistical Planning
0438.14.1	Plan logistics for the smooth execution of adventure activities.
0438.14.2	Develop itineraries and schedules.
0438.14.3	Arrange transportation, accommodation, and other logistical details.
0438.15	Budgeting and Resource Management
0438.15.1	Develop and manage budgets for adventure activities.
0438.15.2	Estimate costs associated with equipment, permits, and logistics.
0438.15.3	Allocate resources efficiently.

Market Trends and Consumer Behavior

0438.16	Market Analysis
0438.16.1	Conduct comprehensive market analyses to identify current trends and opportunities in the tourism industry.
0438.16.2	Utilize industry reports, surveys, and data analysis tools.
0438.16.3	Monitor key performance indicators and market indicators.
0438.17	Consumer Behavior Research
0438.17.1	Understand and analyze consumer behavior in the tourism sector.
0438.17.2	Conduct consumer surveys and interviews.
0438.17.3	Interpret and analyze consumer preferences and decision-making processes.
0438.18	Demographic Analysis
0438.18.1	Analyze demographic factors influencing tourism trends and consumer behavior.
0438.18.2	Identify target demographics for specific tourism products.
0438.18.3	Interpret demographic shifts and their impact on travel preferences.
0438.19	Social Media Analysis
0438.19.1	Analyze social media trends and their impact on travel decisions.

0438.19.2	Track social media discussions and reviews.
0438.19.3	Utilize social media analytics tools to gather insights.
0438.20	Adaptation to Changing Trends
0438.20.1	Demonstrate the ability to adapt to and capitalize on changing market trends.
0438.20.2	Implement agile marketing strategies.
0438.20.3	Identify opportunities arising from evolving consumer behavior.

Adventure Tourism Product Development

0438.21	Product Conceptualization
0438.21.1	Generate creative and viable adventure tourism product concepts.
0438.21.2	Brainstorm and ideate new adventure experiences.
0438.21.3	Evaluate the feasibility and uniqueness of product concepts.
0438.22	Target Audience Identification
0438.22.1	Identify and define the target audience for adventure tourism products.
0438.22.2	Conduct demographic and psychographic analyses.
0438.22.3	Understand the needs and preferences of different consumer segments.
0438.23	Adventure Activity Integration
0438.23.1	Integrate diverse adventure activities into product offerings.
0438.23.2	Curate a mix of activities to create well-rounded adventure experiences.
0438.23.3	Ensure the safety and appeal of integrated activities.
0438.24	Storytelling and Branding
0438.24.1	Develop compelling storytelling and branding for adventure tourism products.
0438.24.2	Craft narratives that resonate with the target audience.
0438.24.3	Establish a strong and memorable brand identity.
0438.25	Costing and Pricing Strategies
0438.25.1	Develop cost-effective and competitive pricing strategies for adventure tourism products.
0438.25.2	Estimate costs associated with activities, logistics, and services.
0438.25.3	Set prices that align with market expectations.

This course is designed to provide students with skills and knowledge to succeed in professional settings, effectively preparing them for the expectations they might face in the workplace. Through engaging classroom sessions students will participate in interactive lectures, practical exercises, and real-life scenarios to foster fundamental competencies crucial for success across diverse career paths. Students will actively seek out opportunities for employment and/or on-the-job training seamlessly integrating their classroom learning by creating job applications, cover letters, and refining interview skills to focus on securing workplace employment, apprenticeships, internships, or experiential learning experiences.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Reading Skills

0511.1	Interpret and comprehend technical and general interest in written material.
0511.1.1	Interpret technical written materials relevant to various career fields, demonstrating comprehension of specialized terminology and concepts.
0511.1.2	Utilize written material, including articles, reports, and other informational texts, to extract key information and insights applicable to career planning and development.
0511.1.3	Apply critical reading strategies to analyze and evaluate written material, identifying main ideas, supporting details, and implicit messages to inform career-related decision-making processes.
0511.2	Apply understanding of the material to job tasks.
0511.2.1	Utilize critical thinking skills to analyze and evaluate written material relevant to job tasks, identifying key details and synthesizing information to inform decision-making processes.
0511.2.2	Evaluate the effectiveness of applying reading skills to job tasks, identifying areas of improvement, and implementing strategies for continued skill development in a professional context.

Math Skills

0511.3	Perform math operations using whole numbers, fractions, and percentages.
0511.3.1	Apply mathematical skills to solve practical problems involving fractions, including addition, subtraction, multiplication, and division.
0511.3.2	Utilize mathematical concepts to calculate percentages, such as discounts, markups, and proportions, in real-world scenarios relevant to career preparation.
0511.3.3	Demonstrate the ability to analyze and interpret numerical data presented in fractions and percentages, applying mathematical operations to draw meaningful conclusions and make informed decisions in a career context.

Writing Skills

0511.4	Determine purpose and audience.
0511.4.1	Understand the importance of determining the purpose and audience when writing documents in a professional setting and apply this understanding to select appropriate content and tone.
0511.4.2	Understand the importance of determining the purpose and audience when applying for a job and apply this understanding to select appropriate content and tone for the application materials.
0511.5	Gather information.

0511.5.1	Develop skills in gathering relevant information about the job position, company, and industry to tailor the application effectively.
0511.5.2	Seek and apply for employment opportunities effectively using traditional, online, and other job search platforms.
0511.6	Plan the format/layout.
0511.6.1	Plan the format and layout of the document based on the purpose, audience, and gathered information, ensuring clarity and coherence in organization.
0511.6.2	Plan the format and layout of the job application materials (such as resume, cover letter, and any additional documents) based on the job requirements, company culture, and industry standards.
0511.7	Write a first draft.
0511.7.1	Write a first draft of the document that effectively communicates the intended message to the target audience, adhering to the planned format and layout.
0511.7.2	Write a first draft of the job application materials (such as resume, cover letter, and any additional documents) that effectively highlights qualifications, experiences, and achievements while addressing the specific needs and preferences of the employer and job position.
0511.7.3	Apply for employment effectively by demonstrating proficiency in correct grammar and vocabulary in both written and oral communications.
0511.8	Edit and revise to ensure document is complete, clear, concise, correct, courteous, and coherent.
0511.8.1	Apply editing and revision techniques to refine the document, ensuring completeness, clarity, conciseness, correctness, courtesy, and coherence in accordance with professional writing standards.
0511.8.2	Demonstrate the ability to complete both online and print job applications accurately and comprehensively, ensuring they meet the requirements and showcase their qualifications effectively.

Speaking and Listening Skills

0511.9	Use effective communication skills.
0511.9.1	Prepare effectively for job interviews, including understanding the significance of communication and presentation in an interview.
0511.9.2	Utilize effective communication skills during the job application process and interviews, including verbal and written communication, to effectively convey qualifications, experiences, and achievements to potential employers.
0511.9.3	Practice simulated job interviews, including responding to sample interview questions to enhance their confidence and proficiency.
0511.10	Provide and comprehend directions or instructions.
0511.10.1	Provide and comprehend directions or instructions given during the job application process, including requirements for submitting application materials and following application procedures
0511.11	Give and respond to oral reports or presentations
0511.11.1	Respond to questions and feedback during interviews, demonstrating active listening and effective verbal communication skills to address inquiries and engage in meaningful dialogue with interviewers.
0511.12	Participate in group or team discussions.
0511.12.1	Develop communication skills necessary for effective group discussions, including active listening, articulating thoughts clearly, and respecting diverse viewpoints.
0511.12.2	Enhance critical thinking skills by analyzing and evaluating ideas presented during group discussions, and synthesizing information to generate informed responses.

Computer Applications and Digital Media

0511.13	Utilize word processing, spreadsheet, and database software.
0511.13.1	Demonstrate skills in word processing software to create and format professional documents such as resumes, cover letters, and reports.
0511.13.2	Demonstrate skills in spreadsheet software to organize and analyze data, including creating tables, performing calculations, and generating charts or graphs.
0511.13.3	Understand the fundamentals of database software to input, organize, and retrieve information efficiently, including creating and querying databases.
0511.13.4	Apply knowledge of word processing, spreadsheet, and database software to complete various tasks relevant to career preparation, such as managing contacts, tracking expenses, and organizing job search information.
0511.13.5	Work towards industry-recognized certifications.
0511.14	Transfer the operating principles of one application to another similar application.
0511.14.1	Understand the fundamental operating principles of various software applications commonly used in professional settings.
0511.14.2	Identify similarities and differences between different software applications within the same category (e.g., word processing, spreadsheet, presentation).
0511.14.3	Demonstrate the ability to transfer knowledge and skills gained from using one application to effectively navigate and utilize similar applications.
0511.15	Use the knowledge of computer logic, operating systems, and basic troubleshooting techniques.
0511.15.1	Apply knowledge of computer logic, operating systems, and troubleshooting techniques to effectively diagnose and address technical problems in a professional setting.
0511.16	Use social media appropriately and effectively, in personal and professional situations.
0511.16.1	Understand the importance of appropriate social media usage in both personal and professional contexts.
0511.16.2	Identify the potential benefits and risks associated with social media usage in relation to career development and professional image.

Work Ethics

0511.17	Exhibit professional practices.
0511.17.1	Understanding the concepts of ethics, values, and morals and their significance in professional conduct.
0511.17.2	Identify examples of unethical behavior in the workplace, such as taking free food or products, abusing employee discounts, or stealing, and recognizing the impact of such behaviors on organizational integrity.
0511.17.3	Exhibit time management techniques by effectively prioritizing tasks to enhance productivity.
0511.17.4	Apply organization skills to daily work and life activities, ensuring efficient handling of responsibilities and achieving optimal outcomes.

Self-Presentation

0511.18	Identify ways in which the individual employee represents the organization.
0511.18.1	Identify the key characteristics exhibited by effective leaders.
0511.18.2	Differentiate between leadership and management skills, discerning the distinct attributes associated with each.
0511.18.3	Evaluate and compare various post-secondary options, including Career and Technical Centers, 2-year community colleges, 4-year colleges or universities, military service, and entry into the workforce, in order to develop a well-informed and personalized career plan.
0511.18.4	Evaluate job offers effectively, considering factors such as salary, job responsibilities, and company culture.

0511.18.5	Compare and contrast types of benefits offered by potential employers, including health insurance, vacation time, dental and vision coverage, and retirement plans, in order to make informed decisions.
0511.18.6	Exhibit professionalism throughout the application process, including adhering to appropriate etiquette and practices.

Attendance

0511.19	Limit tardiness, early departures, and absences to legitimate and essential occasions.
0511.19.1	Understand the importance of punctuality and attendance in professional settings.
0511.19.2	Identify legitimate and essential occasions that may warrant tardiness, early departures, or absences from work or academic commitments.
0511.19.3	Develop strategies to prioritize and manage time effectively to minimize instances of tardiness, early departures, and absences.
0511.20	Explain the importance of satisfactory attendance to the overall operation of the business.
0511.20.1	Understand the significance of satisfactory attendance to the overall functioning and success of a business.
0511.20.2	Identify the various ways in which attendance impacts productivity, workflow, and team dynamics within a business.

Personal Health and Wellness

0511.21	Identify healthy practices and behaviors that will maintain or improve the health of self.
0511.21.1	Identify healthy practices and behaviors that contribute to overall physical, mental, and emotional well-being.
0511.21.2	Recognize the relationship between personal health and professional performance, including productivity, energy levels, and stress management.
0511.21.3	Create a personalized plan for maintaining or improving personal health, incorporating identified healthy practices and behaviors into daily life.

Entrepreneurship

0511.22	Identify aspects of owning or starting up a small business.
0511.22.1	Define entrepreneurship and recognize its significance in business ventures.
0511.22.2	Identify and differentiate between various types of business ownership, including sole proprietorship, partnership, and corporation.
0511.22.3	Research the history of a selected company to understand its origins, evolution, and significant milestones, providing valuable context for understanding small business operations and entrepreneurship.

This course explores career preparation, entrepreneurship, and business knowledge to foster students' ongoing success in professional workplaces. Through engaging classroom sessions, students develop essential competencies and confidence required to navigate complex workplace dynamics and challenges effectively. In-person classroom activities facilitate the documentation of employment and/or on-the-job training to create a portfolio showcasing their skills and achievements and positioning themselves for future career opportunities to demonstrate their readiness for diverse professional environments.

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Math Skills

0512.1	Use statistics (mean, mode, median, standard deviation) to monitor processes and quality of performance.
0512.1.1	Apply statistical methods to analyze and monitor processes within a professional setting, including evaluating performance metrics.
0512.1.2	Calculate and interpret the mean, mode, median, and standard deviation of data sets relevant to career preparation, demonstrating proficiency in statistical analysis.
0512.1.3	Utilize statistical measures to identify trends, patterns, and outliers in data, informing decision-making processes and facilitating continuous improvement efforts in performance and processes.
0512.2	Use mathematical reasoning to solve word problems and interpret graphics.
0512.2.1	Apply mathematical reasoning skills to analyze and solve word problems commonly encountered in professional contexts, including interpreting, and extracting relevant information from written scenarios.
0512.2.2	Utilize mathematical operations and concepts to formulate and implement problem-solving strategies, demonstrating proficiency in applying quantitative reasoning to address real-world challenges.
0512.2.3	Interpret and analyze graphical representations, such as charts, graphs, and diagrams, to extract key insights and draw conclusions relevant to career preparation.
0512.2.4	Demonstrate the ability to summarize information from both text-based and graphical sources to solve complex problems, making connections between numerical data and visual representations.
0512.2.5	Calculate and execute the necessary steps to provide correct change to customers during transactions.
0512.3	Use algebra-based formulas.
0512.3.1	Apply algebraic techniques to manipulate formulas and solve for unknown variables, demonstrating the ability to adapt mathematical concepts to real-world scenarios.
0512.3.2	Utilize algebra-based formulas to model and interpret data, making predictions and drawing conclusions to inform decision-making processes in a career context.

Writing Skills

0512.4	Plan the format/layout.
0512.4.1	Apply basic communication skills in written format by composing notes, memos, and emails addressed to customers, coworkers, and management, demonstrating clarity, professionalism, and appropriate tone.
0512.5	Edit and revise to ensure document is complete, clear, concise, correct, courteous, and coherent.
0512.5.1	Provide a sample of a written two-week notice when leaving a job, understanding the importance of professionalism and proper communication in job transitions.

Speaking and Listening Skills

0512.6	Use effective communication skills.
0512.6.1	Reflect on personal communication and collaboration skills, identifying strengths and areas for improvement to enhance future participation in group or team discussions.
0512.6.2	Identify the components and structure of an effective work experience portfolio, including resumes, cover letters, letters of recommendation, and samples of work.
0512.7	Provide and comprehend directions or instructions.
0512.7.1	Apply principles of technical writing, including accuracy, clarity, and coherence, to create professional-quality technical guidance documents.
0512.7.2	Evaluate and revise technical guidance documents to ensure they meet the needs of the intended audience and effectively communicate the desired information.
0512.7.3	Develop proficiency in selecting and organizing relevant documents and artifacts to showcase skills, experiences, and achievements.
0512.8	Give and respond to oral reports or presentations.
0512.8.1	Create an introduction flyer for their portfolio, incorporating insights gained from employer interviews, effectively showcasing their understanding of workplace skills and importance in a professional setting.
0512.8.2	Acquire skills in presenting information in a professional and visually appealing format using digital tools or portfolio platforms.
0512.8.3	Create a work experience portfolio to ensure it effectively represents qualifications and experiences to potential employers or educational institutions.
0512.9	Participate in group or team discussions.
0512.9.1	Engage in meaningful dialogue, listen attentively to others' perspectives, and communicate their own ideas effectively to facilitate productive discussions and foster a positive team dynamic.

Computer Applications and Digital Media

0512.10	Utilize word processing, spreadsheet, and database software.
0512.10.1	Demonstrate skills necessary to create, edit, format, and manage documents using word processing software, organize and analyze data using spreadsheet software, and input, retrieve, and manipulate data using database software.
0512.11	Transfer the operating principles of one application to another similar application.
0512.11.1	Apply critical thinking and problem-solving skills to adapt to new software interfaces and functionalities, leveraging prior experience to enhance proficiency in new applications.
0512.11.2	Demonstrate proficiency in transferring operating principles and skills between similar software applications through practical exercises and tasks that require application of learned concepts in various contexts.
0512.12	Use social media appropriately and effectively, in personal and professional situations.
0512.12.1	Understand the significance of responsible social media usage in personal situations and its impact on personal branding and reputation.
0512.12.2	Develop skills in using social media platforms effectively to showcase professional achievements, network with industry professionals, and research potential job opportunities.
0512.12.3	Demonstrate proficiency in creating and maintaining a professional online presence on social media platforms, including optimizing privacy settings and curating content.

0512.12.4	Apply ethical considerations and best practices when engaging with social media in professional situations, ensuring alignment with organizational values and industry standards.
0512.12.5	Develop strategies how to use social media platforms effectively to build and maintain meaningful connections, network with peers and professionals, and stay informed about relevant industry trends and opportunities.

Reasoning, Problem-Solving, and Decision Making

0512.13	Differentiate among types of problems (technical, human relations, ethical).
0512.13.1	Identify and categorize problems based on their nature and characteristics, understanding the distinct challenges and considerations associated with each type.
0512.13.2	Analyze and assess various problem-solving approaches tailored to address specific problem types effectively through case studies, discussions, and practical scenarios.

Understanding the “Big Picture”

0512.14	Explain basic economic concepts.
0512.14.1	Explain fundamental economic concepts, including supply and demand, scarcity, opportunity cost, and economic systems.
0512.14.2	Demonstrate comprehension of basic economic concepts through discussions, examples, and real-world applications, gaining a foundational understanding of economic principles essential for career preparation and decision-making.

Work Ethics

0512.15	Exhibit responsibility.
0512.15.1	Determining the role of management in establishing and upholding ethical standards within a workplace environment.
0512.15.2	Identifying strategies through which a business can promote social responsibility and contribute positively to its local community.
0512.16	Explain basic legal and fiduciary obligations.
0512.16.1	Comprehend fundamental legal and fiduciary obligations in the workplace, including adherence to laws, regulations, and ethical standards.
0512.16.2	Explain confidentiality, honesty, integrity, and accountability in professional settings.
0512.16.3	Develop awareness of legal and fiduciary considerations essential for maintaining strong work ethics and fostering trust and integrity in their careers (through case studies).

Self-Presentation

0512.17	Exhibit elements required in professional settings.
0512.17.1	Assess alternative occupational opportunities by analyzing working conditions, benefits packages, and opportunities for career advancement or change, ensuring alignment with personal and professional goals.

Attendance

0512.18	Limit tardiness, early departures, and absences to legitimate and essential occasions.
0512.18.1	Analyze the effects of frequent tardiness, early departures, and absences on workflow, team dynamics, and overall productivity within an organization.
0512.19	Explain the importance of satisfactory attendance to the overall operation of the business.

0512.19.1	Recognize the correlation between attendance, reliability, and professionalism, and their influence on workplace reputation and advancement opportunities.
0512.19.2	Analyze the financial implications of absenteeism and tardiness on a business, including costs associated with lost productivity and employee turnover.

Collaboration

0512.20	Explain the importance of teamwork to the overall operation of the business.
0512.20.1	Explain how effective teamwork enhances communication, problem-solving, and decision-making processes within a business.
0512.20.2	Recognize the impact of teamwork on employee morale, job satisfaction, and organizational success, gaining insight into the importance of cultivating a cooperative and supportive work environment.

Personal Health and Wellness

0512.21	Identify ways to reduce or prevent injuries and illness.
0512.21.1	Explore various safety measures and protocols relevant to their chosen career paths, including workplace ergonomics, proper lifting techniques, use of personal protective equipment (PPE), and emergency response procedures.
0512.21.2	Analyze hazardous working conditions.
0512.21.2	Understand state and federal Department of Labor laws regarding hazardous occupations.

Entrepreneurship

0512.22	Identify the characteristics of a successful entrepreneur.
0512.22.1	Understand the design thinking process of empathizing, defining, ideating, prototyping, and testing solutions, as well as the importance of human-centered design and collaboration.
0512.22.2	Analyze traits such as creativity, resilience, risk-taking, leadership, and adaptability through case studies, examples, and personal reflections.
0512.22.3	Understand the qualities necessary to thrive in entrepreneurial ventures and how to connect to career aspirations.
0512.23	List the advantages and disadvantages of being an entrepreneur.
0512.23.1	Identify potential benefits of entrepreneurial ventures such as autonomy, potential for high earnings, and creative freedom, as well as drawbacks such as financial uncertainty, long hours, and increased responsibility.
0512.23.2	Evaluate personal strengths, interests, and goals to determine if entrepreneurship aligns with their aspirations and preferences.
0512.24	Identify aspects of owning or starting up a small business.
0512.24.1	Gather key advice for seniors interested in pursuing entrepreneurial endeavors, drawing from the experiences and wisdom shared by business managers.
0512.24.2	Explore various considerations including business planning, legal requirements, financial management, marketing strategies, and operational logistics.
0512.24.3	Understanding of the steps involved in launching and operating a small business, as well as the skills and resources required for success (e.g., WV Entrepreneurship Ecosystem, WV Business Link, SparkWV, Pitch Competitions, manufacturing resources, networking, product development, etc.) .

Personal Finance

0512.25	Calculate, track, and evaluate income and spending.

0512.25.1	Understand federal and state tax regulations, including differentiating between W-4 and W-2 forms, completing both federal and state tax forms accurately, and applying their knowledge using actual W-2 forms.
0512.25.2	Utilize budgeting tools and techniques to create a comprehensive budget that aligns with income levels and financial goals.
0512.25.3	Evaluate spending patterns and identify areas for potential savings or adjustments to optimize financial resources.
0512.25.4	Develop strategies for tracking and monitoring income and spending over time to maintain financial stability and achieve long-term financial objectives.
0512.26	Evaluate savings and investment options to meet short- and long-term goals.
0512.26.1	Develop a personalized budget that includes savings and investment plan that aligns with short-term needs, such as emergency funds or major purchases, as well as long-term goals, such as retirement planning or wealth accumulation.
0512.26.2	Evaluate resources and tools for college, technical school, and career planning (e.g., Free Application for Federal Student Aid (FAFSA) application, college scholarships, grants, and loans).
0512.26.3	Identify different savings and investment options available, including savings accounts, certificates of deposit (CDs), stocks, bonds, mutual funds, and retirement accounts.
0512.26.4	Evaluate the features and characteristics of various savings and investment options, including risk level, return potential, liquidity, and tax implications.
0512.27	Analyze the costs and benefits of various types of credit and debt.
0512.27.1	Understand the importance of learning about credit beyond the cost of borrowing, including its impact on financial stability, opportunities, and future goals.
0512.27.2	Identify components of the FICO Score, the credit score most used by lenders, to understand how financial behaviors affect creditworthiness.
0512.27.3	Identify strategies and habits for building strong credit, including responsible credit card usage, timely bill payments, and monitoring credit reports.
0512.27.4	Develop a personalized plan for managing credit effectively, incorporating knowledge of credit principles and practical strategies for building and maintaining a positive credit history.
0512.28	Identify and evaluate types of risk and insurance.
0512.28.1	Evaluate the importance of insurance as a risk management tool to mitigate financial losses associated with unforeseen events.
0512.28.2	Recognize different types of insurance products available, such as health insurance, life insurance, property insurance, and liability insurance.
0512.28.3	Develop skills in evaluating insurance policies to determine their suitability based on individual needs, preferences, and risk tolerance.

This course empowers students to select a career-focused work experience within their desired field through employment and/or on-the-job training, thereby seamlessly integrating classroom skills and knowledge with real-world scenarios. Students work in a chosen career specialization for an in-depth exploration, committing a minimum of 100 hours to relevant job tasks. Throughout the course, emphasis is placed on cultivating employability skills and fostering career development, while also applying pertinent information technology and technical proficiencies. The experience encompasses project and problem-based approaches to simulate authentic business practices, emphasizing the importance of workplace readiness skills.

Given the course's nature and alignment with industry standards, exemplary attendance is essential for student success. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Reading Skills

0513.1	Apply understanding of the material to job tasks.
0513.1.1	Apply reading skills to effectively interpret job-related documents, including manuals, procedures, and instructions, demonstrating comprehension of essential information.
0513.1.2	Demonstrate the ability to adapt reading strategies to different types of job-related texts, such as technical documents, reports, and emails, to meet job requirements effectively.
0513.1.3	Take accountability for work performance, actively seeking and incorporating feedback from employers to improve performance and achieve positive outcomes

Speaking and Listening Skills

0513.2	Use effective communication skills.
0513.2.1	Identify and adapt communication styles to suit different audiences and contexts, such as formal meetings or informal conversations.
0513.2.2	Participate in an actual job interview, applying the skills and strategies learned during preparation.
0513.3	Provide and comprehend directions or instructions.
0513.3.1	Practice asking clarifying questions to ensure understanding of directions or instructions received.
0513.4	Engage in conversations with coworkers, supervisors, and clients.
0513.4.1	Demonstrate confidence and professionalism in verbal communication with colleagues, supervisors, and stakeholders.

Reasoning, Problem-Solving, and Decision Making

0513.5	Use established methods of problem-solving and decision making in individual and group settings.
0513.5.1	Utilize different problem-solving techniques such as brainstorming, root cause analysis, and SWOT analysis to solve problems and make informed decisions.
0513.6	Apply previous learning to situations where problems must be solved, or decisions made quickly.
0513.6.1	Collaborate with colleagues to collectively generate and implement solutions to time-sensitive problems.
0513.6.2	Enhance decision-making abilities by considering both short-term and long-term implications in fast-paced environments.
0513.7	Test solutions or decisions to determine effects or to identify related problems.

0513.7.1	Utilize data analysis techniques to interpret test results and draw conclusions about the effectiveness of solutions.
0513.7.2	Collaborate with team members to identify and address any unforeseen challenges or unintended consequences of implemented solutions.

Understanding the “Big Picture”

0513.8	Identify the company’s mission and the individual employee’s contribution to that mission.
0513.8.1	Understand the company's mission, vision, and values, and their importance in guiding organizational objectives and operations.
0513.8.2	Develop personal workplace goals aligned with the company's objectives, demonstrating an understanding of how individual goals contribute to overall organizational success.
0513.8.3	Articulate the significance of employee engagement and commitment to the company's mission for organizational success.
0513.9	Interpret organizational policies and procedures.
0513.9.1	Interpret and comprehend the content of organizational policies and procedures accurately, including guidelines for conduct, safety protocols, and administrative processes.

Work Ethics

0513.10	Exhibit responsibility.
0513.10.1	Identify efficient, effective, and ethical situations in the workplace by interviewing employers to ascertain the methods and tools utilized in their respective workplaces.
0513.11	Exhibit professional practices.
0513.11.1	Demonstrate a strong work ethic consistently during each work period, adhering to professional standards and contributing positively to organizational goals and objectives.
0513.11.2	Identify appropriate procedures for responding to instances of sexual harassment.

Positive Attitude

0513.12	Cooperate in a pleasant and polite manner with clients, coworkers, and supervisors.
0513.12.1	Show respect for customers, coworkers, and management by maintaining professional interactions and relationships in the workplace.
0513.12.2	Understand the importance of providing excellent customer service and its impact on competitive advantage in the marketplace.
0513.12.3	Exhibit a positive attitude and establish positive relationships with customers, coworkers, and management, contributing to a harmonious and productive work environment.
0513.13	Exhibit flexibility and adaptability.
0513.13.1	Develop strategies to navigate unforeseen challenges with resilience, adjust approaches in response to evolving circumstances, and collaborate with others to find innovative solutions.
0513.14	Take directions willingly.
0513.14.1	Demonstrate the ability to follow instructions accurately and efficiently, ensuring tasks are completed according to management's directives.

Independence and Initiative

0513.15	Exhibit willingness to learn.

0513.15.1	Demonstrate a proactive willingness to learn and develop new skills, attitudes, and knowledge relevant to their career field, fostering a culture of continuous growth and improvement.
0513.16	Exhibit interest in making the organization more effective and productive.
0513.16.1	Seek clarification and ask questions when unsure about instructions or tasks, demonstrating a commitment to understanding and executing assignments correctly.
0513.16.2	Complete assigned tasks efficiently and effectively within specified timelines, meeting or exceeding performance expectations.

Self-Presentation

0513.17	Identify ways in which the individual employee represents the organization.
0513.17.1	Master the job-specific skills relevant to their occupation, including soft skills, through assignments and interactions with employers.
0513.18	Exhibit a neat appearance.
0513.18.1	Display a neat and well-groomed appearance, including appropriate attire, grooming practices, and overall presentation.
0513.19	Exhibit elements required in professional settings.
0513.19.1	Develop and insights into the key elements required for success in their chosen careers, thereby enhancing their readiness for the professional world.

Attendance

0513.20	Limit tardiness, early departures, and absences to legitimate and essential occasions.
0513.20.1	Participate in a work-based experience with a minimum of 100 hours in selected employment or on-the-job training (length of work-based experience is determined by business, organization, credentialing agency requirement and/or school).
0513.20.2	Document work-based experience hours accurately and comprehensively, ensuring compliance with industry standards and requirements.
0513.20.3	Exhibit punctuality, regular attendance, and dependability in the workplace by consistently meeting work schedules and obligations, as observed, and evaluated by employers during each visit.
0513.20.4	Demonstrate the ability to communicate effectively with supervisors or instructors regarding tardiness, early departures, or absences, providing timely and appropriate notification when necessary.
0513.21	Explain the importance of satisfactory attendance to the overall operation of the business.
0513.21.1	Develop strategies to maintain satisfactory attendance and punctuality, demonstrating a commitment to contributing positively to the overall operation and success of the business.
0513.22	Negotiate anticipated absences according to company policy.
0513.22.1	Demonstrate communicating needs, scheduling absences in advance, and mitigating any potential impacts on productivity or workflow for the company.
0513.23	Call in to notify the supervisor of unanticipated absences.
0513.23.1	Demonstrate notifying supervisor of unplanned time off with timely and transparent communication to meet company standards.

Collaboration

0513.24	Attend team meetings, focus on the topic/purpose, or facts and ideas, and help others to contribute.

0513.24.1	Demonstrate effective participation in team meetings by actively engaging in discussions, maintaining focus on the topic or purpose, providing relevant facts and ideas, and facilitating contributions from others.

This course offers students the opportunity to continue in a career-focused work experience tailored to their chosen field, be it through employment and/or on-the-job training. By immersing themselves in real-world scenarios, students seamlessly integrate classroom-acquired skills and knowledge with practical applications. Engaging in a specialized career area, students commit a minimum of 100 hours (in addition to CWST Experience I) to hands-on job tasks, enabling them to gain valuable insights and expertise. This experiential learning opportunity serves as a foundation for students to prepare for future career endeavors. By gaining firsthand experience and industry exposure, students are better equipped to pursue future career opportunities and navigate the complexities of their chosen profession with confidence. Given the course's nature and alignment with industry standards, exemplary attendance is essential for student success.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Speaking and Listening Skills

0514.1	Use effective communication skills.
0514.1.1	Utilize feedback from peers and supervisors to improve communication effectiveness and address areas for development.
0514.2	Provide and comprehend directions or instructions.
0514.2.1	Demonstrate the ability to break down complex instructions into manageable steps for better comprehension.
0514.3	Engage in conversations with coworkers, supervisors, and clients.
0514.3.1	Receive and provide feedback constructively to improve communication skills and interpersonal interactions in the workplace.

Reasoning, Problem-Solving, and Decision Making

0514.4	Use established methods of problem-solving and decision making in individual and group settings.
0514.4.1	Collaborate effectively with team members to solve complex problems and make informed decisions.
0514.5	Apply previous learning to situations where problems must be solved, or decisions made quickly.
0514.5.1	Demonstrate adaptability by efficiently make informed decisions under time constraints.
0514.5.2	Develop critical thinking skills to quickly analyze situations, identify potential solutions, and evaluate their feasibility.
0514.6	Test solutions or decisions to determine effects or to identify related problems.
0514.6.1	Adapt and refine solutions based on test outcomes and feedback to optimize performance and achieve desired results.

Understanding the “Big Picture”

0514.7	Identify how the company functions within the broad world of business, industry, and service.
0514.7.1	Identify the company's position within its industry and its competitive landscape.
0514.7.2	Explore the company's business model, including its products or services, target market, distribution channels, and revenue streams.

0514.7.3	Analyze the factors that influence the company's operations, including market trends, regulatory environment, and technological advancements.
0514.7.4	Analyze and articulate ways in which their company contributes to the community, recognizing initiatives or actions aimed at benefiting the local or broader community.
0514.8	Explain the necessity and benefits/disadvantages of organizational change.
0514.8.1	Identify the driving forces behind organizational change, assess its potential advantages and drawbacks.
0514.8.2	Explore strategies for managing and leveraging organizational change to foster growth and innovation within respective careers.

Work Ethics

0514.9	Exhibit responsibility.
0514.9.1	Demonstrate responsibility in professional contexts by consistently displaying accountability, reliability, and ethical decision-making.
0514.10	Exhibit professional practices.
0514.10.1	Navigate professional environments with confidence, demonstrating appropriate workplace decorum, clear and concise communication, and efficient time management.
0514.10.2	Create a thank-you card expressing gratitude in a concise and courteous manner, demonstrating an understanding of the importance of appreciation in professional relationships.

Positive Attitude

0514.11	Cooperate in a pleasant and polite manner with clients, coworkers, and supervisors.
0514.11.1	Effectively address and resolve complaints from customers or the public, demonstrating empathy, problem-solving skills, and a commitment to customer satisfaction.
0514.11.2	Greet and handle customer inquiries courteously and efficiently, contributing to a positive customer experience and fostering customer loyalty.
0514.12	Exhibit flexibility and adaptability.
0514.12.1	Demonstrate flexibility and adaptability in professional settings by effectively responding to change, adjusting strategies, and embracing new perspectives to achieve organizational goals.
0514.13	Take directions willingly.
0514.13.1	Respond effectively to management's directions, demonstrating understanding and compliance with assigned tasks and responsibilities.

Independence and Initiative

0514.14	Work without constant supervision.
0514.14.1	Develop strategies to manage tasks and responsibilities with minimal oversight, exhibiting traits such as self-discipline, initiative, and resourcefulness.
0514.14.2	Demonstrate the ability to work autonomously without constant supervision, demonstrating self-motivation, accountability, and sound decision-making skills in professional settings.
0514.15	Exhibit willingness to learn.
0514.15.1	Demonstrate openness to employers' suggestions and constructive feedback, showing a willingness to learn and grow professionally.
0514.16	Find tasks to perform on one's own.
0514.16.1	Utilize downtime productively by engaging in activities that contribute to job productivity or personal skill enhancement.
0514.17	Exhibit interest in making the organization more effective and productive.

0514.17.1	Take accountability for work performance, actively seeking and incorporating feedback from employers to improve performance and achieve positive outcomes.
0514.18	Maintain work standards in the midst of change.
0514.18.1	Display flexibility and adaptability in handling changes to job duties or tasks, adjusting work priorities and approaches as needed.

Self-Presentation

0514.19	Exhibit a neat appearance.
0514.19.1	Demonstrate professionalism through a neat and appropriate appearance, reflecting respect for organizational standards and enhancing professional image.
0514.20	Exhibit elements required in professional settings.
0514.20.1	Demonstrate the ability to communicate clearly and professionally, collaborate effectively with colleagues, manage their time efficiently, and solve problems creatively.

Attendance

0514.21	Limit tardiness, early departures, and absences to legitimate and essential occasions.
0514.21.1	Participate in a work-based experience with a minimum of 100 hours in selected employment or on-the-job training (length of work-based experience is determined by business, organization, credentialing agency requirement and/or school).
0514.21.2	Document work-based experience hours accurately and comprehensively, ensuring compliance with industry standards and requirements.
0514.21.3	Exhibit punctuality, regular attendance, and dependability in the workplace by consistently meeting work schedules and obligations, as observed, and evaluated by employers during each visit.
0514.22	Negotiate anticipated absences according to company policy.
0514.22.1	Implement proactive measures to address and mitigate factors that may contribute to tardiness, early departures, or absences, such as scheduling conflicts or personal emergencies.
0514.23	Call in to notify the supervisor of unanticipated absences.
0514.23.1	Display accountability and responsibility in fostering a positive work environment and maintaining productive working relationships by providing supervisor with notice of unanticipated absences.

Collaboration

0514.24	Look for ways to help others.
0514.24.1	Explore strategies for identifying ways to help others, such as offering assistance, sharing resources, or providing constructive feedback.
0514.25	Recognize others for their contributions.
0514.25.1	Understanding of the significance of recognizing and acknowledging the contributions of their peers, fostering a positive and inclusive work environment.
0514.26	Let others know what is needed to get the job done.
0514.26.1	Demonstrate how to communicate requirements and expectations to team members, ensuring clarity and alignment in project execution.
0514.27	Provide clear documentation of assignments, goals, and timelines.
0514.27.1	Develop the ability to create and maintain clear documentation of assignments, goals, and timelines, facilitating accountability and coordination within the team.
0514.28	Explain the importance of teamwork to the overall operation of the business.
0514.28.1	Contribute to collaborative efforts and advocate for the value of teamwork in achieving business goals.

Entrepreneurship

0514.29	Identify the characteristics of a successful entrepreneur.
0514.29.1	Apply design thinking methodologies to develop innovative solutions that address user needs, enhance user experiences, and drive positive outcomes in various industries and organizational settings.
0514.30	List the advantages and disadvantages of being an entrepreneur.
0514.30.1	Analyze and evaluate the advantages and disadvantages of entrepreneurship, gaining insight into the opportunities and challenges inherent in starting and running a business.
0514.31	Identify aspects of owning or starting up a small business.
0514.31.1	Conduct interviews with business managers to gain insights into their vision for the store and the journey they took to achieve their current position, thereby understanding real-world entrepreneurial experiences.

Allowable Teacher Endorsement: Certified Teacher with relevant subject area endorsement(s)

This course allows students to integrate theory and practice by interacting with industry professionals. Students will study various requirements for employability including ethics, communication, teamwork, and professionalism. Students will participate in hands-on, digital, or work-based experiences related to industry settings to practice skill sets and to transition from student to employee. A supervised project will be developed in one or more of the following categories: Entrepreneurship (ownership or operation of a business); Placement (employment or internship); Research and Experimentation (planning and/or conducting a scientific experiment); Exploration (exploration of related careers through activities such as shadowing employees in various work settings, conducting on-line research, attending professional development activities, etc.). Students will develop materials to supplement their Simulated Workplace portfolios.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Workplace Exploration

0520.1	Workplace Exploration
0520.1.1	Discuss methods of socialization in various employment settings within the chosen specialization field.
0520.1.2	Examine organizational structures including policies and procedures of various workplace settings.
0520.1.3	Compare organizational mission statements to organizational performance.
0520.1.4	Identify conceptual frameworks applied in various workplace settings.
0520.1.5	Examine methods of giving and receiving supervision.
0520.1.6	Identify types of customers and assess their needs.
0520.1.7	Describe quality assurance.
0520.1.8	Describe principles of continuous improvements.
0520.1.9	Define different types of conflicts and the four elements of workplace conflict.
0520.1.10	List the steps in the conflict resolution process and different response styles.

Work-Based Learning (WBL) Experience(s)

0520.2	WBL Experience(s)
0520.2.1	Collaborate to identify skills and academic/technical competencies that will be learned through WBL experience(s).
0520.2.2	Enter WBL hours into the WBL tracking system.
0520.2.3	Assess and report on the WBL experience(s) (e.g., site evaluation, student evaluation, exit surveys, etc.).

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

This course allows students to integrate theory and practice by interacting with industry professionals. Students will study various requirements for employability including ethics, communication, teamwork, and professionalism. Students will participate in hands-on, digital, or work-based experiences related to industry settings to practice skill sets and to transition from student to employee. A supervised project will be developed in one or more of the following categories: Entrepreneurship (ownership or operation of a business); Placement (employment or internship); Research and Experimentation (planning and/or conducting a scientific experiment); Exploration (exploration of related careers through activities such as shadowing employees in various work settings, conducting on-line research, attending professional development activities, etc.). Students will develop materials to supplement their Simulated Workplace portfolios.

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Employment Process

0522.1	Employment Process
0522.1.1	Research potential work-based learning (WBL) placements.
0522.1.2	Complete a job application.
0522.1.3	Design a resume to be used in the WBL placement.
0522.1.4	Plan and write a letter of introduction.
0522.1.5	Supplement simulated workplace portfolio materials.

Work-Based Learning (WBL) Experience(s)

0522.2	WBL Experience(s)
0522.2.1	Collaborate to identify skills and academic/technical competencies that will be learned through WBL experience(s).
0522.2.2	Enter WBL hours into the WBL tracking system.
0522.2.3	Assess and report on the WBL experience(s) (e.g., site evaluation, student evaluation, exit surveys, etc.).

Allowable Teacher Endorsement: Certified Teacher with appropriate grade-level endorsement(s)

Entrepreneurship Preparedness is an intensive CTE Enrichment Course designed to equip students with the essential tools and knowledge to transform a business idea into a viable enterprise. This course guides students through the critical stages of business plan development, ensuring they create comprehensive and strategic blueprints for their ventures. Additionally, it covers the intricacies of licensure/regulatory requirements and financial considerations, providing a clear understanding of the legal and financial landscape entrepreneurs must navigate. The course also emphasizes the importance of network development, helping students build valuable connections with mentors, industry professionals, and potential investors, setting a strong foundation for their entrepreneurial journey.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Business Plan Development

0523.1	Understand the purpose and importance of a business plan.
0523.1.1	Understand how a well-crafted business plan guides decision making.
0523.1.2	Recognize the role of a business plan as a roadmap for the entrepreneurial venture.
0523.2	Identify and describe the required components of a business plan.
0523.2.1	Understand and describe different types of business structures and the advantages and disadvantages of each.
0523.2.2	Define the executive summary, company description, and mission statement.
0523.2.3	Outline a market analysis, including target market segmentation and competitive analysis.
0523.2.4	Detail the organization and management structure, product or service offerings, and marketing and sales strategies.
0523.2.5	Discuss operational plans, including logistics, manufacturing, and distribution.
0523.2.6	Describe financial projections, including income statements, cash flow statements, and balance sheets.
0523.3	Complete a comprehensive business plan.
0523.3.1	Apply knowledge of required components to develop a thorough and coherent business plan.
0523.3.2	Utilize templates, tools, and resources to streamline the business planning process.
0523.3.3	Incorporate feedback from instructors, peers, and mentors to refine and improve the business plan.
0523.4	Create an action plan for business launch.
0523.4.1	Set clear goals and milestones for business launch.
0523.4.2	Identify the necessary resources, skills, and support systems required for a successful launch.
0523.4.3	Create a detailed action plan outlining specific tasks, responsibilities, and deadlines for executing the launch process.

Licensure for Business Operation

0523.5	Understand the importance of licensure in business operations.
0523.5.1	Recognize the legal and regulatory requirements for operating a business.
0523.5.2	Understand the consequences of non-compliance with licensure regulations.
0523.6	Identify required licensures for specific business activities.
0523.6.1	Research and identify the specific licensure requirements applicable to a specific business or industry.
0523.6.2	Understand the process and criteria required for obtaining each required license or permit.
0523.6.2	Differentiate between federal, state, and local licensure requirements.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade-level endorsement(s)

0523.7	Explore resources available to support regulatory compliance.
0523.7.1	Investigate government agencies responsible for overseeing business licensure and regulation.
0523.7.2	Utilize online resources, guides, and toolkits provided by state and local government agencies.
0523.7.3	Complete sample licensure requirements for a business idea.

Financial Preparedness

0523.8	Understand financial considerations before seeking business funding.
0523.8.1	Assess personal financial readiness and risk tolerance.
0523.8.2	Evaluate the financial health and viability of a business idea.
0523.8.3	Explore alternative methods of financing to minimize reliance on external capital.
0523.9	Provide insight into the types of funding available for businesses.
0523.9.1	Differentiate between debt financing and equity financing and understand the advantages and disadvantages of each.
0523.9.2	Explore traditional sources of funding, including bank loans, lines of credit and Small Business Administration (SBA) loans.
0523.9.3	Investigate alternative funding options, such as angel investors, venture capital, and private equity.
0523.9.4	Understand the criteria and requirements for securing various types of funding, as well as the implications for business ownership and control.
0523.10	Complete a financial ask.
0523.10.1	Understand the components of the ask, including funding amount, intended use of funds, and proposed terms.
0523.10.2	Create a detailed financial plan and projection to support the financial ask.
0523.10.3	Tailor the financial ask to the preferences and requirements of different funding sources.

Entrepreneurial Protections

0523.11	Understand the importance of entrepreneurship protections.
0523.11.1	Recognize the value of safeguarding intellectual property (IP) and the types of protections available.
0523.11.2	Understand the role of insurance in mitigating risks associated with business operations.
0523.11.3	Explore other recommended protections based on best practices, such as implementing contracts, agreements, and legal structures.
0523.12	Identify potential considerations for utilizing protections within a business.
0523.12.1	Assess the IP assets of a business and determine appropriate strategies for protection.
0523.12.2	Evaluate insurance needs and options based on the specific risks and liabilities applicable to the industry, location, and operations of the business.
0523.12.3	Consider additional recommended protections and generate a template for at least one additional protection (such as operating agreements for partnerships or a process for legal audits).

Network Development

0523.13	Explore the nature of an entrepreneurship ecosystem.
0523.13.1	Explain the role and value of an entrepreneurship ecosystem.
0523.13.2	Understand the composition and dynamics of a local, state, and regional entrepreneurship ecosystem.
0523.13.3	Identify key stakeholders and influencers within the local and state entrepreneurship community.
0523.13.4	Explore resources and opportunities within the local and state ecosystem to support business development.
0523.14	Develop mutually-beneficial business relationships.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade-level endorsement(s)

0523.14.1	Build and nurture relationships with entrepreneurs, industry professionals, and potential customers to create a supportive network.
0523.14.2	Cultivate trust, credibility, and reciprocity by effectively communicating and supporting value creation.
0523.14.3	Leverage networking opportunities to exchange knowledge, resources, and opportunities.
0523.15	Identify key partners to assist with business development.
0523.15.1	Identify strategic partners and service providers to complement and support core business activities.
0523.15.2	Evaluate potential partners based on expertise, reputation, and alignment with the values and goals of the business.
0523.15.3	Engage with industry associations, trade groups, and professional networks.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

This course allows students to integrate theory and practice by interacting with industry professionals. Students will study various requirements for employability including ethics, communication, teamwork, and professionalism. Students will participate in hands-on, digital, or work-based experiences related to industry settings to practice skill sets and to transition from student to employee. A supervised project will be developed in one or more of the following categories: Entrepreneurship (ownership or operation of a business); Placement (employment or internship); Research and Experimentation (planning and/or conducting a scientific experiment); Exploration (exploration of related careers through activities such as shadowing employees in various work settings, conducting on-line research, attending professional development activities, etc.). Students will develop materials to supplement their Simulated Workplace portfolios.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Legal, Ethical, and Safety Guidelines

0524.1	Legal, Ethical, and Safety Guidelines
0524.1.1	Discuss labor laws applicable to work-based learning (WBL).
0524.1.2	Discuss worker's compensation as it applies to paid and unpaid student workers.
0524.1.3	Discuss safety in the workplace.
0524.1.4	Discuss confidentiality in the workplace.
0524.1.5	Explore the Occupational Safety and Health Administration (OSHA) and its standards.
0524.1.6	Describe the rights of employees and employers regarding OSHA standards.
0524.1.7	Recognize what kind of personal protective equipment (PPE) is necessary and how to use it properly.
0524.1.8	Describe managing diversity in the workplace.
0524.1.9	Discuss the Family and Medical Leave Act (FMLA), Americans with Disabilities Act (ADA), Age Discrimination Acts, and Title VII of the Civil Rights Act.

Work-Based Learning (WBL) Experience(s)

0524.2	WBL Experience(s)
0524.2.1	Collaborate to identify skills and academic/technical competencies that will be learned through WBL experience(s).
0524.2.2	Enter WBL hours into the WBL tracking system.
0524.2.3	Assess and report on the WBL experience(s) (e.g., site evaluation, student evaluation, exit surveys, etc.).

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

This course provides students with real-world work experience by connecting on-the-job training (OJT) to related technical instruction and academic competencies that can be applied in the workplace. Students will participate in work-based learning (WBL) opportunities, and study various requirements for employability, including ethics, communication, teamwork, and professionalism. Students will participate in hands-on, authentic WBL opportunities related to industry settings in order to practice skill sets and transition from student to employee.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Professional Behavioral Competencies

0525.1	Professional Behavioral Competencies
0525.1.1	Exhibit professional, ethical behavior.
0525.1.2	Display a positive attitude in the workplace.
0525.1.3	Exhibit effective verbal and non-verbal communication skills.
0525.1.4	Present findings clearly and persuasively using a range of technology tools.
0525.1.5	Recognize information needed for problem-solving.
0525.1.6	Share information through a variety of oral, written, and multimedia communications.
0525.1.7	Define leadership and situational leadership.
0525.1.8	Identify methods of motivation and describe empowerment.
0525.1.9	Distinguish between a group and a team.
0525.1.10	Identify the elements of a good team.
0525.1.11	Describe the roles of each team member including the team leader.

Work-Based Learning (WBL) Experience(s)

0525.2	WBL Experience(s)
0525.2.1	Collaborate to identify skills and academic/technical competencies that will be learned through WBL experience(s).
0525.2.2	Enter WBL hours into the WBL tracking system.
0525.2.3	Assess and report on the WBL experience(s) (e.g., site evaluation, student evaluation, exit surveys, etc.).

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Awareness and Sensitivity to Client Needs

0615.1	Awareness and Sensitivity to Client Needs
0615.1.1	Describe selected client service strategies (e.g., service, quality client care, client participation).

Healthcare Safety and Standard Precautions

0615.2	Healthcare Safety and Standard Precautions
0615.2.1	Explain the current requirements of standard precautions and the procedures used at a variety of healthcare facilities to support those standards (e.g., infection control, proper hand washing, and gloving procedures).
0615.2.2	Identify ways in which healthcare workers can demonstrate personal and client safety (e.g., Safety Data Sheets).

Healthcare Delivery System

0615.3	Healthcare Delivery System
0615.3.1	Explain the difference between public, private, government, and non-profit health care delivery systems.
0615.3.2	Investigate the roles and responsibilities of the consumer within the healthcare system.
0615.3.3	Discuss various types of healthcare providers and the services they provide.
0615.3.4	Investigate a range of services available within the healthcare system.
0615.3.5	Identify members of the healthcare team.
0615.3.6	Discuss methods of payment for healthcare services.
0615.3.7	Discuss emerging issues including technology, epidemiology, bioethics, and socioeconomics on healthcare delivery systems.

Safety Practices

0615.4	Safety Practices
0615.4.1	Explain the principles of infection control.
0615.4.2	Perform hand washing according to Centers for Disease Control regulations.
0615.4.3	Don and remove non-sterile gloves.
0615.4.4	Discuss surgical asepsis.
0615.4.5	Demonstrate how to correctly dispose of biohazardous materials according to appropriate government guidelines such as OSHA.
0615.4.6	Recognize emerging diseases and disorders.
0615.4.7	Distinguish between fact and fiction about the transmission and treatment of diseases caused by bloodborne pathogens including Hepatitis B.
0615.4.8	Identify “at-risk” behaviors that promote the spread of diseases caused by bloodborne pathogens and the public education necessary to combat the spread of these diseases.
0615.4.9	Identify community resources and services available to individuals with diseases caused by bloodborne pathogens.

0615.4.10	Apply infection control techniques designed to prevent the spread of disease by bloodborne pathogens to the care of all patients following Centers for Disease Control (CDC) guidelines.
0615.4.11	Describe and implement Standard Precautions.
0615.4.12	Demonstrate knowledge of the legal aspects of AIDS, including testing.

Environmental Safety

0615.5	Environmental Safety
0615.5.1	Describe types of health, safety, and environmental management systems with healthcare organizations.
0615.5.2	Discuss the importance of environmental safety to organizational performance and regulatory compliance.
0615.5.3	Describe personal and worksite safety rules and regulations that maintain safe and healthy work environments.
0615.5.4	Demonstrate the safe use of medical equipment.
0615.5.5	Explain and apply the theory of root-cause analysis.
0615.5.6	Identify and describe methods for medical error reduction and prevention in various healthcare settings.
0615.5.7	Identify and practice security procedures for medical supplies and equipment.
0615.5.8	Demonstrate personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations (including Standard Precautions).
0615.5.9	Recognize Data Safety Sheets (SDS) and comply with safety signs, symbols, and labels.
0615.5.10	Demonstrate proper body mechanics and ergonomics.
0615.5.11	Demonstrate the procedure for properly identifying patients.
0615.5.12	Demonstrate the procedures for the safe transport and transfer of patients.
0615.5.13	Describe fire safety, disaster, and evacuation procedures.
0615.5.14	Create a disaster and/or emergency response plan.
0615.5.15	Discuss patient safety goals provided/endorsed by the Joint Commission (www.jointcommission.org).
0615.5.16	Explain emergency procedures in response to workplace accidents.

Professional and Legal Responsibilities

0615.6	Professional and Legal Responsibilities
0615.6.1	Discuss the legal framework of healthcare occupations including Scope of Practice legislation.
0615.6.2	Explain practices that could result in malpractice, liability, negligence, abandonment, false imprisonment, and fraud.
0615.6.3	Demonstrate procedures for accurate documentation and record keeping.
0615.6.4	Interpret healthcare facility policies and procedures.
0615.6.5	Explain the patients' <i>Bill of Rights</i> .
0615.6.6	Identify and implement standards of the Health Insurance Portability and Accountability Act (HIPPA).
0615.6.7	Describe advance directives.
0615.6.8	Discuss key issues surrounding end-of-life care.
0615.6.9	Recognize the steps in the grieving process.
0615.6.10	Distinguish between express, implied, and informed consent.
0615.6.11	Explain the laws governing harassment, labor, and employment.
0615.6.12	Differentiate between legal and ethical issues in healthcare.
0615.6.13	Describe a code of ethics consistent with healthcare occupations.
0615.6.14	Identify and compare personal, professional, and organizational ethics.
0615.6.15	Recognize the limits of authority and responsibility of health care workers including legislated Scope of Practice.

0615.6.16	Recognize and report illegal and/or unethical practices of healthcare workers.
0615.6.17	Recognize and report abuse including domestic violence and neglect.
0615.6.18	Evaluate and justify decisions based on ethical reasoning.
0615.6.19	Evaluate alternative responses to workplace situations based on personal, professional, ethical, and legal responsibilities and employer policies.
0615.6.20	Identify and explain the personal and long-term consequences of unethical or illegal behaviors in the workplace.
0615.6.21	Interpret and explain written organizational policies and procedures.

Leadership Development

0615.7	Leadership Development
0615.7.1	Interpret healthcare facility policies and procedures.
0615.7.2	Explain the patients' <i>Bill of Rights</i> .
0615.7.3	Identify and implement standards of the Health Insurance Portability and Accountability Act (HIPPA).
0615.7.4	Describe advance directives.
0615.7.5	Discuss key issues surrounding end-of-life care.

Patient/Client Customer Service

0615.8	Patient/Client Customer Service
0615.8.1	Demonstrate respectful and empathetic treatment of all patients/clients.
0615.8.2	Hear and work to resolve complaints from patients/clients or the public.
0615.8.3	Check completed work for spelling, punctuation, and format.
0615.8.4	Greet visitors or callers and handle their inquiries or direct them to the appropriate persons according to their needs.
0615.8.5	Answer inquiries pertaining to patient care policies and services and work to resolve patient/client complaints.
0615.8.6	Measure and assess patient/client and employee satisfaction.
0615.8.7	Confer with patient/client by telephone or person to provide information about healthcare or services, take orders from superiors, obtain details of complaints, and forward to instructor/supervisors.
0615.8.8	Keep records of patient/client interactions, recording details of inquiries, complaints, or comments, as well as actions taken per healthcare institution guidelines.
0615.8.9	Check to ensure that appropriate changes were made to work toward resolving patient/client problems.
0615.8.10	Describe points of patient safety and respond to questions.
0615.8.11	Investigate and work to resolve complaints regarding food quality, service, or patient/client care within your scope of practice.
0615.8.12	Identify the characteristics of each healthcare industry's target market.

Communications

0615.9	Communications
0615.9.1	Interpret verbal and nonverbal communication.
0615.9.2	Apply basic speaking and active listening skills including reflection, restatement, and clarification techniques.
0615.9.3	Recognize barriers to communication.
0615.9.4	Recognize the elements of communication using a sender-receiver model.
0615.9.5	Apply speaking and active listening skills.
0615.9.6	Develop basic observational skills and related documentation strategies in written and oral form.

0615.9.7	Use appropriate medical/dental terminology and abbreviations.
0615.9.8	Recognize elements of written and electronic communication including writing a letter (spelling, grammar, and formatting).
0615.9.9	Recognize the importance of courtesy and respect for clients/patients and other healthcare workers and maintain good interpersonal relationships.
0615.9.10	Discuss how to adapt communication skills to varied levels of understanding and cultural orientation including diverse age, cultural, economic, ethnic, and religious groups.
0615.9.11	Distinguish between and report subjective and objective information.
0615.9.12	Report relative information in order of occurrence.
0615.9.13	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
0615.9.14	Locate, organize, and reference written information from various sources.
0615.9.15	Design, develop, and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
0615.9.16	Develop and interpret tables and charts to support written and oral communications.

Health Maintenance Practices

0615.10	Health Maintenance Practices
0615.10.1	Apply behaviors that promote health and wellness.
0615.10.2	Identify personal health practices and environmental factors that affect the optimal function of each of the major body systems.
0615.10.3	Identify psychological reactions to illness including defense mechanisms.
0615.10.4	Discuss the adverse effects of the use of alcohol, tobacco, and both legal and illegal drugs on the human body and apply safety practices related to these and other high-risk behaviors.
0615.10.5	Distinguish among the five schedules of controlled substances.
0615.10.6	Explain basic concepts of positive self-image, wellness, and stress.
0615.10.7	Develop a wellness and stress control plan that can be used in personal and professional life.
0615.10.8	Explore and utilize the U.S. Department of Agriculture's MyPlate food guide (www.choosemyplate.gov).
0615.10.9	Examine the basic food groups.
0615.10.10	Identify the six essential nutrients.
0615.10.11	Describe strategies for the prevention of disease including health screening and examinations.
0615.10.12	Discuss complementary (alternative) health practices as they relate to wellness and disease prevention.

Technical Skills

0615.11	Technical Skills
0615.11.1	Monitor and record vital signs.
0615.11.2	Describe legal parameters related to the administration of emergency care.
0615.11.3	Obtain and maintain training or certification in cardiopulmonary resuscitation (CPR), automated external defibrillator (AED), foreign body airway obstruction (FBAO), and first aid.
0615.11.4	Recognize adverse drug-related emergencies and take appropriate first aid action.

Information Technology Applications

0615.12	Information Technology Applications
0615.12.1	Communicate using technology to access and distribute data and other information.
0615.12.2	Describe technology applications in healthcare.
0615.12.3	Define terms and demonstrate basic computer skills.

0615.12.4	Interpret information from electronic medical documents.
0615.12.5	Employ technological tools to expedite workflow including word processing, database, reports, spreadsheets, multimedia presentations, electronic calendars, contracts, emails, and Internet applications.
0615.12.6	Use personal information management (PIM) applications to increase workplace efficiency.
0615.12.7	Employ computer operations applications to access, create, manage, integrate, and store information.
0615.12.8	Employ collaborative/groupware applications to facilitate group work.

Math and Science Foundation

0615.13	Math and Science Foundation
0615.13.1	Construct charts/tables/graphs to interpret healthcare practices using functions and data.
0615.13.2	Measure time, temperature, distance, capacity, and mass/weight.
0615.13.3	Make, use, and convert using both traditional and metric units.
0615.13.4	Make estimates and approximations and judge the reasonableness of the result.
0615.13.5	Convert from regular time to the 24-hour clock.
0615.13.6	Demonstrate ability to evaluate and draw conclusions.
0615.13.7	Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.
0615.13.8	Demonstrate knowledge of arithmetic operations.
0615.13.9	Discuss the role of creativity in constructing scientific questions, methods, and explanations.
0615.13.10	Discuss the role of creativity in constructing scientific questions, methods, and explanations.

Patient Education and Intervention Skills

0615.14	Patient Education and Intervention Skills
0615.14.1	Examine signs and symptoms of various addictions.
0615.14.2	Define the addictive process.
0615.14.3	Analyze theories of addiction.
0615.14.4	Discuss risk and protective factors.
0615.14.5	Develop Alcohol, Tobacco, and Other Drugs (ATOD) prevention education and skill development activities based on target audience analysis.
0615.14.6	Connect prevention theory and practice to implement effective prevention education and skill development activities.
0615.14.7	Maintain program fidelity when implementing evidence-based programs.
0615.14.8	Assure that ATOD education and skill activities are appropriate to the culture of the community being served.
0615.14.9	Use appropriate instructional strategies to meet the needs of the target audience.
0615.14.10	Ensure all ATOD prevention education and skill development programs provide accurate, relevant, timely, and appropriate content information.
0615.14.11	Identify, adapt, or develop instructor and participant materials for use when implementing ATOD prevention activities.
0615.14.12	Provide professionals in related fields with accurate, relevant, timely, and appropriate ATOD prevention information.
0615.14.13	Provide technical assistance to community members and organizations regarding ATOD prevention strategies and best practices.

Needs Assessment and Other Planning Strategies

0615.15	Needs Assessment and Other Planning Strategies
0615.15.1	Use needs assessment strategies to gather relevant data for ATOD prevention planning.
0615.15.2	Identify gaps and prioritize needs based on the assessment of community conditions.
0615.15.3	Select prevention strategies, programs, and best practices to meet the identified needs of the community.
0615.15.4	Develop an ATOD prevention plan based on research and theory that addresses community needs and desired outcomes.
0615.15.5	Identify resources to sustain prevention activities.
0615.15.6	Identify appropriate ATOD prevention program evaluation strategies.
0615.15.7	Conduct evaluation activities to document program implementation and effectiveness.
0615.15.8	Use evaluation findings to determine whether and how to adapt ATOD prevention strategies.

Community Organization

0615.16	Community Organization
0615.16.1	Identify the community's demographic characteristics and core values.
0615.16.2	Identify key community leaders to ensure diverse representation in ATOD prevention programming activities.
0615.16.3	Build community ownership of ATOD prevention programs by collaborating with key community leaders/members when planning, implementing, and evaluating prevention activities.
0615.16.4	Provide technical assistance to community members/leaders in implementing ATOD prevention activities.
0615.16.5	Develop capacity within the community by recruiting, training, and mentoring ATOD prevention-focused volunteers.
0615.16.6	Assist in creating and sustaining community-based coalitions

Public and Organizational Policy

0615.17	Public and Organizational Policy
0615.17.1	Examine the community's public policies and norms to determine environmental change needs.
0615.17.2	Make recommendations to policy makers/stakeholders that will positively influence the community's public policies and normal.
0615.17.3	Provide technical assistance, training, and consultation that promote environmental changes.
0615.17.4	Participate in public policy development and enforcement initiatives to affect environmental change.
0615.17.5	Use media strategies to enhance prevention effects in the community.

Career Preparation Skills

0615.18	Career Preparation Skills
0615.18.1	Apply employability skills in a healthcare setting.
0615.18.2	Exemplify professional characteristics.
0615.18.3	Follow the attendance policies of the employer or educational institution.
0615.18.4	Adhere to the chain of command/lines of authority in the work setting.
0615.18.5	Accept responsibility for own actions.
0615.18.6	Adopt personal appearance and hygiene habits appropriate to the healthcare environment and industry expectations.
0615.18.7	Engage in continuous self-assessment and career goal modification for personal and professional growth.
0615.18.8	Recognize the importance of participating in continuing education.

Technical Skills in Clinical Specialization

0615.19	Technical Skills in Clinical Specialization
0615.19.1	Comply with the required facility regulations.
0615.19.2	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
0615.19.3	Complete documentation required for clinical specialization accuracy.
0615.19.4	Participate in the clinical specialty evaluation process.
0615.19.5	Complete classroom theory/laboratory content skill sets in the clinical specialty area at a minimum mastery level.
0615.19.6	Meet requirements for certifications or registration (where available for the clinical specialty area.

Patient care technicians (PCTs) are healthcare professionals who work in a variety of settings, including hospitals, clinics, nursing homes, and home health agencies. They provide direct patient care under the supervision of licensed nurses or physicians. The skillset required for PCTs is diverse and demanding. However, by completing the PCT curriculum and aligning training with the National Consortium for Health Science Education (NCSHE) Standards, PCTs will be well-prepared to provide high-quality, compassionate care to their patients.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Communication

0617.1.1	Communication
0617.1.2	Communicate effectively to interact with patients, their families, and other healthcare professionals.
0617.1.3	Listen actively, speak clearly, and convey empathy and compassion.

Infection Control

0617.2	Infection Control
0617.2.1	Correctly use Personal Protective Equipment (PPE) and practice proper hand hygiene.
0617.2.2	Understand and follow the principles of infection control to prevent the spread of infectious disease.

Vital Signs

0617.3	Vital Signs
0617.3.1	Measure and record vital signs accurately, including blood pressure, temperature, pulse rate, respiratory rate, and pulse oximetry.
0617.3.2	Understand the normal ranges for vital sign measurements.
0617.3.3	Recognize abnormal vital sign values that may indicate a change in the patient's condition, and appropriate reporting.

Patient Safety

0617.4	Patient Safety
0617.4.1	Know patient safety practices and understand how to identify and report potential safety hazards.
0617.4.2	Understand how to prevent falls.
0617.4.3	Understand and demonstrate proper patient positioning.
0617.4.4	Know when the use of restraints is necessary.

Basic Medical Terminology

0617.5	Basic Medical Terminology
0617.5.1	Understand basic medical terminology.
0617.5.2	Use proper medical terminology to communicate effectively with other healthcare professionals.
0617.5.3	Understand and properly interpret patient chart and medical records.

Patient Care Skills

0617.6	Patient Care Skills
0617.6.1	Proficiently demonstrate patient care skills including bathing, feeding, dressing, grooming, and transferring patients.
0617.6.2	Understand the principles of body mechanics to prevent injury to self and patient.
0617.6.3	Understand basic nutrition, therapeutic diets, and hydration.
0617.6.4	Understand and proficiently demonstrate intake and output measuring and calculations, recording of results, and appropriate reporting.
0617.6.5	Proficiently demonstrate appropriate patient positioning and mobility assistance.
0617.6.6	Proficiently demonstrate basic wound care and dressing changes.
0617.6.7	Proficiently demonstrate ostomy care, and urinary catheter care and monitoring.
0617.6.8	Proficiently demonstrate elimination sample collections.

ECG Skills

0617.7	ECG Skills
0617.7.1	Demonstrate the skills and knowledge necessary to perform electrocardiography (ECG) including recognizing the different leads, how to place them, and what each wave represents.
0617.7.2	Recognize normal and abnormal ECG rhythms and tracings and understand the appropriate response for a cardiac emergency as seen on the ECG.
0617.7.3	Demonstrate proper lead placement and how to modify placement in special circumstances (such as pacemakers).
0617.7.4	Understand and demonstrate proper patient preparation, patient positioning, and the recording of accurate results.
0617.7.5	Understand how to properly maintain the ECG equipment.
0617.7.6	Know the anatomy and physiology of the heart.

Phlebotomy Skills

0617.8	Phlebotomy Skills
0617.8.1	Proficiently demonstrate skills and knowledge necessary to perform phlebotomy.
0617.8.2	Describe and define major body systems with emphasis on the circulatory system.
0617.8.3	List and describe the main superficial veins used in performing venipuncture.
0617.8.4	Identify appropriate sites for capillary/venipuncture and name and locate the most desirable one(s).
0617.8.5	Understand and demonstrate safety guidelines for blood collection and handling.
0617.8.6	Know blood collection equipment and additives.
0617.8.7	Describe the types of patient specimens that are analyzed in the clinical laboratory, and the phlebotomist's role in collecting and/or transporting these specimens to the laboratory.
0617.8.8	Demonstrate knowledge of established protocol for patient and specimen identification.
0617.8.9	Define and utilize correct medical terminology and metric measurement needed for specimen collection.

Emergency Procedures

0617.9	Emergency Procedures
0617.9.1	Know how to respond to emergency situations such as cardiac arrest, seizures, and choking.
0617.9.2	Understand basic life support techniques, including cardiopulmonary resuscitation (CPR).

Electronic Health Records

0617.10	Electronic Health Records
0617.10.1	Understand and demonstrate how to use electronic health records (EHRs) to document patient care accurately and efficiently.
0617.10.2	Know how to enter patient data, review medical orders, and access patient information.

Ethics and Legal Issues

0617.11	Ethics and Legal Issues
0617.11.1	Understand the ethical and legal issues that arise in healthcare, including patient confidentiality, informed consent, and scope of practice.
0617.11.2	Know when to seek guidance from a licensed nurse or physician.
0617.11.3	Understand the principles of ethical caregiving including beneficence, fidelity, and nonmaleficence.

Cultural Competence

0617.12	Cultural Competence
0617.12.1	Display sensitivity to cultural, ethnic, and religious backgrounds of patients.
0617.12.2	Provide care that is respectful and inclusive.
0617.12.3	Understand how cultural differences can affect patient care and communication.

Exploring Health Professions**Course #: 0700****Allowable Teacher Endorsement:** 2200, 2205, 2215, 2250, 2500, 2600, 2800, 2900, 3605, 7041, 7042, 7043, 7045, 7048, 7171, 7172, 7606, 7607, 7608

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals, and to provide information regarding careers in the Health Science Career Cluster. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices. Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction by utilizing grade-level appropriate principles of Simulated Workplace. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect - Instructor's Guide.pdf](#) for more information.

0700.1	Career Preparation Skills.
0700.1.1	Define and use proper terminology associated with the therapeutic services career pathway.
0700.1.2	Describe some of the careers available in the therapeutic services career pathway.
0700.1.3	Identify common characteristics of the careers in the therapeutic services career pathway.
0700.1.4	Research the history of the therapeutic services career pathway and describe how the associated careers have evolved and impacted society.
0700.1.5	Identify skills required to successfully enter any career in the therapeutic services career pathway.
0700.1.6	Describe technologies associated with careers in the therapeutic services career pathway.
0700.1.7	Define and use proper terminology associated with the allied health career pathway.
0700.1.8	Describe some of the careers available in the allied health career pathway.
0700.1.9	Identify common characteristics of the careers in the allied health career pathway.
0700.1.10	Research the history of the allied health career pathway and describe how the careers have evolved and impacted society.
0700.1.11	Identify skills required to successfully enter any career in the allied health career pathway.
0700.1.12	Describe technologies associated in careers within the allied health career pathway.
0700.1.13	Define and use proper terminology associated with the diagnostic services career pathway.
0700.1.14	Describe some of the careers available in the diagnostic services career pathway.
0700.1.15	Identify common characteristics of the careers in the diagnostic services career pathway.
0700.1.16	Research the history of the diagnostic services career pathway and describe how the careers have evolved and impacted society.
0700.1.17	Identify skills required to successfully enter any career in the diagnostic services career pathway.
0700.1.18	Describe technologies associated with careers in the diagnostic services career pathway.
0700.1.19	Define and use proper terminology associated with the health informatics career pathway.
0700.1.20	Describe some of the careers available in the health informatics career pathway.
0700.1.21	Identify common characteristics of the careers in the health informatics career pathway. Research the history of the health informatics career pathway and describe how the careers have evolved and impacted society.

Exploring Health Professions**Course #: 0700****Allowable Teacher Endorsement:** 2200, 2205, 2215, 2250, 2500, 2600, 2800, 2900, 3605, 7041, 7042, 7043, 7045, 7048, 7171, 7172, 7606, 7607, 7608

0700.1.22	Identify skills required to successfully enter any career in the health informatics career pathway.
0700.1.23	Describe technologies associated in careers within the health informatics career pathway.
0700.1.24	Define and use proper terminology associated with biotechnology research and development career pathway.
0700.1.25	Describe some of the careers available in the biotechnology research and development career pathway.
0700.1.26	Identify common characteristics of careers in biotechnology research and development career pathway.
0700.1.27	Research the history of the biotechnology research and development career pathway and describe how the careers have evolved and impacted society.
0700.1.28	Identify skills required to successfully enter any career in the biotechnology research and development career pathway.
0700.1.29	Describe technologies associated with careers in the biotechnology research and development career pathway.
0700.2	Understanding the Workplace.
0700.2.1	Describe the influences that societal, economic and technological changes have on employment trends and future training in healthcare.
0700.2.2	Describe how legislation such as the Americans with Disabilities Act and child labor laws regulates employee rights.
0700.2.3	Identify skills that are transferable from one healthcare occupation to another.
0700.2.4	Demonstrate use of career resources to identify healthcare careers, career opportunities within healthcare, employment outlook and education/ training requirements.
0700.2.5	Explain the relationship between educational achievement and career success in healthcare professions.
0700.3	Leadership Development.
0700.3.1	Use results of an interest assessment to describe their top interest areas and relate to healthcare careers.
0700.3.2	Apply results of all assessments to personal abilities to make realistic career choices.
0700.3.3	Discuss the establishment, history and purpose of the HOSA Future Health Professionals organization.
0700.3.4	Identify the characteristics and responsibilities of leaders.
0700.3.5	Demonstrate use of parliamentary procedure skills during a meeting.
0700.3.6	Participate on a committee which has an assigned task and report to the class.
0700.3.7	Identify secondary and postsecondary courses that meet tentative healthcare career plans.
0700.3.8	Demonstrate knowledge of varied types and sources of financial aid to obtain assistance for postsecondary education.
0700.3.9	Describe how extracurricular programs can be incorporated in career and education planning.
0700.3.10	Demonstrate knowledge of high school exit options (e.g., diploma, certificate of completion, special diploma, GED, etc.) And impact on post-school opportunities.
700.4	Technical Skills.
0700.4.1	Understand how information technology is used in health science career cluster.
0700.4.2	Identify information technology (IT) careers in the health science career cluster including the responsibilities, tasks and skills required.
0700.4.3	Manage information technology components typically used in professions of the health science career cluster.
0700.4.4	Identify security-related ethical and legal IT issues faced by professionals in the health science career cluster.

Employment in Health Occupations**Course #: 0710****Allowable Teacher Endorsement:** 7041, 7042, 7043, 7048, 7050, 7171, 7172, 7606, 7607, 7608, 7614, 7620

Instructional content will focus on healthcare information technology applications, employability skills, career development, and technical skill preparation. The knowledge and skills acquired in this course provide guidance for career selection and application for both entry-level employment and postsecondary preparation. Instruction will incorporate project and problem-based healthcare practices and procedures to demonstrate the criticality of these skills.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Operations/Employment in Healthcare

0710.1	Operations/Employment in Healthcare.
0701.1.1	Describe the desired traits of a healthcare professional.
0701.1.2	Review departmental mission statement, goals, objectives, and strategic plan.
0701.1.3	Review departmental policies, procedures, and processes.
0701.1.4	Monitor customer expectations through satisfaction plans and measurement tools to assure adequacy of products and services.
0701.1.5	Become familiar with organization, consolidation, and/or re-engineering processes.
0701.1.6	Adhere to a Code of Ethics to ensure corporate compliance.
0701.1.7	Become familiar with legal, regulatory and accreditation or codes.
0701.1.8	Become familiar with hazardous materials management programs.
0701.1.9	Review Emergency Preparedness Plan.
0701.1.10	Read and comprehend help wanted ads.
0701.1.11	Discuss qualifying for a job and how to get help finding a job.
0701.1.12	Develop a resume and cover letter.
0701.1.13	Write a business letter and address envelopes.
0701.1.14	Fill out a job application.
0701.1.15	Practice applying for a job by phone.
0701.1.16	Practice interviewing skills.
0701.1.17	Discuss how to keep a job.
0701.1.18	Practice filling out business forms.
0701.1.19	Practice communicating with the public.
0701.1.20	Identify the process for applying for medical coverage (employee).
0701.1.21	Complete an accident report.
0701.1.22	Complete a business travel expense form.

Aseptic Procedures/Employment in Health Occupations

0710.2	Aseptic Procedures/Employment in Health Occupations.
0710.2.1	Demonstrate various decontamination techniques and procedures.
0710.2.2	Demonstrate knowledge of precaution guidelines.
0710.2.3	Select procedures and precautions to be followed when using chemicals.
0710.2.4	Review hazardous waste disposal policies and procedures in accordance with regulatory requirements.
0710.2.5	Monitor the operations of a waste management program including recycling and reduction of regulated medical, solid, hazardous chemical, and radioactive waste materials.

Employment in Health Occupations**Course #: 0710****Allowable Teacher Endorsement:** 7041, 7042, 7043, 7048, 7050, 7171, 7172, 7606, 7607, 7608, 7614, 7620

0710.2.6	Demonstrate process and environmental requirements for proper handling and storage of sterile and non-sterile items.
0710.2.7	Demonstrate appropriate inventory control and distribution systems.
0710.2.8	Describe a program to purchase materials, supplies, and capital equipment within allocated resources.

Resource Management/Employment in Health Occupations

0710.3	Resource Management/Employment in Health Occupations.
0710.3.1	Assess procedures and processes for the maintenance of equipment.
0710.3.2	Review written instructions from the equipment manufacturers' operations manual, and departmental policies and procedures.
0710.3.3	Participate in a comprehensive training and education program, covering such aspects as safety, infection control, hazardous materials, and new equipment use.

Aesthetics/Employment in Health Occupations

0710.4	Aesthetic/Employment in Health Occupations.
0710.4.1	Maintain a clutter-free environment.
0710.4.2	Maintain the facility in good repair.
0710.4.3	Deliver and present products and services in a timely manner.

This course is designed to allow instructional content to focus on basic medical terminology, growth and development, nutrition, health maintenance practices and healthcare delivery systems. It is designed to provide the student with knowledge and technical skills required for infection control and the prevention of disease transmission, CPR and First Aid.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

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- This course is aligned with the National Consortium for Health Science Education Standards and Accountability Criteria

Awareness and Sensitivity to Client/Patient Needs

0711.1	Describe how healthcare workers can be aware and sensitive to clients/patients and their families (across the lifespan) emotional, spiritual, mental health and social needs, behaviors, and attitudes.
0711.1.1	Demonstrate knowledge of human growth and development.
0711.1.2	Explain the four main areas of growth and development in each of the seven life stages.
0711.1.3	Examine Maslow’s Hierarchy of Needs Theory.
0711.1.4	Identify socioeconomic determinants of health and wellness.
0711.2	Describe selected client/patient service strategies (e.g., service, quality client/patient care, client/patient participation).
0711.2.1	Demonstrate respectful and empathetic treatment of all clients/patients.
0711.2.2	Hear and work to resolve complaints from clients/patients or the public.
0711.2.3	Greet visitors or callers and handle their inquiries or direct them to the appropriate people according to their needs.
0711.2.4	Answer inquiries pertaining to client/patient care policies and services and work to resolve client/patient complaints.
0711.2.5	Measure and assess client/patient and employee satisfaction.
0711.2.6	Confer with client/patient by telephone or in person to provide information about health care or services, take orders from superiors, obtain details of complaints and forward to instructor/supervisor.
0711.3	Define the stages and processes of death and dying and the influence those stages have on clients/patients and their families.
0711.3.1	Discuss key issues surrounding end-of-life care.
0711.3.2	Create scenarios to analyze the five stages of grief.

Behaviors for Success in Healthcare Settings

0711.4	Discuss healthcare fields and the types of workers needed.
0711.4.1	Research levels of education, credentialing requirements, and employment trends in health professions.
0711.4.2	Distinguish differences among careers within a health science pathway.

0711.5	Describe employer behavioral expectations of healthcare personnel.
0711.5.1	Identify personal traits and attitudes desirable in a member of the career ready healthcare team.
0711.5.2	Summarize professional standards as they apply to hygiene, dress, language, confidentiality, and behavior.
0711.5.3	Recognize employability skills: chain of command, correct grammar, decision making, flexibility, initiative, integrity, loyalty, positive attitude, professional characteristics, being prompt and prepared, responsibility, scope of practice, teamwork, willing to learn and work.
0711.6	Identify the impact of quality in healthcare facilities as well as the responsibilities of users of the healthcare system (e.g., healthcare workers maintenance of personal wellness).
0711.6.1	Apply behaviors that promote health and wellness.
0711.6.2	Describe strategies for the prevention of diseases including health screenings and examinations.
0711.6.3	Discuss complementary (alternative) health practices as they relate to wellness and disease prevention.
0711.6.4	Examine aspects of behavioral health.
0711.6.5	Describe public health strategies for the prevention of disease.
0711.6.6	Investigate complementary and alternative health practices as they relate to wellness and disease prevention.
0711.7	Describe selected types of healthcare facilities and healthcare delivery systems (e.g., organizational, and financial structure, departments and services, type and levels of healthcare personnel, policies, and requirements).
0711.7.1	Discuss the healthcare delivery system (ex. public, private, government and non-profit).
0711.7.2	Describe the responsibilities of consumers within the healthcare system (ex. self-advocacy, client/patient compliance, provider, and consumer obligations).
0711.7.3	Assess the impact of emerging issues on healthcare delivery systems (ex. technology, epidemiology, bioethics, socioeconomics).
0711.7.4	Discuss healthcare economics and common methods of payment for healthcare (ex. private insurance, managed care, government programs).
0711.7.5	Identify and describe world health issues.
0711.7.6	Identify and describe health issues in West Virginia.
0711.7.7	Discuss the healthcare delivery system (ex. public, private, government and non-profit).

Communication in Healthcare Settings

0711.8	Describe the components of verbal and nonverbal communication and situations in which these skills can be effectively used.
0711.8.1	Model verbal and nonverbal communication.
0711.8.2	Identify common physical barriers to communication (aphasia, hearing loss, impaired vision).
0711.8.3	Identify common psychological barriers to communication (attitudes, bias, prejudice, stereotyping).
0711.9	Explain how active listening skills can improve client/patient and team communication.
0711.9.1	Recognize the elements of communication using the sender-receiver model.
0711.10	Use a variety of communication techniques to achieve effective interpersonal and team communication.
0711.10.1	Apply speaking and active listening skills.
0711.11	Explain the components of accurate and appropriate documentation and reporting (e.g., common medical abbreviations).
0711.11.1	Use roots, prefixes, and suffixes to communicate information.
0711.11.2	Interpret medical abbreviations to communicate information.
0711.12	Explain the roles and responsibilities of team members.

0711.12.1	Recognize characteristics of effective teams: active participation, commitment, common goals, cultural sensitivity, flexibility, open to feedback, positive attitude, reliability, trust, value, individual contributions.
0711.12.2	Recognize methods for building positive team relationships: mentorship and teambuilding.
0711.12.3	Analyze attributes and attitude of an effective leader: characteristics, types, roles.
0711.12.4	Working in a team, analyze major West Virginia or global health challenges and proposed solutions.
0711.13	Describe the use of information technology in healthcare settings.
0711.13.1	Recognize elements of written and electronic communication (spelling, grammar, and formatting).
0711.13.2	Communicate using technology to access and distribute data and other information.
0711.14	Using a problem-solving process applied to healthcare situations, describe how healthcare workers can effectively communicate with their clients/patients and team members.
0711.14.1	Identify differences between subjective and objective information.
0711.14.2	Interpret elements of communication using basic sender-receiver-message feedback model.
0711.14.3	Practice speaking and active listening skills.
0711.14.4	Utilize proper elements of written and electronic communication (spelling, grammar, and formatting).

Respecting Client/Patient Staff and Diversity

0711.15	Using a problem-solving process, applied to healthcare situations, describe how healthcare employees can respect client/patient and staff diversity.
0711.15.1	Apply effective techniques for managing team conflict: communicate assertively, gather the facts, mediate disputes, negotiate resolutions, set clear expectations.
0711.15.2	Discuss religious, social, and cultural values as they impact healthcare: ageism, ethnicity, gender, race, religion.
0711.15.3	Demonstrate respectful and empathetic treatment of all client/patients/families: civility, customer service, client/patient satisfaction.

Academic Foundations

0711.16	Demonstrate knowledge of nutrition.
0711.16.1	Identify the six essential nutrients.
0711.16.2	Examine the basic food groups.
0711.16.3	Compare therapeutic diets.
0711.17	Demonstrate knowledge of medical math.
0711.17.1	Apply mathematical computations related to healthcare procedures (metric and household, conversions, and measurements).
0711.17.2	Analyze diagrams, charts, graphs, and tables to interpret healthcare results.
0711.17.3	Record time using the 24-hour clock.

Technical Skills

0711.18	Demonstrate knowledge of medical emergency response procedures.
0711.18.1	Apply skills to obtain certification in Health Care Provider CPR/AED/First Aid, and Foreign Body Airway Obstruction. <i>(May be offered in 0715 Advanced Principles of Health Science)</i>

Healthcare Safety Standards Precautions

0711.19	Explain the procedures used to respond to client/patient/individual and healthcare facility emergencies (e.g., fire safety and natural disasters).
0711.19.1	Explain fire safety in the healthcare setting.

0711.19.2	Apply principles of basic emergency response in natural disasters and other emergencies (safe location, contact emergency personnel, follow facility protocols).
0711.20	Differentiate methods of controlling the spread and growth of pathogens.
0711.20.1	Understand the specific types of PPE required for different tasks and environments.
0711.20.2	Understand the importance of hand hygiene in preventing the transmission of pathogens.
0711.20.3	Demonstrate the correct handwashing technique.
0711.20.4	Explain principles of infection transmission: pathogens, microorganisms, chain of infection, mode of transmission.
0711.21	Identify ways in which healthcare workers can demonstrate personal and client/patient safety.
0711.21.1	Observe all safety standards related to the occupational exposure to hazardous chemicals standard (Safety Data Sheets [SDS]).
0711.21.2	Comply with safety signs, symbols, and labels.
0711.21.3	Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Legal Issues in Healthcare

0711.22	Describe the importance of confidentiality (HIPAA) and consequences of inappropriate use of healthcare data (social media and email).
0711.22.1	Recognize the importance of Health Insurance Portability and Accountability Act (HIPAA).
0711.22.2	Identify the importance of maintaining privacy of medical records, treatment history, personal identifiers, and other data that could be used to identify an individual.

Instructional content will focus on healthcare safety, environmental safety processes and procedures, ethical and legal responsibilities, and mathematical computations. Medical terminology and the reinforcement, expansion, and enhancement of biology content specific to diseases and disorders are an integral part of the course. Instruction will incorporate project and problem-based healthcare practices and procedures to demonstrate the importance of these skills. Students will develop basic technical skills required for all health career specialties including client/patient privacy, communication, teamwork, and occupational safety, and be provided with opportunities to obtain certifications in HIPPA/Data Privacy and health care safety.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

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- This course is aligned with the National Consortium for Health Science Education Standards and Accountability Criteria.

Awareness and Sensitivity to Client/Patient Needs

0715.1	Explain how different diseases can influence the functioning, behaviors, and attitudes of individuals including dementia/Alzheimer's disease.
0715.1.1	Describe common diseases and disorders of each body system including etiology, pathology, diagnosis, treatment, and prevention.
0715.1.2	Recognize emerging diseases and disorders.
0715.1.3	Describe biomedical therapies as they relate to the prevention, pathology, and treatment of diseases.

Communication in Healthcare Settings

0715.2	Describe communication skills that are important when managing conflict.
0715.2.1	Apply effective techniques for managing team conflict (negotiate resolutions, communicate assertively, gather the facts, set clear expectations, mediate disputes).

Healthcare Ethics

0715.3	Describe dimensions of values as they impact healthcare.
0715.3.1	Differentiate between ethical and legal issues impacting healthcare.
0715.3.2	Understand how values such as autonomy and individual decision-making influence the approach to informed consent and shared decision-making between healthcare providers and clients/patients.
0715.3.3	Understand cultural sensitivity and recognize that values impact how healthcare is delivered, considering diverse beliefs, practices, and preferences of clients/patients.
0715.3.4	Recognize how values guide ethical principles in healthcare, including beneficence (doing good), non-maleficence (avoiding harm), justice, and respect for persons.
0715.3.5	Recognize that values play a significant role in shaping perspectives on issues such as euthanasia, physician-assisted suicide, withdrawal of life-sustaining treatment, gene editing, immunizations, in vitro fertilization, organ donation/transplantation, and scope of practice.

0715.4	Describe basic principles of professional relationships.
0715.4.1	Understand how core values such as integrity, compassion, and accountability guide the behavior of healthcare professionals in their interactions with clients/patients, colleagues, and the broader community.
0715.4.2	Recognize that values impact how healthcare professionals from different disciplines work together, emphasizing teamwork and communication.
0715.4.3	Describe how professional relationships are built on fundamental principles that ensure effective and ethical client/patient care (open and honest communication, respect for client's/patient's dignity and autonomy, client/patient confidentiality, professional competence, adherence to ethical standards, cultural sensitivity, and professional accountability).
0715.5	Describe how ethical decision-making influences the care of clients/patients.
0715.5.1	Explain the ethical principles that guide decision-making in health care including informed consent, beneficence, non-maleficence, justice, cultural competence, end-of-life decisions, professional integrity, and confidentiality.
0715.5.2	Apply procedures for reporting activities and behaviors that affect the health, safety, and welfare of others.
0715.5.3	Demonstrate respectful and empathetic treatment of ALL clients/patients.
0715.6	Explain how an individual's diversity, socioeconomic, or religious beliefs could lead to potential ethical differences with that of other healthcare employees.
0715.6.1	Identify various cultural communication styles and preferences, and how cultural diversity influences health beliefs and practices.
0715.6.2	Understand how socioeconomic status can affect a person's access to healthcare, and how economic factors can impact a client's/patient's ability to adhere to prescribed treatments.
0715.6.3	Examine different religious beliefs and how they can significantly influence perspectives on end-of-life care; and can shape views on contraception, fertility treatments, and abortion.
0715.6.4	Understand the concept of implicit bias, and how healthcare professionals may hold unconscious biases based on factors such as race, ethnicity, or socioeconomic status.

Legal Issues in Healthcare

0715.7	Explain the laws (e.g., liability, influence on client/patient care).
0715.7.1	Recognize legal responsibilities, limitations, and implications on healthcare worker actions including liability and the influence on client/patient care.
0715.7.2	Analyze legal responsibilities and implications of criminal and civil law related to libel, slander, and tort.
0715.7.3	Summarize the essential characteristics of a client's/patient's basic rights within a healthcare setting.
0715.7.4	Describe the concept of scope of practice.
0715.7.5	Explain laws governing labor and regulation of healthcare facilities.
0715.7.6	Identify and describe regulations of drugs and medical devices.
0715.8	Explore legal issues such as sexual harassment, wrongful discharge, negligence, malpractice, and violence in the workplace (e.g., abuse, neglect, exploitation, and the Vulnerable Adults law).
0715.8.1	Interpret procedures for reporting activities and behaviors that affect the health, safety, and welfare of others (incident report).
0715.8.2	Analyze legal responsibilities and implications of criminal and civil law related to malpractice, negligence, abuse, assault, battery, and harassment.
0715.9	Identify the legal issues related to informed consent, advanced directives, ensuring the clients'/patients' rights and responsibilities, and accurate documentation.
0715.9.1	Apply procedures for accurate documentation and record keeping.

0715.9.2	Describe advanced directives.
0715.9.3	Summarize the essential characteristics of a client's/patient's basic rights within a healthcare setting.
0715.9.4	Differentiate informed and implied consent.
0715.10	Describe the importance of confidentiality (HIPAA) and consequences of inappropriate use of healthcare data (social media and email).
0715.10.1	Apply standards for the safety, privacy, and confidentiality of health information (HIPAA, privileged communication).
0715.10.2	Analyze legal responsibilities and implications of criminal and civil law related to invasion of privacy.
0715.10.3	Understand the implications of inappropriate disclosure of sensitive health information and the potential discrimination in various areas including employment and insurance.
0715.10.4	Adhere to information systems policies, procedures, and regulations as required by national, state, and local entities.

Healthcare Safety and Standard Precautions

0715.11	List healthcare safety standards and regulatory agencies and the requirements they set for safety standards for healthcare facilities, their employees, and clients/patients.
0715.11.1	Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Center for Disease Control (CDC).
0715.11.2	Identify how key systems affect services performed and quality of care: Centers for Medicare & Medicaid Services (CMS), National Institutes of Health (NIH), U.S. Department of Veterans Affairs (VA), U.S. Food and Drug Administration (FDA), U.S. Public Health Service (USPHS).
0715.12	Explain the current requirements of standard precautions and the procedures used at a variety of healthcare facilities to support those standards (e.g., infection control, proper hand washing, and gloving procedures).
0715.12.1	Apply skills to obtain training and or certification in Bloodborne Pathogens-Preventing Disease Transmission.
0715.12.2	Differentiate methods of controlling the spread and growth of pathogens through asepsis, standard precautions, isolation precautions, and vaccinations.
0715.12.3	Demonstrate and apply the use of Personal Protective Equipment (PPE).
0715.13	Identify ways in which healthcare workers can demonstrate personal and client/patient safety.
0715.13.1	Demonstrate principles of body mechanics during client/patient care: ambulating, lifting, positioning.
0715.13.2	Apply safety techniques in the work environment: ergonomics, client/patient/employee safety measures, safe operation of equipment.
0715.13.3	Demonstrate safety techniques in the laboratory setting.

Respecting Client/Patient and Staff Diversity

0715.14	Describe one's personal belief system as well as the belief systems and practices of diverse cultures.
0715.14.1	Recognize accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment.
0715.14.2	Understand the importance of personal and professional development to stay current on best practices for interacting with diverse teams and clients/patients.
0715.14.3	Recognize cultural norms, practices, and relevant socio-economic factors.
0715.15	Explore personal responsibility as a healthcare employee to treat each person as an individual.
0715.15.1	Recognize and appreciate the diversity of individuals, including differences in culture, religion, ethnicity, gender, and socio-economic status.

0715.15.2	Develop cultural competence to understand and respect the cultural beliefs and practices of clients/patients.
0715.15.3	Understand age-specific needs and preferences in order to provide effective support and care.
0715.16	Discuss the appropriate workplace expectations to interact with team members and care for client/patients from diverse cultures, gender, age groups.
0715.16.1	Understand religious and cultural values as they impact healthcare.
0715.16.2	Recognize the importance of clear and culturally sensitive communication in building trust and rapport.
0715.16.3	Be aware of potential biases and stereotypes and ways to actively work to overcome them.
0715.16.4	Cultivate empathy towards team members and clients/patients by understanding their unique perspectives.

Academic Foundations

0715.17	Understand medical math principles
0715.17.1	Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.
0715.17.2	Understand the use of the metric system.
0715.18	Understand human anatomy and physiology.
0715.18.1	Describe the organization of the human body and directional terms.
0715.18.2	Classify the basic structural and functional organization of the human body (tissue, organ, and system).
0715.18.3	Recognize body planes, directional terms, quadrants, and cavities.
0715.18.4	Analyze the basic structure and function of the human body.

Technical Skills

0715.19	Apply procedures for measuring and recording vital signs including normal ranges.
0715.19.1	Demonstrate procedures for measuring and recording vital signs in both normal and abnormal ranges - including but not limited to: • Blood pressure • Height and weight • Oxygen saturation • Pain • Pulse • Respirations • Temperature
0715.19.2	Obtain certification in CPR/AED/First Aid, and Foreign Body Airway Obstruction. <i>(May be offered in 0711 Foundations of Health Science)</i>

Information Technology Applications in Healthcare

0715.20	Apply information technology practices common across health professions.
0715.20.1	Identify components of an electronic health record and/or medical record.
0715.20.2	Explore different types of health data collection tools.
0715.20.3	Create electronic documentation that reflects timeliness, completeness, and accuracy.
0715.20.4	Examine information systems policies, procedures, and regulations as required by national, state, and local entities.

Body Structures and Functions

Course #: 0716

Allowable Teacher Endorsement: 7041, 7043, 7045, 7048, 7050, 7172, 7606, 7607

This course focuses on the structure and function of each system in the human body. Additional instructional components include concepts that pertain to the body as a whole, applicable medical terminology, and pathophysiology common to each system.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Basic Structure of the Human Body

0716.1	Analyze the basic structure of the human body.
0716.1.1	Differentiate anatomy and physiology.
0716.1.2	Examine two subdivisions of anatomy.
0716.1.3	Interpret terms referring to location, direction, planes, and sections of the body.
0716.1.4	Examine metabolism, anabolism, catabolism, and homeostasis.
0716.1.5	Distinguish the molecular structure and function of DNA and RNA.
0716.1.6	Describe acids and bases.
0716.1.7	Examine the process of neutralization.
0716.1.8	Differentiate pH and the pH Scale.
0716.1.9	Classify examples of the pH of body fluids.
0716.1.10	Establish the significance of pH for body function.
0716.1.11	Examine a buffer.
0716.1.12	Define and pronounce medical terminology applicable to body structures and functions.

Cells

0716.2	Analyze human cells.
0716.2.1	Examine the structure of a typical cell.
0716.2.2	Distinguish the function of each cell structure.
0716.2.3	Define mitosis.
0716.2.4	Differentiate the five phases of mitosis.
0716.2.5	Examine diffusion, osmosis, filtration, active transport, phagocytosis, and pinocytosis.
0716.2.6	Assess cell specialization.
0716.2.7	Establish the meaning of benign, malignant and metastasis.

Tissues, organs, and organ systems

0716.3	Analyze human tissues, organs, and organ systems.
0716.3.1	Examine the four main types of tissues, describing their function and location.
0716.3.2	Define organ.
0716.3.3	Define organ system.
0716.3.4	Assess the function of each organ and organ system in the human body.
0716.3.5	Distinguish the process by which tissue is repaired.
0716.3.6	Determine the vitamins favorable to tissue repair.

Integumentary System

0716.4	Examine the human integumentary system.
0716.4.1	Define integument.
0716.4.2	Examine the function of the skin.
0716.4.3	Distinguish epidermis, dermis, and subcutaneous layers including structure, function, and location.
0716.4.4	Examine the appendages of the skin and their structure, function, and location.
0716.4.5	Correlate skin functions as a barrier to microorganisms.
0716.4.6	Differentiate the following disorders: acne vulgaris, athlete's feet, dermatitis, eczema, impetigo, psoriasis, ring worm, urticaria, furuncles, carbuncles, shingles, herpes, skin cancer and burns.
0716.4.7	Determine common types of skin lesions in relationship to their characteristics and size including an example of each.

Skeletal System

0716.5	Examine the human skeletal system.
0716.5.1	Determine the functions of the skeletal system.
0716.5.2	Describe how bones are classified.
0716.5.3	Distinguish types of joint movement.
0716.5.4	Examine the process by which bone is formed.
0716.5.5	Label the parts of the long bone, describing structure and function.
0716.5.6	Examine how bones grow.
0716.5.7	Distinguish bones of the skeleton by name and location.
0716.5.8	Examine four types of fractures.
0716.5.9	Differentiate open reduction, closed reduction, and traction.
0716.5.10	Recognize common bone and joint disorders.

Muscular System

0716.6	Examine the human muscular system.
0716.6.1	Interpret the function of muscle.
0716.6.2	Name, describe, and locate each type of muscle.
0716.6.3	Differentiate contractility, extensibility, elasticity, and excitability as they relate to muscular function.
0716.6.4	Establish how muscles work in pairs.
0716.6.5	Relate the attachment of the origin and insertion of a muscle.
0716.6.6	Distinguish the terms antagonist, flexor, extensor, levator, depressor, and dilator.
0716.6.7	Examine energy and heat in relationship to the work of muscles.
0716.6.8	Assess muscle fatigue and tone.
0716.6.9	Name, locate and describe the function of the main skeletal muscles.
0716.6.10	Examine the effect of sports training on muscles.
0716.6.11	Compare common muscular disorders.

Circulatory System

0716.7	Examine the human circulatory system
0716.7.1	Determine the function of the circulatory system.
0716.7.2	Examine and locate the components of the circulatory system.
0716.7.3	Recognize substances that are added and removed from the blood during circulation through body organs.

0716.7.4	Examine the structure and function of the heart.
0716.7.5	Demonstrate the blood pathway through cardiopulmonary circulation.
0716.7.6	Determine the conductive pathway of an electrical impulse as the heart contracts.
0716.7.7	Examine disorders of the heart.
0716.7.8	Differentiate the specialized circulatory systems.
0716.7.9	Trace the blood in fetal circulation.
0716.7.10	Compare and contrast the types of blood vessels.
0716.7.11	Recognize the principal arteries and veins of the body.
0716.7.12	Establish the process by which blood flows through the arteries and veins.
0716.7.13	Distinguish systolic and diastolic blood pressure.
0716.7.14	Examine disorders of the blood vessels.

Blood

0716.8	Examine the structure and function of blood.
0716.8.1	Examine the function of blood components.
0716.8.2	Recognize the three types of blood cells.
0716.8.3	Identify hemoglobin, erythropoiesis, hemolysis, and coagulation.
0716.8.4	Describe the inflammatory process.
0716.8.5	Differentiate the four types of blood.
0716.8.6	Assess the significance of the Rh antigen.
0716.8.7	Examine disorders of the blood.

Lymphatic System and Immunity

0716.9	Examine the lymphatic system and immunity.
0716.9.1	Characterize each component of the lymphatic system.
0716.9.2	Distinguish lymph nodes.
0716.9.3	Differentiate the role of the tonsils, spleen, and thymus gland.
0716.9.4	Compare types of immunity.
0716.9.5	Define immunization, antigen, immunoglobulin and autoimmunity.
0716.9.6	Examine the process of hypersensitivity/allergy development.
0716.9.7	Determine the meaning, signs, and treatment of anaphylaxis.
0716.9.8	Distinguish the symptoms of AIDS.
0716.9.9	Examine AIDS transmission and prevention.
0716.9.10	Describe Standard Precautions.

Respiratory System

0716.10	Examine the structure and function of the respiratory system.
0716.10.1	Identify the mediastinum.
0716.10.2	Describe the breathing process.
0716.10.3	Examine the role of the nervous system and chemical factors necessary for the control of breathing.
0716.10.4	Differentiate four types of lung capacity volumes.
0716.10.5	Distinguish types of respirations (i.e., Apnea, dyspnea, eupnea, hyperpnea, orthopnea and tachypnea).
0716.10.6	Characterize infectious and noninfectious disorders of the respiratory system.

Digestive System

0716.11	Examine the structure and function of the digestive system.

0716.11.1	Examine the structure and function of the digestive system accessory organs.
0716.11.2	Trace the digestive process through the alimentary canal.
0716.11.3	Compare mechanical and chemical digestion.
0716.11.4	Determine the action of enzymes on carbohydrates, fats, and protein.
0716.11.5	Recognize common disorders of the digestive system.

Urinary System

0716.12	Examine the structure and function of the urinary system.
0716.12.1	Describe formation of urine by the nephron.
0716.12.2	Differentiate chemical and nervous system control of urine secretion.
0716.12.3	Recognize common disorders of the urinary system.

Endocrine System

0716.13	Examine the endocrine system.
0716.13.1	Examine glands of the endocrine system including the hormone secreted by each and their locations.
0716.13.2	Determine the negative feedback system in controlling the secretion of hormones.
0716.13.3	Recognize prostaglandins.
0716.13.4	Determine the causative factors for endocrine gland disorders.
0716.13.5	Recognize common disorders of the endocrine system.

Nervous System

0716.14	Examine the structure and function of the nervous system.
0716.14.1	Assess main divisions of the nervous system.
0716.14.2	Determine the function of the neuron.
0716.14.3	Distinguish the parts of the neuron.
0716.14.4	Examine the brain, describing the location and function of each area.
0716.14.5	Examine the spinal cord, describing parts and function.
0716.14.6	Identify cerebrospinal fluid and explain its circulation.
0716.14.7	Assess disorders of the brain and spinal cord.
0716.14.8	Distinguish characteristics and function of a mixed nerve.
0716.14.9	Distinguish the function of the cranial and spinal nerves.
0716.14.10	Examine the function of the sympathetic and parasympathetic nervous system.
0716.14.11	Examine the simple reflex arc.
0716.14.12	Recognize disorders of the central nervous system and peripheral nervous system.

Sensory Organs

0716.15	Examine the structure and function of sensory organs.
0716.15.1	Determine parts of the eye and describe their function.
0716.15.2	Trace a pathway of light from outside to the brain.
0716.15.3	Determine parts of the ear and describe their function.
0716.15.4	Trace the pathway of sound from outside the ear to the brain.
0716.15.5	Evaluate disorders of the eye, ear, and nose.
0716.15.6	Examine the process associated with the sense of smell.

Reproductive System

0716.16	Examine structure and function of the male and female reproductive systems.

Body Structures and Functions**Course #: 0716****Allowable Teacher Endorsement:** 7041, 7043, 7045, 7048, 7050, 7172, 7606, 7607

0716.16.1	Determine the process of meiosis.
0716.16.2	Describe the process of fertilization.
0716.16.3	Distinguish stages of fetal development including characteristics of the zygote, embryo, and fetus.
0716.16.4	Differentiate infertility, artificial insemination, and in-vitro fertilization.
0716.16.5	Identify the stages of the menstrual cycle.
0716.16.6	Discuss menopause.
0716.16.7	Recognize common disorders of the male and female reproductive systems.

Genetics

0717.17	Examine genetics, mutation, and genetically linked disorders.
0717.17.1	Identify two main types of mutation.
0717.17.2	Characterize genetic counseling and engineering.

ECG/Phlebotomy**Course #: 0720****Allowable Teacher Endorsement:** 7041, 7045, 7048, 7050, 7172

Upon successful completion of this course, students will master competencies consistent in the areas of ECG Technician and Phlebotomist.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Health Care Delivery System

0720.1	Health Care Delivery System
0720.1.1	Examine departments found within hospitals and healthcare facilities including the function of each.
0720.1.2	Determine healthcare providers working within hospitals, clinics, and physician's offices.
0720.1.3	Characterize the organizational structure of a hospital.
0720.1.4	Examine the role of the clinical laboratory and the electrocardiography departments.
0720.1.5	Relate the phlebotomist's role in clinical laboratory medicine.
0720.1.6	Differentiate the roles and qualifications of clinical laboratory personnel.
0720.1.7	Recognize the ECG technician's qualifications and role in the clinical facility.
0720.1.8	Examine professionalism as it relates to the phlebotomist and ECG technician.

Laboratory and EKG Departments in a Health Care System

0720.2	Laboratory and EKG Departments in a Health Care System
0720.2.1	Examine the types of laboratory procedures performed in the Clinical Laboratory and ECG Departments.
0720.2.2	Determine how laboratory testing and cardiography is used to assess bodily functions and disease.
0720.2.3	Interpret medical terms and abbreviations commonly used in the laboratory and cardiography departments.

Legal Responsibilities

0720.3	Legal Responsibilities
0720.3.1	Determine the meaning of negligence, malpractice, assault, battery, liability, and Respondent Superior.
0720.3.2	Examine legal responsibilities and actions given sample scenarios.
0720.3.3	Interpret the scope of practice of the phlebotomist and ECG technician.
0720.3.4	Recognize common ethical standards within the healthcare profession.
0720.3.5	Interpret patient confidentiality, recognizing common threats to confidentiality.
0720.3.6	Examine the Patients' Bill of Rights as it applies to clinical laboratory personnel and the ECG technician.
0720.3.7	Determine policies and procedures for maintaining safety in the laboratory and during ECG procedures.
0720.3.8	Examine the modes of transmission of microorganisms.
0720.3.9	Compare methods for controlling the growth and spread of microorganisms.
0720.3.10	Apply infection control and safety procedures based on the Occupational Safety and Health Administration (OSHA) and the Centers for Disease Control (CDC) (i.e., Standard Precautions).
0720.3.11	Apply proper use of personal protective equipment (PPE).
0720.3.12	Examine nosocomial infections.
0720.3.13	Determine the electrical, radiation, biological hazards and fire safety procedures used in the hospital including the clinical laboratory.
0720.3.14	Illustrate the hazard symbols for radiation, biohazard, toxic or poison, carcinogen, corrosive, flammable and NFPA chemical hazard.

ECG/Phlebotomy**Course #: 0720****Allowable Teacher Endorsement:** 7041, 7045, 7048, 7050, 7172

0720.3.15	Recognize and label biohazard specimens.
0720.3.16	Determine the safety measures followed by a phlebotomist when collecting or transporting a specimen.
0720.3.17	Differentiate the following conditions listing first aid for each: petechiae, hematoma, infection, syncope, emesis, osteomyelitis, and sepsis.

Communication

0720.4	Communication
0720.4.1	Demonstrate the proper method for greeting and interacting with a patient.
0720.4.2	Distinguish important components of an interview of a patient or a patient's representative in preparation for obtaining specimens.
0720.4.3	Examine instructions to be given to patients in preparation for routine blood collection, glucose testing, bleeding times and other procedures normally performed by the phlebotomist.
0720.4.4	Examine instructions to be given to patients in preparation for electrocardiography procedures.
0720.4.5	Relate techniques for dealing with family and visitors during the collection of specimens and electrocardiography procedures.
0720.4.6	Assess the importance of appearance and grooming for phlebotomists and ECG technicians.
0720.4.7	Articulate telephone use within the context of extra-laboratory communication.
0720.4.8	Relate rules of telephone etiquette appropriate for the clinical setting.
0720.4.9	Recognize the role of the computer within the laboratory and ECG department.

Quality Assurance in Laboratory Testing

0720.5	Quality Assurance in Laboratory Testing
0720.5.1	Determine policies and procedures used in the clinical laboratory to assure quality in obtaining of blood specimens.
0720.5.2	Examine the system for monitoring quality assurance in the collection and transportation of laboratory specimens.

Specimen Transport and Processing

0720.6	Specimen Transport and Processing
0720.6.1	Determine the laboratory criteria for identifying an appropriate request for specimen collection.
0720.6.2	Relate legal responsibilities of the laboratory and phlebotomist for the need of the physicians' request for all specimen collecting and testing.
0720.6.3	Implement methods for transporting and processing blood specimens for routine and special testing.
0720.6.4	Distinguish methods for processing and transporting specimens for testing at reference laboratories.
0720.6.5	Recognize the potential clerical and technical errors that may occur during specimen processing.
0720.6.6	Relate the general effects of time on test quality and patient care regarding processing and transporting of specimens.
0720.6.7	Determine the conditions that must be met if blood specimens and laboratory tests are to be used as legal evidence.
0720.6.8	Relate criteria for a normal ECG.
0720.6.9	Determine lethal arrhythmias.

Collection Equipment and Precautions

0720.7	Collection Equipment and Precautions
0720.7.1	Determine the additives used in blood collection and rationale for their use.
0720.7.2	Differentiate the evacuated tube color codes associated with the additives.

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0720.7.3	Demonstrate the types of equipment needed to collect blood by venipuncture, capillary, and arterial punctures.
0720.7.4	Choose supplies carried on a phlebotomist's tray.
0720.7.5	Relate special precautions necessary during blood collections.
0720.7.6	Distinguish substances that can interfere in clinical analysis of blood constituents.
0720.7.7	Differentiate the mode of action for each anticoagulant.
0720.7.8	Examine the meaning of the following terms, listing possible causes of each: Demolished Sample, Short Draw, Clotting in Whole Blood Tubes, Lipemic and Icteric.
0720.7.9	Determine the effects of the tourniquet, hand squeezing and heating pads on capillary and venipuncture.
0720.7.10	Recognize a winged infusion set.
0720.7.11	Relate situations appropriate for the use of a winged infusion needle.
0720.7.12	Recognize a syringe, explaining when this technique would be used.

Specimen Collection Procedures

0720.8	Specimen Collection Procedures
0720.8.1	Examine "chain of custody" as it relates to blood specimens collected to rule out illegal drug use.
0720.8.2	Determine the meaning of the following terms: TDM, Peak Levels, Trough Levels, Random Sampling, Toxic Levels, Intramuscular and Intravascular.
0720.8.3	Determine steps used in specimen collection techniques for glucose testing: two hour, random, fasting and glucose tolerance testing.
0720.8.4	Correctly time and label specimen.
0720.8.5	Determine steps in the procedure for blood alcohol specimen collection.
0720.8.6	Relate the phlebotomist's role in the collection of urine specimens for routine urinalysis, culture and sensitivity and timed specimens.
0720.8.7	Perform a multi-draw venipuncture.
0720.8.8	Demonstrate the approach steps in a skin puncture procedure.
0720.8.9	Demonstrate identification of the patient.
0720.8.10	Perform the steps in a skin puncture procedure.
0720.8.11	Perform the steps in a venipuncture.
0720.8.12	Demonstrate the collecting, labeling, and transporting specimens for the following analyses: cold agglutinins, type, antibody screen, cross match, and blood cultures.

Circulatory System

0720.9	Circulatory System
0720.9.1	Examine the structures of the heart.
0720.9.2	Distinguish the four chambers of the heart.
0720.9.3	Distinguish the name, location, and function of the heart valves.
0720.9.4	Illustrate the flow of blood through the heart, labeling each structure.
0720.9.5	Relate the pumping action of the heart known as the Cardiac Cycle.
0720.9.6	Distinguish four properties of the cardiac cells.
0720.9.7	Distinguish between systemic and pulmonary circulation.
0720.9.8	Relate the sequence of the electrical impulse of the conduction system.
0720.9.9	Examine structures of the conduction system including labeling each on a drawing.
0720.9.10	Examine blood and blood components.
0720.9.11	Label major blood vessels on a drawing.

ECG/Phlebotomy**Course #: 0720****Allowable Teacher Endorsement:** 7041, 7045, 7048, 7050, 7172**Basic Electrophysiology**

0720.10	Basic Electrophysiology
0720.10.1	Relate the electrical conduction pathway of the heart.
0720.10.2	Examine the correlation between structures in the conduction pathway and the cardiac cycle.
0720.10.3	Differentiate the waveforms and segments of the heartbeat as demonstrated on the ECG.
0720.10.4	Recognize causes of dysrhythmias.
0720.10.5	Relate the meaning of isoelectric line.

Electrocardiography

0720.11	Electrocardiography
0720.11.1	Articulate the difference between electrocardiogram and electrocardiograph.
0720.11.2	Determine the reasons for performing an ECG.
0720.11.3	Examine the universal marking codes for a manual 12 lead ECG and the auto 12 lead.
0720.11.4	Diagram the limb, augmented and chest leads of an ECG.
0720.11.5	Recognize and correct problems associated in the performance of an ECG tracing.
0720.11.6	Determine the placement of ECG electrodes on the body.

Electrocardiography Machine and Paper

0720.12	Electrocardiography Machine and Paper
0720.12.1	Articulate the difference between electrocardiogram and electrocardiograph.
0720.12.2	Determine the reasons for performing an ECG.
0720.12.3	Examine the universal marking codes for a manual 12 lead ECG and the auto 12 lead.
0720.12.4	Diagram the limb, augmented and chest leads of an ECG.
0720.12.5	Recognize and correct problems associated in the performance of an ECG tracing.
0720.12.6	Determine the placement of ECG electrodes on the body.

Leads

0720.13	Leads
0720.13.1	Articulate the 12 leads in a tracing.
0720.13.2	Relate the difference between unipolar and bipolar.
0720.13.3	Determine the color of the limb and chest leads for a standard 12 lead ECG.
0720.13.4	Examine the principle of Einthoven's triangle and diagram the three leads used.
0720.13.5	Articulate the augmented limb leads and diagram them on a chart.
0720.13.6	Relate the precordial or chest leads in order, explaining what they measure.
0720.13.7	Articulate the frontal and horizontal leads of an ECG.

Electrocardiograph Techniques

0720.14	Electrocardiograph Techniques
0720.14.1	Articulate the universal standard of ECG measurement.
0720.14.2	Identify the patient using proper procedure.
0720.14.3	Identify yourself and explain procedure to the patient.
0720.14.4	Document patient's medication history and vital signs.
0720.14.5	Determine relaxation methods to make the patient comfortable.
0720.14.6	Place the patient into the proper recording position.
0720.14.7	Prepare the patient's skin before placement of leads.
0720.14.8	Place sensors in proper positions on the patient.

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0720.14.9	Connect the cable wires to sensors in proper sequence.
0720.14.10	Acquire ECG tracing using universal standards.
0720.14.11	Recognize and correct artifacts on the ECG tracing.
0720.14.12	Correct standardization of voltage.
0720.14.13	Determine how to identify the tracing after completion.
0720.14.14	Document any variation from a normal tracing or any information useful to the interpreting physician.
0720.14.15	Document any physical or extrinsic situation that could alter ECG vector or standard lead placement.
0720.14.16	Verify information on ECG tracing.

Quality Assurance in the Performance of ECG

0720.15	Quality Assurance in the Performance of ECG
0720.15.1	Relate criteria for a normal ECG.
0720.15.2	Determine lethal arrhythmias.
0720.15.3	Report lethal arrhythmias immediately to a nurse or physician.
0720.15.4	Characterize the guide used in interpreting an ECG strip.
0720.15.5	Calculate the rate of the patient's heartbeat on an ECG tracing.
0720.15.6	Demonstrate utilization of the components of rhythm strip analysis.
0720.15.7	Interpret terms associated with the interpretation of an ECG (i.e., Normal sinus rhythm, sinus arrhythmia, sinus arrest, bradycardia, and tachycardia).

Through the study of medical terminology, the student will be introduced to the language of medicine. Students will gain an understanding of basic elements, rules of building and analyzing medical words, and medical terms associated with the human body utilizing a systems approach.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Basic Elements of Medical Terminology

0721.1	Examine the basic medical elements and interpret their role in forming medical terms.
0721.1.1	Interpret medical terms by identifying their component elements.
0721.1.2	Articulate the basic rules for building medical terms.
0721.1.3	Utilize basic steps to pronounce and define medical terms.
0721.1.4	Analyze the position and role of suffixes when used in building medical terms.
0721.1.5	Compare surgical, diagnostic, and symptomatic suffixes.
0721.1.6	Analyze suffixes to determine their part of speech.
0721.1.7	Examine the role of diminutive suffixes.
0721.1.8	Analyze the position and role of prefixes used in building medical terms.
0721.1.9	Compare prefixes indicating position, number, measurement, negation, and direction.

Medical Terminology Related to Human Body Structure

0721.2	Examine medical terms associated with the levels of organization of structure and function within the human body.
0721.2.1	Demonstrate an understanding of the disease process by defining medical terms used in pathology.
0721.2.2	Define and pronounce medical terms used in conjunction with anatomical body planes, cavities, and regions.
0721.2.3	Compare diagnostic and therapeutic procedures associated with body structure.
0721.2.4	Analyze medical terms indicating direction and position of the body.
0721.2.5	Interpret abbreviations related to body structure.

Medical Terminology Related to Body Systems

0721.3	Demonstrate knowledge of medical terminology associated with the following body systems: integumentary, gastrointestinal, respiratory, cardiovascular, blood, lymphatic, musculoskeletal, genitourinary, reproductive, endocrine, nervous, and special senses.
0721.3.1	Define and pronounce medical terms used to identify the basic structure and function of each body system.
0721.3.2	Interpret the meaning of combining forms, suffixes, and prefixes.
0721.3.3	Define and integrate medical terms associated with basic pathology.
0721.3.4	Compare commonly used diagnostic and symptomatic medical terms.
0721.3.5	Identify and interpret medical terms related to surgery, diagnostic imaging, and therapeutic and laboratory procedures.
0721.3.6	Examine medical terms associated with clinical procedures used in the process of examination and evaluation of structure and function.

Medical Terminology**Course #: 0721****Allowable Teacher Endorsement:** 7043, 7045, 7048, 7050, 7172, 7604, 7606, 7607, 7608, 7610, 7724

0721.3.7	Analyze medical terms related to oncology.
0721.3.8	Examine medical terms used in pharmacology to treat common disorders.
0721.3.9	Interpret meaning of common medical abbreviations related to body systems.

Within this course, students will learn basic principles of human behavior. As a result of this knowledge, students should gain an improved sense of self and build interpersonal relationship skills. The end goal will be the delivery of conscientious, personalized care which conveys respect and sincerity.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Challenges and Satisfaction of Being a Healthcare Provider

0725.1	Challenges and Satisfaction of Being a Healthcare Provider
0725.1.1	Demonstrate knowledge of the realities of a health career in relationship to challenges, responsibilities, problems, and satisfactions.
0725.1.2	Compare satisfaction gained from the approval of others to that of an inner feeling of pride from knowing you performed your job well.
0725.1.3	Determine what is meant for the healthcare provider to set standards of excellence.
0725.1.4	Examine the concepts of mediocrity and empowerment.

Philosophy of Individual Worth and Self-Understanding

0725.2	Philosophy of Individual Worth and Self-Understanding
0725.2.1	Demonstrate knowledge of the philosophy of individual worth and self-understanding in relation to the provider/patient relationship.
0725.2.2	Examine the “Philosophy of Individual Worth.”
0725.2.3	Describe the ethical role of the healthcare provider in providing quality service in relationship to patient diversity.
0725.2.4	Characterize how “prejudice” can influence the practice of the healthcare worker.
0725.2.5	Determine the relationship between learning and a change in behavior.

Influences on Behavior

0725.3	Influences on Behavior
0725.3.1	Demonstrate knowledge of factors that influence behavior.
0725.3.2	Research the healthcare implications in genetic testing and gene therapy.
0725.3.3	Examine ways in which the developmental process can be influenced during the prenatal and childhood period.
0725.3.4	Differentiate the four dimensions of the developmental process.
0725.3.5	Determine the basic stages of human growth and development.
0725.3.6	Compare responsibility for behavior during childhood and the adult period.
0725.3.7	Examine the five levels of human need as proposed by Maslow.
0725.3.8	Determine the process by which a behavior is formed.

Theoretical Perspectives on Developmental Psychology

0725.4	Theoretical Perspectives on Developmental Psychology
0725.4.1	Demonstrate knowledge of the major theoretical perspectives within the field of developmental psychology.
0725.4.2	Define theory and interpret the role theories play in the understanding of human development.
0725.4.3	Characterize Sigmund Freud, summarizing his theory of personality development.
0725.4.4	Examine Erik Erickson's theory of psychosocial development.
0725.4.5	Research Lawrence Kohlberg's psychology of moral development.
0725.4.6	Assess Jean Piaget's theory of cognitive development.

Self-Approval and Acceptance

0725.5	Self-Approval and Acceptance
0725.5.1	Demonstrate knowledge of concepts of self-approval and acceptance and the influence each have on human behavior.
0725.5.2	Determine the differences between self-concept and self-esteem.
0725.5.3	Distinguish the six-step method of the problem-solving process.
0725.5.4	Examine the "martyr complex."
0725.5.5	Determine the correlation between approval and disapproval in relationship to the person giving it.
0725.5.6	Assess the role of conformity in acceptance.
0725.5.7	Differentiate between sympathy and empathy.

Influence of Emotions on Behavior

0725.6	Influence of Emotions on Behavior
0725.6.1	Demonstrate how emotions influence behavior and how to use this knowledge in relationships with patients.
0725.6.2	Examine emotions and their psychological effects.
0725.6.3	Critique "stress," "mind talk" and "stressor."
0725.6.4	Determine the essential characteristics of unconditional love.
0725.6.5	Establish the meaning of "temperament."
0725.6.6	List factors that influence formation of temperament.

Adjustments and Threats to Adjustments

0725.7	Adjustments and Threats to Adjustments
0725.7.1	Examine potential threats to adjustment occurring during childhood, adolescence, and adulthood.
0725.7.2	Examine "adjustment" by comparing and contrasting a person who is well adjusted versus one who is poorly adjusted.
0725.7.3	Determine steps for adapting to a new situation.
0725.7.4	Identify the role of the healthcare worker in the modification of behavior in consideration of the code of ethics.
0725.7.5	Differentiate six life stages in which milestones can threaten adjustments, naming one significant change occurring in each stage.
0725.7.6	Recognize five long term effects of child abuse.
0725.7.7	Determine three stressors that adolescents commonly experience.
0725.7.8	Examine traumatic effects of discrimination, sexism, rape, and domestic violence.

Defense Mechanisms, Inner Conflict and Frustration

0725.8	Defense Mechanisms, Inner Conflict and Frustration
0725.8.1	Examine behaviors resulting from defense mechanisms, inner conflict, and frustration.
0725.8.2	Determine the role of the healthcare provider in the recognition and reduction of behaviors resulting from defense mechanisms.
0725.8.3	Examine defense mechanisms and explain their purpose.
0725.8.4	Compare substance dependency and defense mechanisms.
0725.8.5	Determine actions that can reduce a patient's need for defensive behavior.
0725.8.6	Assess three types of inner conflict.
0725.8.7	Determine the meaning of frustration, examining underlying causes and effects.
0725.8.8	Relate a general approach to dealing with frustration.

Illness and Patient Behavior

0725.9	Illness and Patient Behavior
0725.9.1	Identify common behavior patterns of patients.
0725.9.2	Understand appropriate strategies for use in the provision of health care.
0725.9.3	Examine five communication techniques that may be used when responding to patients.
0725.9.4	Articulate five guidelines for becoming an effective member of the healthcare team.

Patient Behavior and Human Relations in the Provision of Health Care

0725.10	Patient Behavior and Human Relations in the Provision of Health Care
0725.10.1	Identify common behavior patterns of patients.
0725.10.2	Examine appropriate strategies for use in the provision of health care.
0725.10.3	Examine five communication techniques that may be used when responding to patients.
0725.10.4	Articulate five guidelines for becoming an effective member of the healthcare team.

Verbal and Nonverbal Communication

0725.11	Verbal and Nonverbal Communication
0725.11.1	Provide five examples of nonverbal behavior that convey a message.
0725.11.2	Recognize and interpret nonverbal behavior.
0725.11.3	Examine message discrepancy.
0725.11.4	Determine why assumptions and expectations can be a source of communication breakdown.
0725.11.5	Distinguish ways in which the healthcare provider can assist with the clarification of communication.

Gains and Losses Throughout Life

0725.12	Gains and Losses Throughout Life
0725.12.1	Examine the effects of losses that occur throughout the lifespan.
0725.12.2	Identify effective coping skills for dealing with losses throughout the lifespan.
0725.12.3	Determine the effects of suppressed emotions.
0725.12.4	Discuss common reactions of survivors to various causes of death.
0725.12.5	Examine appropriate responses of the healthcare provider in situations involving suicide.

0725.12.6	Differentiate euthanasia, including active and passive, complete and incomplete suicide, and assisted-suicide.
0725.12.7	Relate seven guidelines for coping with loss and helping others to do so.

Death, Grief, and Caring for the Dying Patient

0725.13	Death, Grief, and Caring for the Dying Patient
0725.13.1	Understand the emotional, physical, and legal facts involved in the care of patients during the process of death and dying.
0725.13.2	Relate how attitudes toward death have changed from past to present.
0725.13.3	Define thanatology.
0725.13.4	Interpret the Uniform Anatomical Gift Act.
0725.13.5	Examine the following Advanced Directives: Do Not Resuscitate, Patient Self-Determination Act, Advanced Medical Directives, Living Will and Durable Power of Attorney.
0725.13.6	Differentiate grief, anticipatory grief, bereavement, and interment.
0725.13.7	Compare the common aspects of the grief model offered by Dr. Kubler-Ross and Oates.
0725.13.8	Recognize five indications of unresolved grief.
0725.13.9	Establish five guidelines for assisting the family of a dying patient.
0725.13.10	Characterize five fears common to those dying.
0725.13.11	Relate the primary focus of palliative care.
0725.13.12	Determine three reasons why patients should be informed of a terminal illness.
0725.13.13	Examine five guidelines for meeting the needs of a dying patient.

Trends in Health Care

0725.14	Trends in Health Care
0725.14.1	Recognize the contribution of the following people: Leuwenhoek, Lister, Koch, Pasteur, Jenner, Salk, Pierre and Curie, Roentgen, Freud, Simonton, Shealy, Dossey, and Benson.
0725.14.2	Determine components of the scientific model and empirical data.
0725.14.3	Differentiate alternative therapy, complementary therapy, and holistic care.
0725.14.4	Relate the meaning "placebo effect."
0725.14.5	Distinguish the physical and psychological effects of relaxation and meditation.
0725.14.6	Demonstrate a technique for relaxation and meditation.
0725.14.7	Recognize four possible indicators of quackery.
0725.14.8	Examine the primary characteristics of a holistic approach to health care.
0725.14.9	Differentiate the difference between the "D.O.," "M.D.," and "D.C."

In the introductory course of the Biomedical Science program, students explore the fields of biology and medicine to determine factors that led to the death of a fictional person. While investigating the case, students examine autopsy reports, investigate medical history, and explore medical treatments that might have prolonged the person's life. The activities and projects introduce students to human physiology, basic biology, medicine, and research processes while allowing them to design their own experiments to solve problems.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Teachers must attend and successfully complete a course-specific training session sponsored by PLTW. Required skillsets are dispersed at that time.

Work Habits

0727.1	Demonstrate professional work habits.
0727.1.1	Relate skills and abilities to possible career pathways.
0727.1.2	Explain methods of goal development.
0727.1.3	Discuss methods of time management and task coordination.
0727.1.4	Practice professionalism in punctuality, appropriate dress, task completion, etc.
0727.1.5	Investigate methods of supervision such as giving and receiving feedback and instruction.
0727.1.6	Develop and present a statement of their personal work ethic beliefs.
0727.1.7	Prepare an application, cover letter, resume, and thank you letter.
0727.1.8	Create a personal portfolio for use when applying for employment.
0727.1.9	Practice simulated job interviews.
0727.2	Demonstrate the ability to organize, implement, and troubleshoot specific tasks.
0727.2.1	Engage in laboratory experiments, research projects, and case studies that require them to organize, implement, and troubleshoot tasks related to biomedical science concepts.
0727.3	Demonstrate the ability to work in teams and as an individual.
0727.3.1	Collaborate in group activities, discussions, and laboratory experiments, fostering teamwork skills essential for biotechnology research and development.

Knowledge of Biotechnology

0727.4	Define biotechnology and its role.
0727.4.1	Identify what is science, what clearly is not science and what can superficially resemble science but does not meet the criteria for science.
0727.4.2	Understand the concept of biotechnology and its applications in healthcare, medicine, agriculture, and environmental science.
0727.5	Demonstrate knowledge of the history of biotechnology.
0727.5.1	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
0727.5.2	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.

0727.5.3	Learn about key milestones and developments in the field of biotechnology, including historical breakthroughs, advancements, and ethical considerations.
0727.6	Describe the life cycle of biotechnology product development.
0727.6.1	Understand the process of biotechnology product development, including research, design, testing, regulatory approval, and commercialization.
0727.7	Identify the application of the biotechnology industry.
0727.7.1	explore various applications of biotechnology in healthcare, agriculture, pharmaceuticals, environmental science, and other industries.
0727.8	Describe careers in biotechnology.
0727.8.1	Explore various careers related to biomedical science and their impact including roles in research, development, quality control, regulatory affairs, and sales/marketing.
0727.8.2	Discuss and describe the role of a variety of biomedical sciences professionals that are involved in determining the cause of death.
0727.8.3	Investigate and discuss a variety of biomedical sciences careers that relate to the prevention, diagnosis, and treatment of both cardiovascular and infectious disease.

Laboratory Knowledge and Skills

0727.9	Demonstrate competency in validating and using laboratory equipment.
0727.9.1	Practice and demonstrate how to use a microscope properly and safely.
0727.10	Perform basic laboratory math skills.
0727.10.1	Demonstrate accuracy in calculating and measuring graphical work required to complete career/technical assignments and projects.
0727.10.2	Analyze tables, charts, graphs and multiple data sources to complete career/technical assignments and projects.

Ethics

0727.11	Demonstrate the knowledge of bioethics.
0727.11.1	Differentiate between legal and ethical issues in healthcare.
0727.11.2	Evaluate and justify decisions based on ethical reasoning.
0727.12	Demonstrate the knowledge of professional ethics.
0727.12.1	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.

Safety in the Biotechnology Laboratory

0727.13	Demonstrate general requirements for laboratory safety.
0727.13.1	Explain principles of infection control.
0727.13.2	Perform hand washing according to Centers for Disease Control regulations.
0727.13.3	Adhere to safety protocols and best practices in laboratory settings, ensuring the safe handling of chemicals, biological materials, and laboratory equipment.
0727.13.4	Demonstrate knowledge of biosecurity measures and risk management strategies to mitigate potential hazards associated with biotechnological processes.
0727.14	Identify and use personal protective equipment.
0727.14.1	Don and remove non-sterile gloves.
0727.14.2	Identify appropriate PPE for specific tasks and hazards.
0727.14.3	Correctly wear, use, and maintain PPE to ensure personal safety.
0727.14.4	Understand the importance of PPE in preventing occupational hazards and injuries.

0727.15	Demonstrate ability implement safety protocols.
0727.15.1	Communicate safety instructions effectively to others in the laboratory.
0727.15.2	Regularly evaluate and improve safety practices to mitigate risks.
0727.16	Follow SDS guidelines for handling, storage, and disposal of hazardous material.
0727.16.1	Demonstrate proficiency in safe handling, storage, and disposal procedures for hazardous substances.
0727.16.2	Understand the potential environmental and health impacts of improper material handling.
0727.17	Demonstrate knowledge of safety regulatory agencies such as OSHA.
0727.17.1	Understand regulatory requirements and compliance standards applicable to laboratory safety.
0727.17.2	Access and interpret regulatory guidelines to ensure compliance and best practices.

Appropriate Use of Equipment and Instrumentation

0727.18	Use microscopes.
0727.18.1	Understand the principles and proper usage of microscopes for cellular observation.
0727.19	Use balances.
0727.19.1	Learn how to use laboratory balances for precise measurements.
0727.20	Use pH meters.
0727.20.1	Learn how to use pH meters for determining acidity or alkalinity in solutions.

Legal Issues

0727.21	Demonstrate knowledge of legal issues in biomedical science.
0727.21.1	Discuss the basics of the legal framework of healthcare occupations.
0727.21.2	Explain common practices that could result in malpractice, liability, and/or negligence.
0727.21.3	Identify standards of the Health Insurance Portability and Accountability Act (HIPAA).
0727.21.4	Describe the purpose of Informed Consent from the client/patient and provider perspective.

Human Body Systems

0727.22	Understand the structure and functions of the major human body systems, the organs making up these systems and the interconnections between body systems.
0727.22.1	Identify the major body systems and their functions.
0727.22.2	Demonstrate an understanding of how body systems work together to maintain good health.
0727.22.3	Identify and locate specific organs that comprise the major human body systems.
0727.22.4	Describe the general structure and function of each of these organs.
0727.22.5	Describe how parts of the human body systems work together to perform the job of the entire system.
0727.22.6	Identify common diseases and conditions that can disrupt the functioning of cells, tissues, and organs within the body.

Medical Investigation

0727.23	Understand how determining the cause of death involves the investigation of many aspects of the medical condition of the victim.
0727.23.1	Describe how evidence at a crime scene, such as blood, hair, fingerprints, and shoeprints can help forensic investigators determine what might have occurred and help identify or exonerate potential suspects.
0727.23.2	Understand that evidence can be seen post-mortem through medical examination and interpret information from an autopsy report to predict the manner of death.
0727.23.3	Recognize that bloodstain patterns left at a crime scene can help investigators establish the events that took place during the crime.

0727.23.4	Analyze key information gathered at a simulated crime scene.
0727.23.5	Describe some of the major aspects involved in determining cause of death, including the gross physical condition of a victim, the need for internal and external examination of the body, and the need for chemical and microscopic analysis of tissues and body fluids.
0727.23.6	Discuss how the use of medical terminology and the involvement of many medical professionals are vital to the investigation process.

Heart and Circulatory System

0727.24	Understand and describe the importance of the circulatory system by examining the structure and function of the heart.
0727.24.1	Describe and demonstrate how a simple and a two-chambered pump works.
0727.24.2	Understand and discuss that the human heart is a four-chambered living pump that provides the force needed to transport blood, both oxygenated and un-oxygenated, throughout the body without mixing the two types of blood.
0727.24.3	Identify and describe the gross structures and functions of the heart.
0727.24.4	Understand how a heartbeat is caused by the contraction of cardiac muscle cells that result in the movement of blood from the heart to the arteries and to the whole body.
0727.24.5	Calculate heart rate as the number of heart contractions per unit of time, most done as beats per minute.
0727.24.6	Explain how blood pressure is a measure of the force put on the vascular walls by the blood as it is pushed by the cardiac muscles through the vascular system.
0727.24.7	Indicate how heart rate, blood pressure and EKG can be used to measure a person's medical condition.
0727.24.8	Describe how selected internal and external factors such as being frightened, exercise, exposure to cold and rest affect heart function including heart rate, blood pressure and EKG.
0727.24.9	Demonstrate the importance of technology in biomedical sciences by using software and equipment to collect and analyze cardiovascular data.

Blood and Circulatory System

0727.25	Understand and describe the importance of blood in relation to the circulatory system and the human body.
0727.25.1	Explain that blood is a liquid connective tissue composed of red cells, white cells and platelets that are suspended in liquid plasma.
0727.25.2	Compare and contrast the functions of red cells, white cells, platelets, and erythrocytes.
0727.25.3	Recognize that blood is a major transport for many substances in the body that must be replenished throughout life including hormones, gases, molecules, and nutrients.
0727.25.4	Examine using a microscope and sketch red and white blood cells as well as various types of human tissue.

Human Nutrition

0727.26	Demonstrate an understanding of how food and water are essential to the health of the human body.
0727.26.1	Compare and contrast the recommended daily values for food groups, minerals, and vitamins.
0727.26.2	Describe that food is made of molecules and macromolecules which in turn are made of atoms.
0727.26.3	Describe how homeostasis depends upon many different chemical reactions and large organic molecules.
0727.26.4	Describe the role of chemical bonding in chemical reactions and transfer of energy.

Homeostasis

0727.27	Describe how food provides nutrients for the body to help maintain homeostasis.
0727.27.1	Describe the function of macromolecules in relation to the breakdown of food and the human body.
0727.27.2	Differentiate between the four classes of macromolecules.
0727.27.3	Describe different foods that contain each kind of nutrients.

Impact of Diabetes

0727.28	Describe and discuss the causes, symptoms, treatments and effects of diabetes and the impact that this specific disease has on the human body and human lifestyle.
0727.28.1	Explain how many systems, living or non-living, operate using feedback mechanisms and that information put into a system causes a reaction within the system.
0727.28.2	Understand that there are two different types of feedback systems, positive and negative.
0727.28.3	Summarize how insulin regulates the transfer of glucose into the body cells and its role as part of the feedback system.
0727.28.4	Compare Type 1 & Type 2 Diabetes.
0727.28.5	Explain the major causes, symptoms, complications effects and treatments of both Type 1 and Type 2 diabetes.
0727.28.6	Understand and describe the dietary requirements and restrictions of diabetics of both types and how these changes can impact one's lifestyle to avoid severe and life-threatening diabetic emergencies.
0727.28.7	Describe healthy behaviors and actions that could help prevent the onset of Type 2 diabetes.
0727.28.8	Investigate and describe the roles of Biomedical Sciences professions related to the treatment and prevention of Diabetes.

DNA

0727.29	Investigate the significance of DNA and chromosomes in the human body.
0727.29.1	Describe the Structure and function of a chromosome.
0727.29.2	Describe the structure and function of deoxyribonucleic acid (DNA).
0727.29.3	Explain the relationship between chromosomes, DNA and Genes.
0727.29.4	Interpret the structure of a chromosome in relation to the size of a cell and the amount of DNA it contains.
0727.29.5	Explain the interactions between nucleotides using DNA models.
0727.29.6	Demonstrate how the genetic information in DNA molecules provides instructions for creating protein molecules and that the structure of DNA is basically the same for all living organisms.
0727.29.7	Describe the importance of nucleotides in the process of creating protein molecules with the information from DNA.
0727.29.8	Distinguish between the different levels of proteins and understand that a protein's shape can change depending on its environment.
0727.29.10	Explain how the sequence of amino acids in a protein determines the protein's structure.
0727.29.11	Describe the appropriate laboratory methods to isolate DNA from plant and animal cells.
0727.29.12	Explain how restriction enzymes cut DNA.
0727.29.13	Describe how gel electrophoresis separates DNA fragments.
0727.29.14	Recognize that gel electrophoresis can be used to examine DNA differences between individuals.

Impacts of Genetic Disorders

0727.30	Describe factors that contribute to genetic disorders.
0727.30.1	Investigate and discuss biomedical sciences careers responsible for the diagnosis and treatment of genetic disorders.

0727.30.2	Investigate the role of mutations in DNA sequences causing genetic disorders.
0727.30.3	Analyze the impact of environmental factors on the development of genetic disorders.
0727.30.4	Evaluate the influence of familial history and genetic predispositions on the likelihood of inheriting genetic disorders.
0727.30.5	Discuss the ethical considerations surrounding genetic testing and counseling in identifying and managing genetic disorders.

Heredity and Mutation

0727.31	Understand the factors involved in heredity and mutation in relation to genetic disorders.
0727.31.1	Describe that chromosomes each carry numerous genes that are passed along from parents to offspring through reproductive cells.
0727.31.2	Identify and be able to use a karyotype to identify multiploidy and sex in an individual.
0727.31.3	Compare and contrast between chromosomal and gene mutations.
0727.31.4	Explain the results of insertion and deletion gene mutations and the effects that they have on the corresponding proteins produced by the gene.
0727.31.5	Describe the process of meiosis, including independent assortment.
0727.31.6	Explain how reduction division results in the formation of haploid gametes.
0727.31.7	Compare and contrast mitosis and meiosis and relate to the processes of sexual reproduction and their consequences for genetic variation.
0727.31.8	Analyze genotype to determine phenotype.
0727.31.9	Use appropriate research techniques to obtain information on the symptoms and complications of genetic disorders.
0727.31.10	Create and analyze pedigree charts to illustrate passage of a trait through at least three generations and calculate the probability of a trait appearing in offspring.

Chromosomes and Mutation

0727.32	Examine how changes in chromosomes or genes can cause disease/chromosomal abnormalities.
0727.32.1	Define, identify, and analyze karyotypes to determine multiploidy and sex.
0727.32.2	Explain how karyotypes are used to diagnose chromosomal disorders.
0727.32.3	Explain how the substitution of a single amino acid can change a protein and indicate how it may change interactions with other proteins.
0727.32.4	Identify the structure and function of chromosomes and their role in individual traits of humans.
0727.32.5	Explain how specific mutations lead to specified genetic diseases.

Cholesterol and Heart Disease

0727.33	Demonstrate an understanding of the function of cholesterol in the body and its role in heart disease.
0727.33.1	Explain that there are different types of lipid molecules and that they have different physical properties and functions.
0727.33.2	Explain that cholesterol is transported in the blood by protein complexes called high density lipoprotein (HDL) and low-density lipoprotein (LDL) and the role each of them play in the body.
0727.33.3	Describe how the measurement of these complexes affects a person's risk for heart disease.
0727.33.4	Describe the function of an angiogram in diagnosing blocked vessels and list medical interventions to treat blocked vessels.
0727.33.5	Discuss risk factors for heart disease.

Techniques to Diagnose Disease

0727.34	Describe molecular biological techniques for diagnosing diseases, specifically hypercholesterolemia.
0727.34.1	Explain how the processes of polymerase chain reaction (PCR), and DNA gel electrophoresis can be used in the diagnosis of genetic diseases and disorders such as familial hypercholesterolemia.
0727.34.2	Explain using proper laboratory techniques how to separate DNA fragments by gel electrophoresis.
0727.34.3	Analyze the results of a gel electrophoresis to correctly diagnose the presence of the familial hypercholesterolemia mutation.

Bacteria and Infectious Disease

0727.35	Demonstrate an understanding of bacteria as a cause for infectious diseases.
0727.35.1	Identify the basic structures of a bacterial cell.
0727.35.2	Explain that there are different types of bacteria and some cause disease while some do not.
0727.35.3	Classify bacteria by shape, metabolism, and reaction to gram staining.
0727.35.4	Understand how antibiotics are used to treat infections and that their effectiveness depends on the type of bacteria that has caused the infection.
0727.35.5	Explain that overuse of antibiotics can cause resistance in bacteria and what that means to human health.
0727.35.6	Describe the immune response in relation to the introduction of antigens.
0727.35.7	Isolate and examine bacterial colonies using aseptic techniques.
0727.35.8	Effectively communicate the symptoms, prevalence, and treatment for bacterial infection as well as the global and social impact of an infectious disease that is caused by bacteria.

This course is designed to be used in conjunction with a Health Science Education course that includes a clinical specialization experience. Instructional content focuses on extending career preparation and technical skills associated with a previously selected clinical specialization. For example, Health Science Clinical Experience Skill Sets may be taught in conjunction with Clinical Specialty 1 (0789) or Clinical Specialty II (0790), PTCB Applications (0772), Medical Assistance Clinical (0732), Certified Nursing Assistant (0615), and Dental Assisting Clinical Science (0743).

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Notes: This course is designed to be used in conjunction with a Health Science Education course that includes a clinical specialization experience. Instructional content focuses on extending career preparation and technical skills associated with a previously selected clinical specialization. For example, Health Science Clinical Experience Skill Sets may be taught in conjunction with Clinical Specialty 1 (0789) or Clinical Specialty II (0790), PTCB Applications (0772), and Dental Assisting Clinical Mentoring (0745).

Career Preparation Skills

0730.1	Career Preparation Skills
0730.1.1	Apply employability skills in a healthcare setting.
0730.1.2	Exemplify professional characteristics.
0730.1.3	Follow attendance policies of the employer or educational institution.
0730.1.4	Adhere to the chain of command/lines of authority in the work setting.
0730.1.5	Accept responsibility for own actions.
0730.1.6	Adopt personal appearance and hygiene habits appropriate to the healthcare environment and industry expectations.
0730.1.7	Engage in continuous self-assessment and career goal modification for personal and professional growth.
0730.1.8	Recognize the importance of participating in continuing education.

Technical Skills in Clinical Specialization

0730.2	Technical Skills in Clinical Specialization
0730.2.1	Comply with the required facility regulations.
0730.2.2	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
0730.2.3	Complete documentation required of clinical specialization accurately.
0730.2.4	Participate in clinical specialty evaluation process.
0730.2.5	Complete classroom theory/laboratory content skill sets in the clinical specialty area at a minimum mastery level.
0730.2.6	Meet requirements for certification or registration (where available) for the clinical specialty area.

The Performance skills for Emergency Services 1 meet the requirement for First Responder. The first responder is the first person to arrive at the scene who has emergency medical training and the first designated level of professional emergency medical care as outlined by the national EMS education and practice blueprint skills taught to a First Responder include: Assessment for life-threatening conditions in both medical and trauma clients/patients, provision of initial airway care, assistance with breathing, provision of CPR, control of bleeding, and stabilization of spinal and extremity injuries. In addition, the West Virginia Office of Emergency Services requires successful completion of the hazardous materials awareness training meeting the Department of Labor, Occupational Safety and Health Administration (OSHA) 1910120 requirements.

Emergency Services 2 Applies fundamental knowledge of the EMS system, safety/well-being of the EMT, and medical/legal and ethical issues to the provision of emergency care. Emergency Services 2 builds upon knowledge obtained in Emergency Services 1.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Workforce Safety and Wellness

0732.1	Ensure EMS provides well-being and safety through comprehensive training.
0732.1.1	Describe health habits that promote physical and mental well-being.
0732.1.2	Demonstrate/determine the proper personal protective equipment to prevent exposure to infectious disease.
0732.1.3	Demonstrate proper procedures for hand washing and using alcohol-based hand cleaners.
0732.1.4	Discuss the health concerns related to exposure to hepatitis B, hepatitis C, tuberculosis, and HIV/AIDS.
0732.1.5	Access the Centers for Disease Control website to obtain updated information on diseases of concern to EMS providers.
0732.1.6	Explain the essential provisions of OSHA, CDC, and the Ryan White CARE Act as they relate to infection control in EMS.
0732.1.7	Describe the indication for use of an N95 or HEPA respirator.
0732.1.8	Describe the purpose of the tuberculin skin test.
0732.1.9	Give examples of common stressors in EMS work.
0732.1.10	Describe and differentiate between the stages of the stress response, including the effects of each stage on the body.
0732.1.11	List lifestyle changes that can be made to manage stress.
0732.1.12	Explain the purpose of critical incident stress management.
0732.1.13	Given a scenario involving death or dying, recognize a client/patient's or family member's reaction to death and dying.
0732.1.14	Given a scenario involving death or dying, use effective techniques for interacting with the client/patient and family members.
0732.1.15	Outline proper responses to incidents, including hazardous material incidents, terrorist incidents, rescue operations and violence.
0732.1.16	Given a scenario of an emergency response involving a safety threat, describe actions you should take to protect yourself and other EMS providers.
0732.1.17	Demonstrate/promote safety on EMS calls.

Communication and Documentation

0732.2	Master EMS radio procedures, deliver concise reports verbally and in writing, ensuring effective communication and legal compliance.
0732.2.1	Master the radio procedure used during various stages of the EMS call.
0732.2.2	Demonstrate the delivery and format of a radio report to the hospital.
0732.2.3	Prepare and deliver a verbal hand-off report to the hospital.
0732.2.4	Develop communication skills used when interacting with other members of the health care team.
0732.2.5	Develop communication skills used when interacting with the client/patient.
0732.2.6	Develop components and procedures for the written prehospital care report.
0732.2.7	Understand and demonstrate legal aspects and benefits of documentation.
0732.2.8	Demonstrate documenting concerns in client/patient refusal.
0732.2.9	Using a variety of scenarios, demonstrate giving an organized, complete, and concise report of pertinent client/patient information when giving a verbal report.
0732.2.10	Demonstrate principles and techniques of effective communication.
0732.2.11	Adapt communication principles for effective interaction with clients/patients of various ages and cultures.
0732.2.12	Understand legal issues and special situations associated with documentation.

Medical, Legal and Ethical Issues

0732.3	Effectively navigate legal and ethical issues.
0732.3.1	Describe and demonstrate the scope of practice of an EMT.
0732.3.2	Differentiate between the scope of practice and the standard of care.
0732.3.3	When given a variety of scenarios, determine which type of client/patient consent applies, including refusal of care, and do not resuscitate orders.
0732.3.4	When given a variety of scenarios, recognize/describe negligence and the duty to act.
0732.3.5	Explain the purpose of good Samaritan laws.
0732.3.6	Identify situations that would constitute a breach of client/patient confidentiality.
0732.3.7	Recognize medical identification devices and organ donor status.
0732.3.8	List items that may be considered evidence at a crime scene, and ways to minimize your impact on evidence while caring for your client/patient.
0732.3.9	Determine situations that may legally require reporting to authorities.
0732.3.10	Given a scenario involving an ethical challenge, decide the most appropriate response for an EMT.

Client/Patient Evacuation and Transfer

0732.3.	Practice safe client/patient handling techniques and utilize urgent and non-urgent moves.
0732.3.1	Demonstrate good body mechanics while lifting and moving clients/patients.
0732.3.2	Protect clients/patients by using urgent and non-urgent moves.

EMS Foundations

0732.4	Understand EMS system fundamentals.
0732.4.1	Apply fundamental knowledge of the Emergency Medical Services System
0732.4.2	Recognize the NHTSA Technical Assistance Program Assessment Standards:

	• Regulation and policy • Resource management • Human Resources and Training • Transportation • Facilities
0732.4.3	Describe the access to Emergency Medical Services.
0732.4.4	Understand the educational level of EMS licensure.
0732.4.5	Describe the authorization to practice: • Legislative decision on the scope of practice • State EMS office oversight • Medical oversight (clinical protocols, Quality Improvement, Administrative) • Local credentialing • Administrative • Employer policies and procedures
0732.5	Analyze medical terminology.
0732.5.1	Apply common prefixes, suffixes, and roots to determine the meaning of medical terms.
0732.5.2	Recognize and use acronyms and abbreviations commonly used in EMS.
0732.5.3	Use anatomical terms of position and direction to describe the location of body structures and the position of the body.
0732.5.4	Utilize topographical anatomical landmarks as points of reference.
0732.6	Understand anatomy and physiology.
0732.6.1	Describe and recognize the structures and functions of each of the body systems: • Musculoskeletal • Respiratory • Cardiovascular • Nervous • Digestive • Integumentary • Endocrine • Renal • Reproductive
0732.6.2	Describe the differences in the respiratory anatomy of children as compared to adults.
0732.6.3	Given a variety of scenarios, apply understanding of anatomy and physiology to explain the functions of the life support chain.
0732.6.4	Describe the roles of water, glucose, and oxygen in the cell.
0732.6.5	Summarize conditions that can threaten cardiopulmonary function.
0732.6.6	Explain how impaired cardiopulmonary function affects the body.
0732.6.7	Discuss the mechanisms the body uses to compensate for impaired cardiopulmonary function.
0732.6.8	Describe ways/indications in which the body's: • Fluid balance can become disrupted • Nervous system may be impaired • Endocrine dysfunction • Digestive system dysfunction • Immune system dysfunction
0732.7	Assess physical and psychosocial traits across lifespan stages.

0732.7.1	Describe physical and physiological characteristics, including normal vital signs for the following age groups: • infant • toddler • preschool age • school age • adolescent • early adult • middle adult • late adult
0732.7.2	Describe psychosocial characteristics and concerns of individuals at each stage of life span development.
0732.7.3	Given a variety of scenarios, utilize the knowledge of physical, physiological, and psychosocial development to anticipate the needs and concerns of clients/patients of all ages.

Airway Management, Respiration and Artificial Ventilation

0732.8	Understand airway management.
0732.8.1	Apply knowledge of general anatomy and physiology to client/patient assessment and management to assure a client/patient airway, adequate mechanical ventilation, and respiration for clients/patients of all ages.
0732.8.2	Describe airway pathophysiology.
0732.8.3	Recognize the sounds of a partially obstructed airway.
0732.8.4	Ensure open airways.
0732.8.5	Demonstrate the use of airway adjuncts.
0732.8.6	Demonstrate suctioning.
0732.8.7	Describe and demonstrate how to keep an airway open.
0732.8.8	Explain the physiological relationship between assessing and maintaining an open airway, assessing, and ensuring adequate ventilation, and assessing and maintaining adequate circulation.
0732.9	Review respiratory function.
0732.9.1	Describe the mechanics of ventilation.
0732.9.2	Explain mechanisms that control the depth and rate of ventilation.
0732.9.3	Explain the relationships between tidal volume, respiratory rate, minute volume, dead air space, and alveolar ventilation.
0732.9.4	Describe the physiology of external and internal respiration.
0732.10	Understand artificial ventilation.
0732.10.1	Given a variety of scenarios, differentiate between clients/patients who require artificial ventilation, those who do not, and those who require administration of supplemental oxygen and are at risk for failure of the cardiopulmonary system.
0732.10.2	• Demonstrate the following techniques of artificial respiration for pediatric and adult medical and trauma clients/patients: • mouth to mask • Two rescuer bag-valve mask (BVM) • One rescuer BVM • flow-restricted; oxygen powered ventilation device • automatic transport ventilator (local protocol)

0732.10.3	Demonstrate assessment of the adequacy of artificial ventilation.
0732.10.4	Demonstrate the application of cricoid pressure.
0732.10.5	Demonstrate administration of oxygen by: • nonrebreather mask • nasal cannula
0732.10.6	Describe the purpose and use of partial rebreather masks, venture masks and tracheostomy masks.
0732.10.7	Demonstrate safe transport, storage, and use of oxygen.

Client/Patient Assessment

0732.11	Assess scene hazards and client/patient condition to guide emergency response.
0732.11.1	Apply scene information and client/patient assessment findings (scene size-up, primary, and secondary assessment, client/patient history, and reassessment) to guide emergency management.
0732.11.2	Explain the ongoing nature of scene size-up beyond the initial moments at the scene.
0732.11.3	Given a scene-arrival scenario, list several examples of potential hazards for which the EMT should actively search.
0732.11.4	Describe and explain considerations in establishing a danger zone at the scene of a vehicle collision.
0732.11.5	Recognize indications of possible crime scenes and possible violence.
0732.12	Rapidly assess and prioritize the client's/patient's airway, breathing, circulation, and mental status.
0732.12.1	Given a variety of scenarios, perform a scene size-up and determine: • mechanism of injury or nature of illness • recognizing potential dangers • make decisions about body substance isolation • the number of clients/patients • the need for additional resources
0732.12.2	Demonstrate knowledge of the primary assessment, including: • decide on the approach to the primary assessment • manual stabilization of the head and neck • assessment of mental status • ABCs as part of the assessment process • how to make a priority decision
0732.12.3	Given several scenarios, do the following: • form a general impression • determine the chief complaint • determine the client/patient's mental status • assess the airway • assess breathing • assess circulation
0732.12.4	Determine the client/patient priority for transport.
0732.12.5	Recognize findings that require immediate intervention.
0732.12.6	Recognize the mechanism of injury or nature of illness and level of responsiveness.
0732.12.7	Determine how the approach to the assessment varies depending on the client's/patient's age.
0732.13	Obtain and interpret vital signs to monitor client/patient status and guide treatment decisions.
0732.13.1	Obtain vital signs, including pulse, respiration, blood pressure, skin, temperature, and pupils.
0732.13.2	Document vital signs on a prehospital care report.
0732.13.3	Use various monitoring devices.

0732.13.4	Integrate vital signs into the client/patient assessment process according to the client's/patient's condition and the situation.
0732.13.5	Explain the use of vital signs in client/patient care decision making.
0732.13.6	Demonstrate assessment of: • pulse • respirations • skin • pupils • blood pressure • oxygen saturation • blood glucose
0732.13.7	Integrate assessment of mental status and ongoing primary assessment while obtaining vital signs.
0732.13.8	Differentiate between vital signs that are within expected ranges for a given client/patient and those that are not.
0732.13.9	Compare and contrast the techniques of assessment and expected vital sign values for pediatric and adult.
0732.14	Conduct a thorough trauma assessment to identify injuries and prioritize interventions.
0732.14.1	Describe the difference between assessment procedures for a trauma client/patient with no significant mechanism or injury and for a client/patient with a significant mechanism or injury.
0732.14.2	Conduct a history of the present illness for a trauma client/patient.
0732.14.3	Perform a physical exam for a trauma client/patient.
0732.14.4	Obtain a past medical history for a trauma client/patient.
0732.14.5	Perform a rapid trauma assessment.
0732.14.6	Know when and how to perform a detailed physical examination for a trauma client/patient.
0732.14.7	Conduct a systematic secondary assessment of an unstable or potentially unstable trauma client/patient or client/patient with a significant mechanism or injury.
0732.14.8	Given a variety of scenarios: • recognize situations where requesting advanced life support personnel to assist with the management of a trauma client/patient • incorporate a detailed physical examination of the unstable or potentially unstable trauma client/patient
0732.15	Perform a comprehensive assessment to identify medical conditions and provide appropriate care.
0732.15.1	Compare and contrast assessment procedures for a responsive medical client/patient and for an unresponsive medical client/patient.
0732.15.2	Perform a secondary assessment for a responsive medical client/patient.
0732.15.3	Collect a relevant past medical history and a systematic history of the present illness.
0732.15.4	Adapt the secondary assessment process to specific client/patient complaints.
0732.15.5	Explain the importance of collecting baseline vital signs in an unresponsive medical client/patient.
0732.15.6	Identify other sources of client/patient information for the unresponsive or uncooperative client/patient.
0732.16	Continuously monitor and reassess the client's/patient's condition to detect changes and adjust treatment as needed.
0732.16.1	Perform reassessment.
0732.16.2	Recognize the significance of changes in vital signs over time.
0732.16.3	Compare and contrast reassessments for stable versus unstable clients/patients using a variety of scenarios.
0732.16.4	Assign meaning to trends in client's/patient's condition over time.

0732.16.5	Recognize both obvious and subtle changes in the client/patient's condition.
0732.16.6	Adapt the reassessment process and frequency of reassessment based on client/patients' conditions.

Critical Thinking and Decision Making

0732.17	Cultivate EMT critical thinking abilities.
0732.17.1	Initiate basic interventions based on assessment findings intended to mitigate the emergency and provide limited symptom relief while providing access to definitive care.
0732.17.2	Understand EMT diagnosis.
0732.17.3	Develop the role of critical thinking in EMS.
0732.17.4	Understand how an EMT can improve critical thinking skills.

General Pharmacology

0732.18	Demonstrate a comprehensive understanding of ambulance medications and prescribed drugs.
0732.18.1	Demonstrate knowledge of medication on the ambulance and prescribed medications.
0732.18.2	Use critical decision-making related to medication administration for a medical emergency.
0732.18.3	Understand/describe medication safety.
0732.18.4	Demonstrate knowledge of forms of medication, routes of medication administration.
0732.18.5	Identify special considerations in medication administration related to clients/patients ages and weights.
0732.18.6	Demonstrate competency in medication administration safety, including the five rights of medication administration.
0732.18.7	Describe and demonstrate the characteristics of the oral, sublingual, inhaled, intravenous, intramuscular, subcutaneous, and endotracheal routes of administration.
0732.18.8	Explain the importance of accurate documentation of drug administration and client/patient reassessment.
0732.18.9	Discuss steps an EMT may take in assisting with IV therapy.
0732.18.10	Describe the following information about medications an EMT may administer/assist a client/patient with: • drug name (generic and trade) • drug actions • contraindications • side effects • dose • route • prescribing information
0732.18.11	Reassess: • data indications for medications, action • action-medication administered • response-effect of medication
0732.19	Recall and apply appropriate information regarding specific medications for administration or assistance.
0732.19.1	Recall facts and apply information about medications an EMT may administer: • aspirin • oral glucose

	oxygen
0732.19.2	Recall facts and apply information about medications an EMT may assist the client/patient to administer: - inhaled bronchodilators - epinephrine - nitroglycerin
0732.20	Apply foundational knowledge to effectively assist clients/patients in taking prescribed medications, administering medications, and following medical direction.
0732.20.1	Apply fundamental knowledge of assist/administering medications in the following situations: - assisting clients/patients in taking prescribed medications - administering medications - taking medical direction (offline, online)
0732.21	Systematically reassess client/patient data, medication indications, actions taken, and responses to ensure appropriate and effective treatment.
0732.21.1	Reassess: - data indications for medications, action - action-medication administered - response-effect of medication

Respiratory Emergencies

0732.22	Master respiratory system basics, understand breathing physiology and problems, manage airway and ventilation issues, and differentiate ventilation methods.
0732.22.1	Identify basic structures and functions of the respiratory system: - upper airway tract, lower airway tract - chest cage, ribs, muscles, pleura, phrenic nerve innervation - Vascular structures that support respiration - Cellular function, respiratory regulation, respiration/pulmonary ventilation
0732.22.2	Describe the physiology of respiration: - pulmonary ventilation - oxygenation - respiration
0732.22.3	Describe the pathophysiology of respiration: - pulmonary ventilation - oxygenation - circulation compromise - cells
0732.22.4	Differentiate between adequate and inadequate breathing: - Internal respiration - Respiration, Ventilation, or oxygenation problems and how they relate to each other - Assessment of Ventilation (signs of adequate and inadequate ventilation) - Assessment of respiration
0732.22.5	Demonstrate management of adequate and inadequate respiration: assure adequate airway

	administer supplemental oxygen therapy (ambient air, oxygen sources, oxygen delivery devices, assisting ventilation in reparatory distress/failure)
0732.22.6	Explain techniques of assuring a patent airway (manual airway maneuvers, mechanical airway devices, relief of foreign body airway obstruction, upper airway suctioning).
0732.22.7	Demonstrate use and purpose of artificial ventilation devices: - bag-valve-mask (advantages and disadvantages) - manually triggered ventilation device (advantages and disadvantages) - automatic transport ventilator/resuscitator (advantages and disadvantages)
0732.22.8	Demonstrate ventilation of an apneic client/patient.
0732.22.9	Demonstrate ventilation of a protected airway.
0732.22.10	Differentiate between: - normal and positive pressure ventilation - air movement - blood movement - airway wall pressure - esophageal opening pressure - over ventilation
0732.22.11	Identify basic structures and functions of the respiratory system: - upper airway tract, lower airway tract - chest care, ribs, muscles, pleura, phrenic nerve innervation - Vascular structures which support respiration - Cellular function, respiratory regulation, respiration/pulmonary ventilation

Client/Patient Assessment

0732.23	Ensure scene safety, identify hazards, protect client/patients and bystanders, assess injury mechanisms, and deploy specialized resources when needed.
0732.23.1	Apply information related to scene safety: - identify common scene hazards (environmental, hazardous substances, violence, rescue) - Evaluation of the scene
0732.23.2	Identify components of scene management and the impact of the environment on client/patient care (Medical, Trauma, Environmental considerations).
0732.23.3	Demonstrate addressing hazards: - protect the client/patient - protect the bystanders - request resources - scan the scene for information related to the mechanism of injury, nature of illness
0732.23.4	Assess the scene for violence and follow protocols.
0732.23.5	Recognize the need for additional or specialized resources: (only specialized trainee responders use the specialized equipment) - chemical and biological suits - rescue equipment necessary for difficult extrications - ascent or descent gear
0732.23.6	Demonstrate understanding of standard precautions as it relates to the scene.
0732.23.7	Describe how to handle a scene with multiple client/patient situations.
0732.24	Perform a comprehensive primary client/patient assessment.

0732.24.1	Demonstrate an initial general impression based upon the client/patients age-appropriate appearance.
0732.24.2	Assess level of consciousness (speaking to client/patient and assessing client/patient response).
0732.24.3	Assess airway status (unresponsive clients/patients, trauma clients/patients, assess responsive client's/patient's airway patency).
0732.24.4	Assess breathing status for a responsive and unresponsive client/patient.
0732.24.5	Assess circulatory status (pulse, bleeding perfusion).
0732.24.6	Identify life threats.
0732.24.7	Assess vital functions.
0732.24.8	Integrate the treatment/procedures needed to preserve life.
0732.24.9	Evaluate the priority of client/patient care and transport.
0732.25	Perform a comprehensive client/patient history assessment.
0732.25.1	Investigate the chief complaint: • consider factors that influence data collection • obtain the history of the present illness
0732.25.2	Identify components of a client/patient history: • statistical and demographic information • obtain and document past medical history • obtain and document current health status
0732.25.3	Demonstrate techniques of history taking: • setting the stage • learning about the present illness • determine the chief complaint • history of present illness • assess past medical history (pertinent to the medical event) • assess current health status
0732.25.4	Understand the standardized approach to history taking.
0732.25.5	Demonstrate knowledge of the SAMPLE history taking method.
0732.25.6	Demonstrate knowledge of the OPQRST history taking method.
0732.25.7	Understand how to take a history of sensitive topics (alcohol and drugs, physical abuse, violence, sexual history).
0732.25.8	Using a variety of scenarios, demonstrate taking a history on clients/patients that are silent, over talkative, have multiple symptoms, anxious, angry, and hostile, intoxicated, crying, depressed, demonstrating inappropriate behavior, have limited cognitive ability, have a language barrier, or hearing problems and visual impairment.
0732.25.9	Use critical decision making to recognize when to locate a friend or family member to gather data.
0732.25.10	Recognize age-related variation for pediatric and geriatric assessment and management.
0732.25.11	Investigate the chief complaint: • consider factors that influence data collection • obtain the history of the present illness
0732.26	Perform a comprehensive secondary client/patient assessment.
0732.26.1	Demonstrate knowledge of the techniques of physical examination: • general approach • respiratory system (chest shape, symmetry, respiratory effort, auscultation) • cardiovascular system (pulse, perfusion) • neurological system (mental status-appearance, behavior, speech and language, mood, thought and perceptions, memory, and attention)

	• musculoskeletal system (pelvic region, lower extremities, upper extremities, back) • all anatomical regions (head, neck, chest) • abdomen (client/patient position, shape/size, palpating, physical findings)
0732.26.2	Demonstrate knowledge of client/patient assessment monitoring devices: • pulse oximetry • non-invasive blood pressure • other monitoring devices
0732.26.3	Use critical decision making related to client/patient reassessment: • how and when to reassess • performed at regular intervals • reassessment includes primary assessment, vital signs, chief complaint, interventions • compare the reassessment to the baseline client/patient status • repeat vital signs as necessary
0732.26.4	Constantly reassess the chief complaint or major injury, assess pain/comfort level.
0732.26.5	Reassess the effectiveness of each intervention and consider the need for new interventions or modifications to care.

Medicine

0732.27	Apply fundamental knowledge to provide basic emergency care based on neurological assessment findings for an acutely ill client/patient.
0732.27.1	Demonstrate knowledge related to the neurological system.
0732.27.2	Review the anatomy and function of the brain and cerebral blood vessels.
0732.27.3	Assess symptoms and signs r/t the neurological system.
0732.27.4	Understand the stroke alert criteria.
0732.27.5	Demonstrate how to manage a client/patient with stroke symptoms and findings.
0732.27.6	Demonstrate scene safety and standard precautions r/t neurological symptoms and findings.
0732.27.7	Recognize findings and symptoms related to TIA, seizures, and headache.
0732.27.8	Differentiate between age-related variations for pediatric and geriatric assessment and management.
0732.27.9	Understand and utilize communication and documentation r/t neurological findings and symptoms.
0732.28	Apply fundamental knowledge to provide basic emergency care based on abdominal and GI assessment findings for an acutely ill client/patient.
0732.28.1	Define acute abdomen.
0732.28.2	Describe the location, structure, and function of the organs of the abdominopelvic cavity.
0732.28.3	Explain the origins and characteristics of visceral, parietal, and tearing pain.
0732.28.4	Associate areas of referred pain with the likely origins of the pain.
0732.28.5	Recognize the common signs and symptoms of abdominal conditions, including appendicitis, peritonitis, cholecystitis, pancreatitis, ulcers, abdominal aortic aneurysm, hernia, and renal colic.
0732.28.6	Discuss the type of abdominal pain that may indicate cardiac involvement.
0732.28.7	Discuss the appropriate assessment and management of a client/patient complaining of abdominal pain.
0732.28.8	Using a variety of scenarios, elicit key information in the history of clients/patients complaining of abdominal pain, including history specific to female clients/patients.
0732.28.9	Consider age-related variations for pediatric and geriatric assessment and management.
0732.28.10	Describe the anatomic and physiological differences in children.
0732.28.11	Describe the pathophysiology of pediatric abdominal emergencies.

0732.28.12	Using a variety of scenarios, elicit key information in history, assessment, and demonstrate management of pediatric clients/patients with abdominal emergencies.
0732.28.13	Describe the variances in geriatric client's/patient's presentation with an abdominal condition/emergency.
0732.28.14	Understand transport decisions r/t abdominal conditions/emergencies, findings and symptoms.
0732.29	Apply fundamental knowledge to provide basic emergency care based on immunology assessment findings for an acutely ill client/patient.
0732.29.1	Define allergic reaction and anaphylaxis.
0732.29.2	Define risk factors and list common allergens.
0732.29.3	Describe the basic immune system's response to allergens.
0732.29.4	Understand the fundamental pathophysiology of the immune system's response to allergens.
0732.29.5	Recognize the signs and symptoms of allergic reactions.
0732.29.6	Prioritize the steps in the assessment and management of clients/patients with allergic and anaphylactic reactions.
0732.29.7	Recognize the indications for administering and assisting a client/patient in the use of an epinephrine auto-injector.
0732.29.8	Describe the desired effects and side effects associated with the administration of epinephrine.
0732.29.9	Demonstrate administration of epinephrine by auto-injector.
0732.29.10	Describe/demonstrate considerations in reassessment of clients/patients with allergic and anaphylactic reactions.
0732.30	Apply fundamental knowledge to provide basic emergency care based on endocrine assessment findings for an acutely ill client/patient.
0732.30.1	Define diabetes types I and II, hypoglycemia, hyperglycemia, and diabetic ketosis.
0732.30.2	Research the anatomy and function of the pancreas.
0732.30.3	Describe the pathophysiology of diabetes and diabetic emergencies.
0732.30.4	Describe a general assessment of a diabetic client/patient and the different findings and symptoms that may be present.
0732.30.5	Identify and describe the management of diabetes and medications used to treat endocrine disorders.
0732.30.6	Consider age-related variations for pediatric and geriatric assessment and management of endocrine disorders.
0732.30.7	Demonstrate communication and documentation with a client/patient with an endocrine disorder emergency.
0732.30.8	Understand transport decisions- rapid transport for altered level of consciousness.
0732.31	Apply fundamental knowledge to provide basic emergency care based on psychiatric assessment findings for an acutely ill client/patient.
0732.31.1	Define behavior, psychiatric disorder, and behavioral emergency.
0732.31.2	Discuss the epidemiology of psychiatric disorders.
0732.31.3	Discuss the assessment of a client/patient who appears to be suffering from a behavior or psychiatric emergency.
0732.31.4	Describe behavioral change and factors that may alter a client's/patients' behavior.
0732.31.5	For a client/patient whose abnormal behavior appears to be caused by stress, discuss techniques to calm the client/patient and gain his cooperation.
0732.31.6	Discuss the assessment of a client/patient who appears to be suffering from a behavioral or psychiatric emergency.
0732.31.7	Discuss the steps in managing a client/patient presenting with a behavioral or psychiatric emergency.
0732.31.8	Describe factors often associated with the risk of suicide.

0732.31.9	Discuss care for a client/patient who is at risk for potential or attempted suicide.
0732.31.10	Recognize warning signs that a client/patient may become violent.
0732.31.11	Explain the consideration in using force and restraint when managing behavioral emergency calls.
0732.31.12	Explain considerations when faced with a behavioral emergency client/patient who refuses treatment and transport.
0732.31.13	Consider age-related variation for pediatric and geriatric assessment and management.
0732.32	Apply fundamental knowledge to provide basic emergency care based on cardiovascular assessment findings for an acutely ill client/patient.
0732.32.1	Describe the anatomy and physiology of the cardiovascular system.
0732.32.2	Describe the pathophysiology of cardiac compromise.
0732.32.3	Discuss the primary assessment of a client/patient with cardiac signs and symptoms.
0732.32.4	Complete a history of a client/patient experiencing cardiac signs and symptoms.
0732.32.5	Research and discuss the management of cardiac signs and symptoms
0732.32.6	Define acute coronary syndrome and discuss its most common signs and symptoms.
0732.32.7	Define hypertensive emergencies and discuss the most common signs and symptoms.
0732.32.8	Define cardiogenic shock and discuss the most common signs and symptoms.
0732.32.9	Discuss the following conditions and how each may lead to a cardiac emergency: • Coronary artery disease • aneurysm • electric malfunctions of the heart • mechanical malfunctions of the heart • angina pectoris • acute myocardial infarction • congestive heart failure
0732.32.10	Discuss the following factors in the chain of survival and how each may contribute to the client/patient survival of the cardiac arrest: • immediate recognition and activation • early cardiopulmonary resuscitation • rapid defibrillation • effective advanced life support • integrated post-cardiac arrest care
0732.32.11	List the skills necessary for an EMT to manage a client/patient in cardiac arrest.
0732.32.12	Discuss types of automated external defibrillators and how AEDs work.
0732.32.13	Discuss the effective coordination of CPR and AED for a client/patient in cardiac arrest.
0732.32.14	Discuss the purpose and use of mechanical CPR devices.
0732.32.15	Discuss the following pharmacological agents used in cardiovascular emergencies: • Aspirin • Nitroglycerin
0732.32.16	Comprehend the role of medical oversight in medication administration.
0732.32.17	Discuss client/patient-assisted medication administration.
0732.32.18	Using a variety of scenarios related to cardiovascular emergencies, document care provided.
0732.33	Apply fundamental knowledge to provide basic emergency care based on toxicology assessment findings for an acutely ill client/patient.
0732.33.1	Define toxicology, poisoning, overdose, National Poison Control Center.
0732.33.2	Identify ways in which poisons can enter the body.

0732.33.3	Provide examples, assessment findings, and general management considerations of poisoning by ingestion, inhalation, injection, and absorption.
0732.33.4	Identify common causative agents, assessment findings, symptoms, and management of opiate/narcotic overdose.
0732.33.5	Describe alcoholism, including long-term effects.
0732.33.6	Identify assessment findings, symptoms, and management of alcohol abuse and withdrawal.
0732.33.7	Identify common causative agents, assessment findings, symptoms and management of cannabis, hallucinogens, stimulants, barbiturates/sedatives/hypnotics.
0732.33.8	Explain potential dangers to EMS providers and others at scenes where poisoning, alcohol abuse, or substance abuse is involved.
0732.33.9	Recognize common causative agents, assessment findings and symptoms of pesticides, chemicals, household cleaning and poisonings poisonous plants.
0732.33.10	Collect key elements in the history of a client/patient who has been poisoned.
0732.33.11	Analyze management techniques of clients/patients who have ingested poisonings, absorbed poisons through the skin and have inhaled poisons.
0732.33.12	Describe the use of activated charcoal in the management of ingested poisons.
0732.33.13	Explain the common causes of medication overdoses (cardiac, psychiatric, non-prescription pain medications, other).
0732.33.14	Analyze client/patient assessment findings and symptoms for client/patients with medication overdose.
0732.33.15	Given a variety of scenarios, develop a treatment plan for clients/patients with emergencies related to alcohol and substance abuse.
0732.33.16	Employ management for a client/patient with a medication overdose.
0732.33.17	Illustrate general treatment modalities for poisonings (scene safety, standard precautions and decontamination, airway control, ventilation and oxygenation, circulation, use of activated charcoal).
0732.33.18	Consider age-related variations for pediatric and geriatric assessment management.
0732.33.19	Utilize communication and documentation techniques for clients/patients with toxicological emergencies.
0732.33.20	Justify transport decisions related to clients/patients with toxicological emergencies.
0732.34	Apply fundamental knowledge to provide basic emergency care based on respiratory assessment findings for an acutely ill client/patient.
0732.34.1	Describe the anatomy and physiology of the respiratory system.
0732.34.2	Differentiate between adequate and inadequate breathing based on the rate, rhythm, and quality of breathing.
0732.34.3	Discuss the differences between adult and pediatric airways and respiratory systems.
0732.34.4	Recognize signs of inadequate breathing in pediatric clients/patients.
0732.34.5	Provide supplemental oxygen and assisted ventilation as needed for clients/patients with inadequate breathing.
0732.34.6	Analyze assessment findings, symptoms, and management for respiratory conditions (respiratory distress).
0732.34.7	Analyze the following respiratory conditions to define causes, assessment findings, symptoms, complications, specific prehospital management, and transport decisions: • asthma • pulmonary edema • chronic obstructive pulmonary disease • pneumonia • spontaneous pneumothorax

	• pulmonary embolism • epiglottitis • pertussis • cystic fibrosis • environmental/industrial exposure/toxic gases • viral respiratory infections
0732.34.8	Assess the effectiveness of artificial ventilation.
0732.34.9	Recognize and assess the client/patient with difficulty breathing.
0732.34.10	Provide care for the client/patient with difficulty breathing.
0732.34.11	Recognize the indications, contraindications, risks, and side effects of CPAP.
0732.34.12	Summarize the indications/contraindications, actions, side effects, dose, route, and medical control role involving metered-dose inhalers and small volume nebulizers.
0732.34.13	Assist a client/patient with administration of a prescribed bronchodilator by inhaler or small volume nebulizer as permitted by medical direction.
0732.34.14	Demonstrate simulated communication and documentation related to care for clients/patients with respiratory emergencies.
0732.34.15	Consider age-related variations for pediatric and geriatric assessment and management of respiratory emergencies.
0732.35	Apply fundamental knowledge to provide basic emergency care based on hematology assessment findings for an acutely ill client/patient.
0732.35.1	Identify the anatomy and physiology of blood, plasma, and blood-forming organs.
0732.35.2	Identify medications that can interfere with blood clotting.
0732.35.3	Explain the pathophysiology and complications of sickle cell anemia.
0732.35.4	Discuss assessment and management for clients/patients with emergencies related to sickle cell anemia/sickle cell crisis.
0732.35.5	Describe clotting disorders.
0732.35.6	Consider age-related variations for pediatric and geriatric clients/patients with a hematologic emergency.
0732.36	Apply fundamental knowledge to provide basic emergency care based on genitourinary/renal assessment findings for an acutely ill client/patient.
0732.36.1	Identify and describe the structure and function of the renal system.
0732.36.2	Explain the pathophysiology of kidney failure and the development of kidney stones.
0732.36.3	Explain the purpose of hemodialysis and peritoneal dialysis.
0732.36.4	Compare and contrast types of dialysis (hemodialysis and peritoneal).
0732.36.5	Identify special considerations for hemodialysis client/patients.
0732.36.6	Analyze complications/adverse effects of dialysis.
0732.36.7	Recognize clients/patients with complications of end-stage renal disease, dialysis, signs, and symptoms of missed dialysis treatments.
0732.36.8	Identify management techniques for a client/patient with complications of end-stage renal disease, dialysis and missed dialysis.
0732.36.9	Explain the special considerations for clients/patients who have received a kidney transplant.
0732.36.10	Demonstrate urinary catheter management.
0732.36.11	Consider age-related variations in pediatric and geriatric clients/patients with renal disease.
0732.36.12	Demonstrate communication and documentation related to clients/patients with renal disease.
0732.36.13	Summarize transport decisions made related to clients/patients with renal disease.

0732.37	Apply fundamental knowledge to provide basic emergency care based on gynecology assessment findings for an acutely ill client/patient.
0732.37.1	Identify the anatomy of the female reproductive system and fetal development.
0732.37.2	Explain the physiology of pregnancy.
0732.37.3	Classify and describe assessment findings related to abdominal pain, vaginal pain, vaginal bleeding, vaginal discharge, fever, nausea and vomiting, syncope.
0732.37.4	Identify general management techniques related to gynecological emergencies.
0732.37.5	Define and list the causes, risk factors, assessment findings and management of the following specific gynecological emergencies: • vaginal bleeding • sexual assault- legal issues • infections -pelvic inflammatory disease • sexually transmitted diseases
0732.37.6	Consider age-related variations for pediatric and geriatric assessment and management of gynecological emergencies.
0732.37.7	Explain and describe measures to prevent or correct supine hypotensive syndrome.
0732.37.8	Describe the 3 stages of labor.
0732.37.9	Discuss the assessment of a client/patient in labor, including history and physical examination.
0732.37.10	Discuss how to decide if delivery is imminent or if the client/patient in labor should be transported to a medical facility for delivery.
0732.37.11	State findings that may indicate the need for neonatal resuscitation.
0732.37.12	Discuss the role of the EMT in childbirth, including preparation and delivery.
0732.37.13	Describe the normal steps in the care of the neonate.
0732.37.14	Explain the indications and procedures for neonatal resuscitation, following the inverted pyramid order of priorities.
0732.37.15	Discuss after-delivery care of the mother, including delivery of the placenta, controlling vaginal bleeding, and providing comfort to the mother.
0732.37.16	Describe and discuss the special care required for complications of delivery, including: • breech presentation • limb presentation • prolapsed umbilical cord • multiple birth • premature birth • meconium • describe and discuss the special care required for emergencies in pregnancy, including: • excessive pre-birth bleeding • ectopic pregnancy • seizures in pregnancy • miscarriage and abortion • trauma in pregnancy • stillbirths • accidental death of a pregnant woman
0732.37.17	Discuss transport decisions related to gynecological emergencies.
0732.38	Apply fundamental knowledge to provide basic emergency care based on musculoskeletal assessment findings for an acutely ill client/patient.
0732.38.1	Describe the anatomy of the musculoskeletal system.

0732.38.2	Research the pathophysiology of non-traumatic fractures (cancers or osteoporosis).
0732.38.3	Perform an assessment related to non-traumatic musculoskeletal disorders, noting pain, swelling, abnormal or loss of movement, sensation changes, circulatory changes, and deformity.
0732.38.4	Describe management of airway, ventilation, circulation, splinting, transport considerations, communications and documentation related to non-traumatic musculoskeletal injury.
0732.38.5	Consider age-related variations in pediatric and geriatric conditions related to musculoskeletal injury.
0732.39	Apply fundamental knowledge to provide basic emergency care based on eyes, ears, nose, and throat assessment findings for an acutely ill client/patient.
0732.39.1	Explain the causes of nosebleeds.
0732.39.2	Discuss the general assessment findings related to a nosebleed.
0732.39.3	Demonstrate techniques to stop bleeding in conscious clients/patients if no risk of spine injury.

Shock and Resuscitation

0732.40	Apply fundamental knowledge to provide basic emergency care for shock and resuscitation for an acutely ill client/patient.
0732.40.1	Discuss ethical issues in resuscitation.
0732.40.2	Review the anatomy and physiology of the respiratory system and, cardiovascular system.
0732.40.3	Explain the pathophysiology of respiratory failure.
0732.40.4	Describe assessment findings related to: • pulmonary symptoms • cardiovascular symptoms • neurological symptoms • other symptoms related to shock and resuscitation
0732.40.5	Identify treatments r/t shock and resuscitation, including oxygen therapy and ventilator support.
0732.40.6	Define cardiac arrest and explain the pathophysiology.
0732.40.7	Explain the system components to maximize the survival of resuscitation.
0732.40.8	Research AED use for Adult, Child, Infant Special AED Situations
0732.40.9	Discuss shock related to poor perfusion.
0732.40.10	Review the anatomy and physiology that relates to poor perfusion (heart, blood vessels, essential components for normal perfusion, physiology of respiration).
0732.40.11	Discuss disruptions that can cause shock.
0732.40.12	Identify the categories of shock.
0732.40.13	Describe signs and symptoms related to shock due to fluid loss, pump failure, and container failure.
0732.40.14	Using a variety of scenarios, complete a client/patient assessment, including scene size up, primary assessment, relevant history, secondary assessment, and reassessment related to shock.
0732.40.15	Discuss the management of clients/patients in shock.
0732.40.16	Consider age-related variations in pediatric and geriatric related to shock.

Trauma

0732.41	Apply fundamental knowledge of trauma overview.
0732.41.1	Review the structure and function of the circulatory system, including the functions of the blood.
0732.41.2	Explain the concept of perfusion.
0732.41.3	Compare and contrast arterial, venous, and capillary bleeding.
0732.41.4	Describe the types of traumatic bleeding, severity, and the physiological response to bleeding.

0732.41.5	Discuss the general assessment of a bleeding trauma client/patient, including mechanism of injury, primary survey, physical exam, history, Pediatric considerations, and geriatric considerations.
0732.41.6	Describe body substance isolation, airway patency, oxygenation, and ventilation management strategies for a bleeding trauma client/patient.
0732.41.7	Compare and contrast internal and external bleeding control management strategies.
0732.41.8	Describe how to stabilize body temperature and provide psychological support for a bleeding trauma client/patient.
0732.41.9	Consider transport decisions related to a bleeding trauma client/patient.
0732.42	Apply fundamental knowledge to provide basic emergency care based on bleeding trauma assessment findings for an acutely ill client/patient.
0732.42.1	Review the structure and function of the circulatory system, including the functions of the blood.
0732.42.2	Explain the concept of perfusion.
0732.42.3	Compare and contrast arterial, venous, and capillary bleeding.
0732.42.4	Describe the types of traumatic bleeding, severity, and the physiological response to bleeding.
0732.42.5	Discuss the general assessment of a bleeding trauma client/patient, including mechanism of injury, primary survey, physical exam, history, Pediatric considerations, and geriatric considerations.
0732.42.6	Describe body substance isolation, airway patency, oxygenation, and ventilation management strategies for a bleeding trauma client/patient.
0732.42.7	Compare and contrast internal and external bleeding control management strategies.
0732.42.8	Describe how to stabilize body temperature and provide psychological support for a bleeding trauma client/patient.
0732.42.9	Consider transport decisions related to a bleeding trauma client/patient.
0732.43	Apply fundamental knowledge to provide basic emergency care based on chest trauma assessment findings for an acutely ill client/patient.
0732.43.1	Research the incidence, morbidity, and mortality of chest trauma.
0732.43.2	Describe the mechanisms of injury commonly associated with chest injuries.
0732.43.3	Review the anatomy of the chest.
0732.43.4	Describe the role of the chest in systemic oxygenation and ventilation.
0732.43.5	Research the pathophysiology of chest trauma, including impaired cardiac output, ventilation, gas exchange.
0732.43.6	Explore the general assessment findings related to chest trauma.
0732.43.7	Describe the specific chest injuries, including flail chest, open chest wound, pneumothorax, tension pneumothorax, hemothorax, hemopneumothorax, traumatic asphyxia, cardiac tamponade, aortic injury, and commotio cordis and the assessment and management for each of these specific injuries.
0732.43.8	Consider age-related variations for pediatric and geriatric assessment and management of chest trauma.
0732.44	Apply fundamental knowledge to provide basic emergency care based on abdominal trauma assessment findings for an acutely ill client/patient.
0732.44.1	Discuss the incidents of morbidity and mortality related to abdominal and genitourinary trauma.
0732.44.2	Recognize the location, structure, and function of the organs in the abdominal cavity.
0732.44.3	Describe the structures of the genitourinary system.
0732.44.4	Explain the physiology of the genitourinary and abdominal organs.
0732.44.5	Associate areas of referred pain with the likely origins of the pain.
0732.44.6	Recognize the mechanism of injury, common signs, and symptoms of a closed abdominal trauma.
0732.44.7	Perform an assessment and develop a treatment plan to manage the signs and symptoms of a closed abdominal trauma.

0732.44.8	Recognize the mechanism of injury, common signs, and symptoms of penetrating/open abdominal trauma.
0732.44.9	Perform an assessment and develop a treatment plan to manage the signs and symptoms of a penetrating/closed abdominal trauma.
0732.44.10	Analyze and consider the following injuries in abdominal trauma: hollow organ injuries, solid organ injuries.
0732.44.11	Discuss appropriate assessment and management of clients/patients complaining of abdominal pain.
0732.44.12	Compare and contrast the areas of referred pain with the likely origins of the pain.
0732.44.13	Distinguish the type of abdominal pain that may indicate cardiac involvement.
0732.44.14	Elicit key information in the history of clients/patients complaining of abdominal pain, including history specific to female clients/patients.
0732.44.15	Distinguish different types of general management techniques for abdominal pain, including transportation, communication, and documentation.
0732.45	Apply fundamental knowledge to provide basic emergency care based on orthopedic trauma assessment findings for an acutely ill client/patient.
0732.45.1	Research the incidence of orthopedic trauma, including: • morbidity/mortality (upper/lower extremity) • pediatric considerations • geriatric considerations • mechanism of injury (direct, indirect, twisting force)
0732.45.2	Explain the anatomy related to orthopedic trauma: • skin layers • subcutaneous layers • extremity structures • axial structures • component of a long bone
0732.45.3	Summarize the physiology of the function of the musculoskeletal system.
0732.45.4	Elaborate on the pathophysiology of sprains/strains.
0732.45.5	Relate the mechanism of injury to the anatomical structure (upper extremity, lower extremity).
0732.45.6	Identify complications related to musculoskeletal trauma.
0732.45.7	Identify types of fractures.
0732.45.8	Identify dislocations related to specific anatomical area injury (clavicle, shoulder, elbow, wrist, metacarpal-phalanx, knee).
0732.45.9	Describe the management of scene safety, limb-threatening injury, and splinting related to musculoskeletal trauma.
0732.45.10	Compare and contrast 4 types of musculoskeletal injury (fracture, dislocation, sprain, and strain), the mechanism of injury, assessment, and management.
0732.45.11	Define open and closed extremity injuries.
0732.45.12	Summarize the incidence, mechanism of injury, signs and symptoms, assessment, and management of pelvic fracture injury.
0732.45.13	Using a variety of scenarios, perform a general assessment including scene safety, mechanism of injury, determine life-threatening injuries, use the 6 Ps of assessment, complete physical exam, bleeding, guarding/self-splinting, and associated injuries for a musculoskeletal trauma client/patient.
0732.45.14	Using a variety of scenarios, students will analyze scenario data and create a general management plan and demonstrate skills to control hemorrhage, embolization/splinting, neurologic/circulatory

	examination, pain management, associated injuries, transport to an appropriate facility, appropriate communication, and documentation.
0732.45.15	Discuss considerations in the assessment and management of specific types of injuries including: • amputation • sprains and strains, including special assessment findings (sound, severe weakness, pain, edema, apply cold/pressure, wrap, elevate, immobilize) • shoulder girdle injuries • pelvic injuries • hip dislocation • hip fracture • femoral shaft fracture • knee injury • tibia of fibula injury • ankle or foot injury • clavicle injury • humerus injury • forearm injury
0732.45.16	Compare specific considerations for splinting (rigid, formable, traction, air, vacuum, pillow/blanket, short spine board, long spine board).
0732.45.17	Contrast age-related variations for pediatric and geriatric assessment and management with an orthopedic traumatic injury.
0732.46	Apply fundamental knowledge to provide basic emergency care based on soft tissue trauma assessment findings for an acutely ill client/patient.
0732.46.1	Research the incidence of soft tissue injury, including the mortality and morbidity.
0732.46.2	Describe the structure and function of the skin.
0732.46.3	Compare the different types of closed soft-tissue wounds and the assessment and management of closed soft-tissue wounds.
0732.46.4	Compare the different types of open soft-tissue wounds and general assessment and care for open soft-tissue wounds.
0732.46.5	Describe specific treatment for abrasions and lacerations, puncture wounds, impaled objects, avulsions, amputation, and genital injuries.
0732.46.6	Research the incidence of burn injury, including morbidity/mortality and risk factors.
0732.46.7	Explain the anatomy and physiology of burns (types of burns, depth classification, body surface area of burns, severity).
0732.46.8	Discuss the complications of burn injuries.
0732.46.9	Describe assessment and management for burns including thermal, inhalation, chemical, radiation and electrical burns.
0732.46.10	Compare and contrast considerations in the dressing and bandaging of open wounds.
0732.46.11	Discuss the age-related variations related to soft tissue trauma injuries both pediatric and geriatric.
0732.47	Apply fundamental knowledge to provide basic emergency care based on head, neck, and spine trauma assessment findings for an acutely ill client/patient.
0732.47.1	Research the incidence of head/scalp, face, neck injuries including the mechanism of injuries, morbidity and mortality and associated injuries.
0732.47.2	Discuss the components and function of the nervous system and the anatomy of the head and spine.
0732.47.3	Describe the types of injuries to the skull and brain.

0732.47.4	Analyze the general assessment and management of scalp, facial, neck injuries (non-spinal), nasal fractures, eye/orbit, dental, laryngeal, head injury, skull fractures and brain injuries.
0732.47.5	Describe the specific concerns in the management of cranial injuries with impaled objects.
0732.47.6	Describe specific concerns in the management of injuries to the face and jaw.
0732.47.7	Define nontraumatic brain injuries.
0732.47.8	Explain the purpose and elements of the Glasgow Coma Scale.
0732.47.9	Discuss the assessment and management of open wounds to the neck.
0732.47.10	Using a variety of scenarios, complete assessment and management plan for a client/patient with a head, neck, facial and non-spinal injury trauma.
0732.47.11	Using a variety of scenarios, demonstrate the skills necessary for management of a client/patient with a head, neck, facial and non-spinal injury trauma.
0732.48	Apply fundamental knowledge to provide basic emergency care based on neurotrauma assessment findings for an acutely ill client/patient.
0732.48.1	Research the incidence, including morbidity and mortality of nervous system trauma.
0732.48.2	Review the anatomy and physiology of the brain and spine.
0732.48.3	Identify general assessment and management for brain trauma clients/patients.
0732.48.4	Discuss the management of a client/patient with brain trauma.
0732.48.5	Analyze transport considerations for a client/patient with brain trauma.
0732.48.6	Research the Brain Injury Foundation Guidelines.
0732.48.7	Consider age-related variations for pediatric and geriatric assessment and management of brain injuries.
0732.48.8	List types and mechanisms of spine injury.
0732.48.9	Discuss the assessment and management of spine and spinal cord injury.
0732.48.10	Discuss other assessment findings in spinal trauma clients/patients (presentation of other injuries with spinal injury).
0732.48.11	Discuss the general management considerations of a client/patient with spinal trauma.
0732.48.12	Discuss issues in the immobilization of the head, neck, and spine for the following: • applying a cervical collar • immobilizing a seated client/patient, including rapid extrication for high-priority clients/patients • applying a long backboard • rapid extrication for a child safety seat • immobilizing a standing client/patient • immobilizing a client/patient wearing a helmet
0732.48.13	Discuss issues in selective spine immobilization.
0732.48.14	Compare and contrast age-related variations for pediatric and geriatric assessment and management of spinal injury.
0732.49	Apply fundamental knowledge to provide basic emergency care based special populations.
0732.49.1	Consider unique considerations for pregnant clients/patients involved in trauma, including the mechanism of injury and fetal health.
0732.49.2	Explain the special anatomy, physiology and pathophysiology related to pregnancy and fetal considerations.
0732.49.3	Explain unique types of injuries and conditions of concern for pregnant clients/patients involved in trauma.
0732.49.4	Demonstrate assessment consideration for a pregnant client/patient involved in trauma.
0732.49.5	Express management considerations for the pregnant client/patients involved in trauma.
0732.49.6	Summarize special considerations for pediatric clients/patients involved in trauma.

0732.49.7	Explain the special anatomy, physiology and pathophysiology related to injured pediatric clients/patients involved in trauma.
0732.49.8	Consider unique assessment findings for pediatric clients/patients who have sustained trauma.
0732.49.9	Demonstrate unique management considerations for pediatric clients/patients involved in trauma.
0732.49.10	Describe special considerations for geriatric clients/patients involved in trauma.
0732.49.11	Explain the special anatomy, physiology and pathophysiology related to injured geriatric clients/patients involved in trauma.
0732.49.12	Consider unique assessment findings for geriatric clients/patients who have sustained trauma.
0732.49.13	Demonstrate unique management considerations for geriatric clients/patients involved in trauma, including the cognitively impaired client/patient.
0732.50	Apply fundamental knowledge to provide basic emergency care based on environmental emergencies.
0732.50.1	Describe submersion incidents, including the incidence and predictors of morbidity and mortality.
0732.50.2	Describe the difference between freshwater and saltwater submersion incidents.
0732.50.3	Explain the pathophysiology related to submersion incidents.
0732.50.4	Describe the following related to submersion incidents: • unique signs and symptoms • assessment considerations • management considerations
0732.50.5	Recognize temperature-related illnesses, including cold and heat-related illness.
0732.50.6	State how the body loses heat.
0732.50.7	Identify the type of temperature-related illness (generalized cold injury, localized cold injury, generalized heat injury).
0732.50.8	Recognize the pathophysiology of cold-related and heat-related injuries.
0732.50.9	Summarize signs and symptoms of cold-related illness (generalized and localized) as well as heat-related illness (moist pale skin and hot skin).
0732.50.10	Using a variety of scenarios, demonstrate management of cold and heat-related illnesses.
0732.50.11	Describe safe techniques for water rescues and ice rescues.
0732.50.12	Discuss the assessment and management of the following types of bites and stings:
0732.50.13	• Insect bites and stings • Snake bites • Poisoning from marine life
0732.50.14	Define dysbarism as related to diving emergencies.
0732.50.15	Summarize the following related to diving emergencies: • mechanism of injury • pathophysiology • signs and symptoms • management considerations
0732.50.16	Describe the assessment and management of electrical burns.
0732.50.17	Describe the assessment and management of radiation injuries.
0732.50.18	Analyze age-related variations for pediatric and geriatric assessment and management related to environmental emergencies.
0732.51	Apply fundamental knowledge to provide basic emergency care based on multi-system trauma.
0732.51.1	Explain the kinematics of trauma.
0732.51.2	Distinguish multisystem trauma.
0732.51.3	Analyze the golden principles of out-of-hospital trauma care.

0732.51.4	Using a variety of scenarios and critical thinking skills for multi-system trauma care, differentiate the following: • oxygenation related to profuse bleeding • sequence of treating clients/patients • rapid transport use • backboard use
0732.51.5	Recognize the most harmful injuries on the scene.
0732.51.6	Identify trauma care as a leading cause of death among young people.
0732.51.7	Distinguish specific injuries related to multi-system trauma, such as blast injuries.

Special Client/Patient Populations

0732.52	Apply fundamental knowledge of growth, development, aging, and assessment findings to provide basic emergency care and transportation for an obstetrical client/patient.
0732.52.1	Review anatomy and physiology of the female reproductive system.
0732.52.2	Review normal anatomical, physiological, and psychological changes in pregnancy.
0732.52.3	Identify: premonitory signs of labor, stages of labor and delivery, antepartum and intrapartum assessment findings, management of a normal delivery and postpartum care.
0732.52.4	Identify the following complications of pregnancy: abuse, substance abuse, diabetes mellitus, placental problems, hypertensive disorders, high-risk pregnancy, complications of labor, complications of delivery, and postpartum complications.
0732.53	Apply a fundamental knowledge of growth, development, aging, and assessment findings to provide basic emergency care and transportation for a neonatal and pediatric client/patient.
0732.53.1	Describe the anatomical and physiological differences between an adult, neonatal, and pediatric client/patient (head, airway, chest and lungs, abdomen, extremities, integumentary, respiratory, nervous system and spinal column, metabolic differences).
0732.53.2	Identify the growth and development stages of infancy, toddler years, preschool years, middle childhood years, adolescence.
0732.53.3	Discuss and demonstrate a pediatric assessment including general considerations, assessment process, scene survey, client/patient assessment, hands-on learning ABCs, focused history, and detailed physical exam.
0732.53.4	Explain specific pathophysiology, assessment and management of the neonatal and pediatric client/patient related to: • respiratory distress • shock • neurological changes • gastrointestinal changes • toxicology • sudden infant death syndrome • pediatric trauma
0732.54	Apply a fundamental knowledge of growth, development, aging, and assessment findings to provide basic emergency care and transportation for a geriatric client/patient.
0732.54.1	Identify cardiovascular changes in the elderly.
0732.54.2	Recognize myocardial infarction in a geriatric client/patient.
0732.54.3	Explain heart failure.
0732.54.4	Identify respiratory changes in the elderly.

0732.54.5	Explain pneumonia from bacterial, viral, or fungal causes (evaluation, risk factors, signs and symptoms, physical assessment, treatment).
0732.54.6	Describe pulmonary embolism (signs and symptoms, physical assessment, assessment tools, treatment).
0732.54.7	Recognize neurovascular system anatomical and physiological changes and pathophysiology in elderly.
0732.54.8	Describe the cognitive abilities, psychomotor skills and social skill changes related to dementia.
0732.54.9	Complete and evaluation of pathophysiology through history, risk factors and current medications as it relates to dementia.
0732.54.10	Describe known reversible causes of dementia, associated signs and symptoms, problems associated with the management of clients/patients with dementia.
0732.54.11	Express the difference between dementia and delirium.
0732.54.12	Describe the following as it relates to delirium: • mortality rates • evaluation of pathophysiology through history • risk factors and medications • associated signs and symptoms • possible changes in physical assessment • assessment tools • treatment
0732.54.13	Describe the gastrointestinal system's anatomical and physiological changes and pathophysiological changes in the elderly.
0732.54.14	Identify gastrointestinal bleeding caused by disease processes, inflammation, infection, and obstruction of the upper and lower gastrointestinal tract.
0732.54.15	Recognize the genitourinary system anatomical and physiological changes and pathophysiology changes in the elderly.
0732.54.16	Define the endocrine system, anatomical and physiological changes, and pathophysiology changes in the elderly.
0732.54.17	Identify hyperosmolar hyperglycemic syndrome (nonketotic coma) as a complication of type 2 diabetes (formerly NIDDM of Type II) in the elderly (does not cause ketosis but does lead to osmotic diuresis and shift of fluid to the intravascular space, resulting in dehydration).
0732.54.18	Describe musculoskeletal system anatomical and physiological changes and pathophysiology in the elderly.
0732.54.19	Recognize toxicological emergencies in the elderly.
0732.54.20	Identify sensory changes in the elderly.
0732.54.	Apply fundamental knowledge of growth, development, aging, and assessment findings to provide basic emergency care and transportation for clients/patients in special situations.
0732.54.1	Recognize the types of abuse and neglect in children and the elderly.
0732.54.2	Use the assessment to identify findings of concern related to abuse in children and the elderly.
0732.54.3	Develop a management plan that includes reporting and safely transporting suspected abuse victims.
0732.54.4	Summarize the legal aspects related to abuse.
0732.54.5	Identify documentation techniques related to abuse.
0732.54.6	Explain the special concerns related to: • homelessness/poverty and emergency care • Bariatric clients/patients • technology-assisted/dependent clients/patients • hospice care and the terminally ill

	• tracheostomy care • sensory deficits • homecare clients/patients • clients/patients with a developmental disability

EMS Operations

0732.55	Apply knowledge of operational roles and responsibilities to ensure client/patient, public, and personnel safety in incident management.
0732.55.1	Identify multiple casualty incidents as an event that places great demand on resources (equipment, personnel).
0732.55.2	Perform triage, re-triage, and destination decisions.
0732.55.3	Identify post-traumatic and cumulative stress.
0732.56	Apply knowledge of operational roles and responsibilities to ensure client/patient, public, and personnel safety in multiple casualty incidents.
0732.56.1	Identify multiple casualty incidents as an event that places great demand on resources (equipment, personnel).
0732.56.2	Perform triage, re-triage, and destination decisions.
0732.56.3	Identify post-traumatic and cumulative stress.
0732.57	Apply knowledge of operational roles and responsibilities to ensure client/patient, public, and personnel safety in air medical operations.
0732.57.1	Describe safe air medical operations, landing zone selection and preparation.
0732.57.2	Demonstrate the correct way to approach the aircraft.
0732.57.3	Identify communication issues r/t air traffic.
0732.57.4	Recognize the criteria for utilizing air medical response.
0732.58	Apply knowledge of operational roles and responsibilities to ensure client/patient, public, and personnel safety in vehicle extraction.
0732.58.1	Describe safe vehicle extrication (role of EMS, personal safety, client/patient safety, situation safety, determine number of client/patients).
0732.58.2	Demonstrate the use of simple hand tools in relation to vehicle extrication.
0732.58.3	Examine special considerations for client/patient care related to vehicle extrication.
0732.59	Apply knowledge of operational roles and responsibilities to ensure client/patient, public, and personnel safety related to hazardous materials.
0732.59.1	Identify risks and responsibilities of operating in a cold zone at a hazardous material or other special incident.
0732.59.2	Entry-level students need to be certified in Hazardous Waste Operations and Emergency Response (HAZWOPER) standard 29 CFR 1910120(q)(6)(i)-First Responder Awareness Level (this can be done as a co-requisite, prerequisite, or part of the entry-level course).
0732.60	Apply knowledge of operational roles and responsibilities to ensure client/patient, public, and personnel safety in mass casualty incidents due to terrorism and disaster.
0732.60.1	Analyze the risks and responsibilities of operating on the scene of a natural or man-made disaster (role of EMS, personal and client/patient).
0732.60.2	Using a variety of scenarios, complete a 360-degree assessment and scene size-up, determine the number of clients/patients, evaluate the need for additional resources.
0732.60.3	Explain EMS operations during terrorist, weapons of mass destruction, and disaster events.
0732.60.4	Summarize care of emergency responders on scene.

Clinical Behavior and Judgement

0732.61	Apply professional, ethical, and clinical judgement to ensure safe, compassionate, and effective emergency medical care.
0732.61.1	Demonstrate integrity, accountability, and professional behavior in all clinical and simulated settings.
0732.61.2	Communicate clearly and compassionately with clients/patients, families, and the healthcare team, including verbal, non-verbal, and written formats.
0732.61.3	Use situational awareness and critical thinking to assess, prioritize, and adapt patient care based on scene dynamics and patient condition.
0732.61.4	Respect diversity, uphold confidentiality, and make ethically sound decisions consistent with the EMT scope of practice.
0732.61.5	Participate in continuous improvement by seeking feedback, reflecting on clinical performance, and supporting team-based care.

Instructional content in course this will focus on clinical procedures utilized within medical offices. Major components include emergency medical care, physical exam, basic pharmacology, and administration of medication. Students will focus upon employability strategies and career development necessary for successful employment. Students will participate in a work-based clinical externship within a medical office or equivalent health care facility. Due to health care industry standards, exemplary attendance is mandatory. All content skill sets must be mastered before students are eligible to attain established credentials and/or industry validation.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Client Interaction

0733.1	Interpret client/patient assessment and treatment data.
0733.1.1	Record client/patient assessment and treatment data.
0733.1.2	Recognize signs and symptoms that may indicate to the physician a need for laboratory testing.
0733.2	Understand and demonstrate proper quality control procedures.
0733.2.1	Describe the criteria used by Food and Drug Administration (FDA) to classify a test as "CLIA waived" and the regulatory constraints on test performance.
0733.2.2	Explain the methods of quality control for CLIA-waived testing, identify acceptable and unacceptable control results and describe specific corrective action required when results are unacceptable.
0733.2.3	Instruct patients/clients in the proper collection of urine (clean catch, mid-stream), sputum and stool specimens.
0733.2.4	Demonstrate proper techniques for the collection of urine, capillary whole blood (finger/heel stick), culture material (throat/nasal swab) and other specimen types required for CLIA-waived tests.

Information Collection

0733.3	Perform basic diagnostic medical assisting procedures.
0733.3.1	Assist with ultrasound treatment.
0733.3.2	Perform pulse oximetry measurement and recording.
0733.3.3	Perform spirometry procedures.
0733.3.4	Perform visual and auditory screenings.

Treatment Planning and Implementation

0733.4	Perform basic office examination procedures.
0733.4.1	Prepare patients/clients for and assist the physician with physical examinations including, but not limited to: pre- and post-natal, male and female reproductive, rectal and pediatric.
0733.4.2	Measure and record vital signs, recognizing abnormalities and danger signs.
0733.4.3	Measure and record pulse pressure.
0733.4.4	Measure and record orthostatic blood pressure.
0733.4.5	Record client/patient data.
0733.4.6	Instruct client/patient on breast or testicular self-examinations.
0733.4.7	Assist with pediatric procedures, including, but not limited to: weighing, measuring, and collecting specimens.

0733.4.8	Prepare client/patient s for diagnostic procedures.
0733.5	Apply pharmaceutical principles for administering medications.
0733.5.1	Identify commonly administered drugs, their uses, and effects.
0733.5.2	Use correct pharmaceutical abbreviations and terminology.
0733.5.3	Identify various methods and routes of drug administration.
0733.5.4	Calculate dosage and administer pharmaceuticals to correct anatomical sites, to correct client/patient , by correct route of administration, at the correct time and chart correctly.
0733.5.5	Demonstrate knowledge of the legal and ethical related to the administration and dispensing of drugs in the office setting under a doctor's supervision.
0733.5.6	Demonstrate appropriate techniques to: • prepare and administer non-parenteral medications (solid and liquids). • prepare and administer parenteral medications. • reconstitute powdered drugs. • prepare injections from ampules and vials. • administer intradermal injections. • administer subcutaneous injections. • administer intramuscular injections. • administer z-track intramuscular injections.

Intra Team Communications

0733.6	Perform the role of the medical assistant.
0733.6.1	Evaluate relevancy of information to be conveyed.
0733.6.2	Organize and express ideas in a concise, precise, and logical manner.
0733.6.3	Use medical terminology as appropriate for a medical assistant.
0733.6.4	Formulate and report information clearly and concisely.
0733.7	Distinguish the appropriate roles and responsibilities of each team member.
0733.7.1	Respect and value the expertise and contributions of all team members.
0733.7.2	Demonstrate techniques and strategies for communicating client/patient information within a team.

Technical Skills

0733.8	Assist with minor treatments.
0733.8.1	Instruct patients/clients regarding self-administration of medications.
0733.8.2	Prepare examination and treatment areas before, during and after client/patient care.
0733.8.3	Perform minor treatments as directed by the physician including hot and cold therapy (which includes but is not limited to the following: hot water bag, heating pad, hot soaks and compresses, ice bag, cold compresses, and packs).
0733.8.4	Assist the physician with examination, treatment and/or minor surgery.
0733.8.5	Perform orthopedic procedures, including but not limited to the following: crutch measurements and instruction in use of canes, crutches, walkers, and wheelchairs.
0733.8.6	Apply all types of roller bandages, using turns as appropriate.
0733.8.7	Perform eye irrigations and instillations.
0733.9	Perform clinical microscopy techniques and procedures that may be performed in CLIA-exempt laboratories under physician supervision.
0733.9.1	Perform CLIA-waived occult blood tests.

0733.9.2	Perform CLIA-waived urinalysis testing including color and turbidity, assessment, specific gravity, and reagent test strips.
0733.9.3	Perform CLIA-waived hematology tests (e.g. - hemoglobin, hematocrit).
0733.9.4	Perform CLIA-waived chemistry tests (e.g. - glucose, cholesterol).
0733.9.5	Perform CLIA-waived pregnancy tests.
0733.9.6	Perform CLIA-waived infectious disease testing (e.g. – strep screen, mono test, influenza A/B).
0733.9.7	Explain the CLIA-exemption for physician office laboratories.
0733.9.8	Describe the criteria used by Food and Drug Administration (FDA) to classify a test as “Provider Performed Microscopy” and the regulatory constraints on test performance.
0733.9.9	Demonstrate the operation of a compound microscope using direct and oil immersion lens.
0733.9.10	Observe examples of urine sediment (microscopic urinalysis and explain quantitation systems).
0733.9.11	Observe examples of gram-stained preparations of gram positive and gram-negative organisms.
0733.9.12	Observe examples of Wright’s-stained blood smears.
0733.9.13	Observe examples of wet preps, KOH preps and pin-worm preps for fungal elements and parasites.
0733.10	Assist with basic X-Ray procedures.
0733.10.1	Position patients/clients for basic x-rays.
0733.10.2	Demonstrate awareness of operation and maintenance of x-ray equipment/accessories.
0733.10.3	Demonstrate knowledge of how to process X-Ray film and maintain film files.
0733.10.4	Evaluate X-Ray film quality.
0733.10.5	Describe X-Ray principles and safety practices.
0733.10.6	Instruct client/patient in preparation for basic X-Ray examinations.
0733.10.7	Describe X-Ray equipment operation.
0733.10.8	Use precautions and provide appropriate protection for patients/clients and staff in the presence of ionizing radiation.
0733.10.9	Maintain a safe working environment in radiological work areas.
0733.11	Perform front office duties.
0733.11.1	Discuss principles of using Electronic Medical Record (EMR).
0733.11.2	Execute data management using Electronic Medical Record (EMR) including, but not limited to, client/patient registration, appointment scheduling, charting, billing and insurance processing, procedure, and diagnostic coding, ordering, and monitoring client/patient testing, medication and prescription orders, keyboarding and correspondence and performing an office inventory.
0733.11.3	Execute non-EMR data management including, but not limited to: selecting appropriate procedure and diagnostic codes, processing insurance data and claims, develop and maintain billing and collection systems, and keyboarding documents.
0733.11.4	Perform various financial procedures including, but not limited to, billing and collection procedures, payroll procedures, checkbook procedures and related medical office software.
0733.11.5	Utilize the Electronic Medical Record (EMR) to maintain personnel records and perform payroll duties.

Clinical Applications

0733.12	Demonstrate competence in performing procedures in a clinical setting.
0733.12.1	Demonstrate appropriate workplace skills.
0733.12.2	Perform skills listed and obtained through mastery of theory content.
0733.12.3	Perfect individual competency in performing medical assisting functions.
0733.12.4	Assist with and participate in client/patient care.
0733.12.5	Assist a physician.

In this course, the instructional focus will center on pharmacology, covering the applications, origins, varieties, and administration methods of drugs. Students will acquire knowledge pertaining to drug categorizations, effects, as well as the legal ramifications concerning regulated substances and alternative medications.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Pharmacology Basics

0734.1	Explore the basics of pharmacology.
0734.1.1	Determine the meaning of drugs and establish their origin and use.
0734.1.2	Compare the three types of drug names.
0734.1.3	Examine four sources of drugs and provide examples.
0734.1.4	Determine the three forms in which drugs are prepared, choosing examples and the route of administration for each.

Drug References

0734.2	Utilize drug reference resources.
0734.2.1	Examine PDR and other reference sources.
0734.2.2	Determine the meaning of drugs and establish their origin and use.
0734.2.3	Compare the three types of drug names.
0734.2.4	Examine four sources of drugs and provide examples.
0734.2.5	Determine the three forms in which drugs are prepared, choosing examples and the route of administration for each.

Agencies and Safety Guidelines

0734.3	Study and understand the importance of pharmaceutical agencies and safety guidelines.
0734.3.1	Demonstrate knowledge of the legal and ethical implications of medication administration.
0734.3.2	Determine the role of the FDA.
0734.3.3	Examine the drug approval process.
0734.3.4	Relate the function of the Drug Enforcement Agency and the purpose of the Controlled Substance Act.
0734.3.5	Determine the meaning of a controlled substance.
0734.3.6	Recognize five schedules of controlled substances providing examples of each.
0734.3.7	Select the proper method for storing and dispensing a controlled substance.
0734.3.8	Implement documentation associated with controlled substances.
0734.3.9	Examine legal considerations associated with controlled substances and prescription pads.
0734.3.10	Identify professions that can legally prescribe medication.

Medication Orders and Prescriptions

0734.4	Master the intricacies of medication orders, pharmacology terminology, prescription differentiation, abbreviations, controlled substance guidelines, and prescription order procedures.
0734.4.1	Understand how to interpret and document medication orders including the parts of a prescription.
0734.4.2	Determine the meaning of common pharmacology terms.
0734.4.3	Differentiate the information found on a prescription form.
0734.4.4	Utilize prescription abbreviations.
0734.4.5	Interpret medication orders.
0734.4.6	Examine the prescription guidelines for controlled substances.
0734.4.7	Demonstrate the proper procedure for phoning in prescription orders.

Drug Classifications and Actions

0734.5	Develop a comprehensive understanding of drug classifications and actions.
0734.5.1	Analyze drug classification systems to understand their organizational principles and regulatory implications.
0734.5.2	Utilize reference materials to accurately categorize drugs based on their pharmacological properties and medical uses.
0734.5.3	Explain how specific classifications of drugs exert their therapeutic effects in treating various medical conditions.
0734.5.4	Compare therapeutic action and side effects of specific drugs.
0734.5.5	Determine common contraindications.
0734.5.6	Examine precautions and adverse reactions of specific drugs.
0734.5.7	Select the classification, action, and side effects of over the counter (OTC) drugs.
0734.5.8	Assess alternative medications and their action.
0734.5.9	Evaluate drug interactions and their consequences.
0734.5.10	Examine how drugs are classified.

Mathematical Applications in Pharmacology

0734.6	Develop a thorough understanding of mathematical computations essential for dosage calculations in pharmacology.
0734.6.1	Understand mathematical computations related to dosage calculations.
0734.6.2	Demonstrate conversion equations used in pharmacology.
0734.6.3	Compare the systems of measurement commonly used in pharmacology.
0734.6.4	Differentiate metric, household, and apothecary units of measure.
0734.6.5	Use metric, household, and apothecary abbreviations.
0734.6.6	Utilize the fundamental units of the metric system.
0734.6.7	Convert quantities between the systems of measure.
0734.6.8	Demonstrate the ability to use decimals, fractions, ratios, and proportions.
0734.6.9	Demonstrate the ability to solve for x.

Dosage Calculations

0734.7	Develop proficiency in mathematical computations pertinent to dosage calculations.
0734.7.1	Select steps in the calculation of drug doses.
0734.7.2	Interpret medication labels.
0734.7.3	Compare medication label information to medication order.

0734.7.4	Convert to the same units of measure.
0734.7.5	Articulate the proportion method and the formula method for calculating drug doses.
0734.7.6	Compute drug doses using the proportion method and the formula method.
0734.7.7	Utilize the methods for calculating pediatric drug doses.

Medication Classification in Actions

0734.8	Explore classifications of drugs.
0734.8.1	Describe medication classifications and actions based on desired body system affected.
0734.8.2	Explore factors that affect drug action.
0734.8.3	Describe undesirable actions of drugs.
0734.8.4	Describe how drugs are classified.
0734.8.5	Classify drugs using reference books.
0734.8.6	Relate therapeutic action of specific classifications of drugs.
0734.8.7	Compare therapeutic action and side effects of specific drugs.
0734.8.8	Determine common contraindications.
0734.8.9	Examine precautions and adverse reactions of specific drugs.
0734.8.10	Select the classification, action, and side effects of over the counter (OTC) drugs.
0734.8.11	Assess alternative medications and their action.
0734.8.12	Evaluate drug interactions and their consequences.
0734.9	Explore examples of classifications of drugs.
0734.9.1	Explore examples of classifications for neurological medication CNS drugs: · sedative hypnotics · skeletal muscle relaxants · anticonvulsants · narcotic analgesics · antipsychotics · antidepressants · antianxiety agents · CNS stimulants · anti-Parkinson's agents · sympathomimetic agents · sympatholytic agents · parasympathomimetic agents · parasympatholytic agents · neuromuscular blocking agents
0734.9.2	Explore examples of classification for hormone medications: · estrogens progestins · corticosteroids · insulin · oral hypoglycemics · oxytocics · thyroid hormones · anti-thyroid hormones
0734.9.3	Explore examples of cardiovascular medications: · antiarrhythmics

	· antianginals · vasodilators · calcium channel blockers · angiotensin-converting enzyme (ACE) inhibitors · angiotensin II inhibitors · beta-adrenergic blockers · alpha-adrenergic blockers · antilipidemic agents antiarrhythmics
0734.9.4	Explore examples of renal system medications: · thiazides · loop · potassium sparing · combination · osmotics
0734.9.5	Explore Examples of bacteriostatic and bactericidal medications: · antibacterial · urinary anti-infectives · antibiotics · penicillins · cephalosporins · quinolones · macrolides · Tetracyclines · aminoglycosides · antifungals · antiparasitic agents · anthelmintics · amebicides · antitubercular agents · antiviral agents
0734.9.6	Explore examples of chemotherapy medications · antimetabolites · alkylating agents · hormones · vinca alkaloids · asparaginase · antibiotics
0734.9.7	Explore examples of medication used for blood disorders:

	· anticoagulants · hemostatics · antithrombotics · thrombolytics · hemorrhheologic agents · antianemics
0734.9.8	Explain characteristics of vitamins and minerals.

Within this course, instructional content will focus on advanced pharmacology. Course content will include the uses, sources, forms, and delivery routes of drugs. Knowledge will be gained in the area of drug classifications and actions, along with legal implications regarding controlled substances and other medications.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Medical Terminology

0736.1	Medical Terminology
0736.1.1	Interpret commonly used health insurance terms.
0736.1.2	Interpret commonly used abbreviations.
0736.1.3	Use standard medical terms and abbreviations to interpret and submit medical insurance claims.

Medical Insurance Claims

0736.2	Medical Insurance Claims
0736.2.1	Understand basic coding used to complete and submit medical insurance claims.
0736.2.2	Examine the evolution of medical insurance.
0736.2.3	Determine the significance of diagnosis-related groups.
0736.2.4	Recognize the origin and function of coding.
0736.2.5	Differentiate the types of codes used in health care.
0736.2.6	Analyze the documentation tools used in the coding process.
0736.2.7	Utilize the proper technique for determining the physician's diagnosis.

ICD-10-CM Coding

0736.3	ICD-10-CM Coding
0736.3.1	Examine the ICD-10-CM code book format.
0736.3.2	Use correct symbols, punctuation, and abbreviations in the ICD-10-CM code book.
0736.3.3	Utilize the steps for accurate coding from the ICD-10-CM code book.
0736.3.4	Implement the CMS guidelines for ICD-10-CM coding.
0736.3.5	Determine the purpose for V codes and E codes.
0736.3.6	Use the Drug and Chemical Tables found in the ICD-10-CM code book.
0736.3.7	Demonstrate the procedure for coding special complexities.
0736.3.8	Demonstrate the technique for determining when procedures and services can be coded.
0736.3.9	Examine the CPT-4 code book format.
0736.3.10	Use the CPT-4 code book signs and symbols.
0736.3.11	Determine the use of modifiers to CPT-4 codes.
0736.3.12	Compare starred, global, and unlisted CPT-4 codes.

CPT-4 Coding

0736.4	CPT-4 Coding
0736.4.1	Demonstrate the technique for determining when procedures and services can be coded.
0736.4.2	Examine the CPT-4 code book format.

0736.4.3	Use the CPT-4 code book signs and symbols.
0736.4.4	Determine the use of modifiers to CPT-4 codes.
0736.4.5	Compare starred, global, and unlisted CPT-4 codes.

CPT-4 Sections

0736.5	CPT-4 Sections
0736.5.1	Utilize the concepts of evaluation and management coding.
0736.5.2	Apply the principle elements of anesthesia coding.
0736.5.3	Implement the surgery coding guidelines.
0736.5.4	Examine coding rules for pathology services.
0736.5.5	Select the coding guidelines for medicine services.
0736.5.6	Articulate the rules and application of modifiers to the coding process.
0736.5.7	Code a sample claim for

Reimbursement and Auditing

0736.6	Reimbursement and Auditing
0736.6.1	Distinguish reimbursement methods.
0736.6.2	Articulate the purpose of third-party contracts.
0736.6.3	Demonstrate components for reimbursement calculations.
0736.6.4	Complete a claim form.
0736.6.5	Examine internal and external obstacles to accurate and timely reimbursement.
0736.6.6	Determine the purpose of audits.

Instructional content will focus on an introduction to the medical laboratory, safety, principles of disease transmission and prevention, as well as medical and surgical asepsis. Students will obtain the knowledge and skills necessary to assist and/or perform basic laboratory and diagnostic procedures. With participation and input of therapeutic services professionals, instructional content will incorporate project and problem-based therapeutic practices and procedures to demonstrate the criticality of these skills.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Client/Patient Interaction

0737.1	Demonstrate communication skills used by medical assistants.
0737.1.1	Organize and express ideas in a concise, precise, and logical manner.
0737.1.2	Use medical terminology as appropriate for a medical assistant.
0737.1.3	Choose jargon-free language appropriate to the situation.
0737.1.4	Perform effective communication skills essential to the medical office.
0737.1.5	Demonstrate accepted professional, communication, and interpersonal skills.
0737.2	Identify and respond to client/patient health care needs, strengths, and problems.
0737.2.1	Instruct client/patient regarding health care and wellness practices.
0737.2.2	Explain procedures to client/patient.
0737.2.3	Evaluate patient's/client's ability to understand given information.
0737.2.4	Demonstrate empathy for client/patient.
0737.2.5	Adjust communication to the needs of the client/patient.

Intra Team Communication

0737.3	Understand the role of the medical assistant and other health care team members.
0737.3.1	Describe the role of the medical assistant.
0737.3.2	Distinguish appropriate roles and responsibilities of each team member.
0737.3.3	Respect and value the expertise and contributions of all team members.
0737.4	Determine and evaluate the relevancy of information to be conveyed.
0737.4.1	Organize and express ideas in a concise, precise, and logical manner.
0737.4.2	Use medical terminology as appropriate for a medical assistant.
0737.4.3	Formulate and report information clearly and concisely.
0737.5	Explore techniques and methods to communicate client/patient information with the team.
0737.5.1	Follow approved procedure for completing a laboratory requisition form.
0737.5.2	Demonstrate the proper/approved procedure for labeling of specimens.
0737.5.3	Recognize a properly completed requisition and apply established protocol for client/patient and specimen identification.

Safety, Ethics, and Legal Issues

0737.6	Comprehend legal and ethical responsibilities of medical assistants.
0737.6.1	Distinguish between the liability of the physician and staff members in the medical office.

0737.6.2	Explain the principles for preventing medical liability.
0737.6.3	List the principles in the Code of Ethics for medical assistants, as stated by the American Association of Medical Assistants.
0737.7	Identify and apply infection control policies and Universal precautions.
0737.7.1	Apply skills to obtain training and/or certification in Bloodborne Pathogens – Preventing Disease Transmission (American Red Cross).
0737.7.2	Identify and apply personal safety precautions as established by the Occupational Safety and Health Administration (OSHA).
0737.7.3	Demonstrate the correct procedure for donning and removal of Personal Protective Equipment and use of engineering controls.
0737.8	Understand fundamentals of microbial control and use of aseptic techniques.
0737.8.1	Define the term "nosocomial infection."
0737.8.2	Describe/practice procedures for infection prevention.
0737.8.3	Discuss/perform isolation procedures.
0737.8.4	Identify potential routes of infection.
0737.8.5	Identify forms of fomites.
0737.8.6	Demonstrate competence in sanitation, disinfection, and sterilization.
0737.8.7	Sanitize instruments.
0737.8.8	Sterilize and maintain instruments and supplies.
0737.8.9	Chemically disinfect articles.
0737.8.10	Wrap articles for autoclave.
0737.8.11	Sterilize articles in autoclave.
0737.8.12	Practice infection control and contamination prevention.
0737.8.13	Safely handle contaminated equipment and supplies.
0737.8.14	Create and maintain sterile fields for dressings and minor surgery.
0737.8.15	Prepare for minor surgical procedures including surgical hand wash.
0737.8.16	Remove sutures.
0737.8.17	Correctly dispose of contaminated materials.
0737.9	Learn emergency preparedness and protective practices.
0737.9.1	Maintain and operate emergency equipment and supplies.
0737.9.2	Comply with safety signs, symbols, and labels.
0737.9.3	Evaluate the work environment to identify safe versus unsafe working conditions.
0737.9.4	Develop a personal (client/patient and employee) safety plan.
0737.9.5	Develop an environmental safety plan.
0737.9.6	Participate in a mock environmental exposure event and document steps taken.
0737.9.7	Explain an evacuation plan for a physician's office.
0737.9.8	Maintain a current list of community resources for emergency preparedness.

Technical Skills

0737.10	Perform technical skills in phlebotomy.
0737.10.1	Perform venipuncture and capillary puncture procedures for blood collection.
0737.10.2	Ensure patient comfort and safety during blood collection.
0737.10.3	Follow proper labeling and handling procedures for blood specimens.
0737.11	Perform technical skills in electrocardiography.
0737.11.1	Operate electrocardiogram machines proficiently, including proper setup and calibration.
0737.11.2	Understand the functions of ECG electrodes, leads, and cables.

0737.11.3	Prepare patients for ECG procedures, including explaining the process and ensuring patient comfort.
0737.11.4	Position patients correctly and securely attach ECG electrodes according to standard lead placements.
0737.11.5	Perform ECG recordings accurately, ensuring good electrode contact and artifact-free tracings.
0737.11.6	Verify the quality of ECG signals and troubleshoot technical issues as needed.
0737.11.7	Assist healthcare providers in interpreting ECG tracings accurately.
0737.11.8	Identify and report abnormalities or artifacts in ECG readings promptly.
0737.11.9	Recognize normal sinus rhythm and common arrhythmias and conduction abnormalities.
0737.11.10	Document ECG findings accurately in patient records, including date, time, lead configuration, and interpretation.
0737.11.12	Ensure proper labeling and organization of ECG tracings for easy retrieval and reference.
0737.11.13	Troubleshoot technical issues with ECG equipment and electrodes to ensure optimal performance.
0737.11.14	Perform routine maintenance tasks such as cleaning and calibration of ECG machines.
0737.11.15	Educate patients about the purpose of ECG testing and provide reassurance during the procedure.
0737.11.16	Adhere to regulatory standards and institutional policies governing ECG procedures and documentation.
0737.12	Demonstrate knowledge of basic clerical/medical office duties.
0737.12.1	Schedule patient appointments and maintain appointment calendars.
0737.12.2	Greet patients, obtain medical histories, and verify insurance information.
0737.12.3	Process medical billing and insurance claims accurately.
0737.12.4	Follow approved procedure for completing a laboratory requisition form.
0737.12.5	Describe role of medical assistant in assisting with intravenous therapy.
0737.12.6	Outline principles of intravenous therapy.
0737.12.7	Demonstrate knowledge of intravenous terminology and practices.
0737.12.8	Describe dangers of intravenous treatment.
0737.12.9	Demonstrate knowledge of intravenous equipment
0737.13	Demonstrate knowledge of quality assurance and safety.
0737.13.1	Implement appropriate Joint Commission client/patient safety goals.
0737.13.2	Define and utilize correct medical terminology and metric measurement needed for specimen collection.
0737.13.3	Participate in quality assurance activities, including periodic review of policies and standards of practice.

Treatment Planning and Implementation

0737.14	Understand the general purpose and apply the components of a treatment plan.
0737.14.1	Plan procedures according to facility protocol and regulatory guidelines.
0737.14.2	Comprehend how identified procedures support the goals and objectives of the client's/patient's treatment plan.
0737.14.3	Know how to implement procedures within the MA scope of practice.
0737.14.4	Create a treatment plan using a problem-solving model and evaluate for intervention opportunities.
0737.14.5	Select appropriate resources to implement treatment plan.
0737.14.6	Evaluate priorities to organize work.
0737.14.7	Use equipment and instruments according to the manufacturer's guidelines and accepted safety practice.
0737.14.8	Document actions according to facility protocol and regulatory guidelines.

Monitoring Client/Patient Status

0737.15	Assess and monitor client/patient health status and report results to the treatment team.
0737.15.1	Describe the process for monitoring client/patient health status.

0737.15.2	Evaluate client/patient response to administered treatments and procedures.
0737.15.3	Analyze and report client/patient response.
0737.15.4	Assess need for follow-up and alternative care.

Client/Patient Status Evaluation

0737.16	Evaluate client/patient needs, strengths, and problems to determine if treatment goals are being reached.
0737.16.1	Choose appropriate evaluation tools to assess client/patient response to treatment plan.
0737.16.2	Analyze information gathered.
0737.16.3	Revise or create modifications to treatment plan based on information gathered.

Students will examine nutrition in relation to the maintenance and/or restoration of wellness. Topics include food composition, nutritional guidelines, therapeutic diets, eating disorders, menu planning and patient teaching.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Digestive System

0739.1	Digestive System
0739.1.1	Examine the structure and function of the digestive system.
0739.1.2	Distinguish the digestive and absorption processes.
0739.1.3	Relate the function of enzymes in digestion.
0739.1.4	Examine the roles of accessory organs in digestion.

Metabolism

0739.2	Metabolism
0739.2.1	Determine the process of metabolism and its role in the production of energy.
0739.2.2	Compare anabolism and catabolism.
0739.2.3	Interpret basal metabolic rate (BMR).
0739.2.4	Calculate BMR given the formula and client scenarios.
0739.2.5	Identify the factors that influence metabolic rate.

Basic Nutrition and Food Composition

0739.3	Basic Nutrition and Food Composition
0739.3.1	Examine nutrition including its relationship to physical well-being.
0739.3.2	Determine the essential nutrients including their function and source.
0739.3.3	Examine the basic chemical composition of fat, carbohydrates, and protein.
0739.3.4	Examine the function and storage of carbohydrates.
0739.3.5	Compare simple and complex carbohydrates.
0739.3.6	Examine the three categories of lipids including use and storage in the body.
0739.3.7	Compare saturated, monounsaturated, and polyunsaturated fats.
0739.3.8	Examine cholesterol, differentiating between cholesterol made by the body and dietary cholesterol.
0739.3.9	Evaluate the relationship between cholesterol and heart disease.
0739.3.10	Compare LDL and HDL, focusing on their relationship to the risk of heart disease.
0739.3.11	Determine how glucose is made available to the body.
0739.3.12	Define amino acids.
0739.3.13	Examine the function and storage of protein.
0739.3.14	Correlate the significance between essential amino acids and complete protein.
0739.3.15	Define calorie and compare the caloric values of carbohydrates, fat, and protein.
0739.3.16	Calculate individual minimum caloric requirement using the given formula.
0739.3.17	Determine the function and source of vitamins and minerals in the body.
0739.3.18	Distinguish between water-soluble and fat-soluble vitamins.
0739.3.19	Evaluate the vitamin and mineral content of various foods.

0739.3.20	Relate vitamin and mineral deficiencies to resulting diseases.

Nutrition Guidelines

0739.4	Nutrition Guidelines
0739.4.1	Examine the USDA's Food Guide and DASH Eating Plan.
0739.4.2	Interpret food intake recommendation tables and Dietary Reference Intakes (DRI) tables.
0739.4.3	Use food intake recommendation tables to create a balanced eating plan for selected client scenarios.
0739.4.4	Determine nutritional requirements throughout various stages of life.
0739.4.5	Relate the effects of culture and religion on nutrition.

Regular Diet

0739.5	Regular Diet
0739.5.1	Determine patient/client dietary requirements.
0739.5.2	Understand USDA's nutritional and caloric recommendations.
0739.5.3	Create a sample menu for a regular diet based on nutritional guidelines and caloric requirements.
0739.5.4	Calculate the caloric value of the sample menu.
0739.5.5	Calculate the nutritional value of the sample menu.
0739.5.6	Analyze the information on food labels.
0739.5.7	Use information on food labels to analyze meal plans.

Therapeutic Diets

0739.6	Therapeutic Diets
0739.6.1	Demonstrate knowledge of the relationship of therapeutic diets to the physiology and pathology of the body.
0739.6.2	Examine diet therapy.
0739.6.3	Demonstrate the similarities and differences in a therapeutic diet and a balanced eating plan.
0739.6.4	Determine common therapeutic diets and the rationale for their use.
0739.6.5	Differentiate between food allergies and food sensitivities.

Eating Disorders

0739.7	Eating Disorders
0739.7.1	Examine types of eating disorders and corresponding symptoms.
0739.7.2	Assess the factors that contribute to eating disorders.
0739.7.3	Compare the methods of treatment for eating disorders.
0739.7.4	Create a dietary plan for a patient with an eating disorder.

Patient/Client Teaching

0739.8	Patient/Client Teaching
0739.8.1	Examine the healthcare professional's role in patient teaching regarding nutrition.
0739.8.2	Determine a nutritional teaching plan based on USDA's dietary guidelines.
0739.8.3	Analyze the factors that influence patient compliance.
0739.8.4	Create a patient teaching plan for selected therapeutic diets.
0739.8.5	Develop the communication skills necessary for effective patient teaching.

This course introduces the dental assisting profession while preparing the student with foundational dental assisting knowledge and entry level skill. Students will obtain knowledge in communication, safety, legal and ethics, and teamwork skills to prepare for employment as dental assistants.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Introduction to the Dental Assisting Profession

0740.1	Identify career roles, functions, obligations, and limitations of a dental assistant.
0740.1.1	Research and understand the scope of practice of a dental assistant, including clinical and administrative duties.
0740.1.2	Research and recognize the obligations and limitations imposed on a dental assistant within the dental team.
0740.1.3	Demonstrate knowledge of professional conduct and behavior expected of a dental assistant in various workplace settings.
0740.1.4	Research and discuss levels of education, credentialing requirements and employment trends in dental science.
0740.2	Identify professional organizations within the dental community.
0740.2.1	Research and identify prominent professional organizations relevant to dental assisting.
0740.2.2	Research and explore the purpose, mission, and benefits of membership in these organizations.
0740.2.3	Research and understand how professional organizations contribute to career development and networking opportunities.
0740.3	Describe ethics and jurisprudence as they relate to the dental profession.
0740.3.1	Define ethical principles relevant to dental practice.
0740.3.2	Discuss legal regulations and standards governing dental assisting.
0740.3.3	Analyze ethical dilemmas commonly encountered in dental healthcare settings and strategies for resolution.
0740.4	Identify the roles of the dental healthcare team.
0740.4.1	Research, identify and describe the roles of various members of the dental healthcare team.
0740.4.2	Research and understand the importance of interdisciplinary collaboration in providing comprehensive client/patient care.
0740.4.3	Demonstrate effective communication and teamwork skills within the dental healthcare team.
0740.5	Identify the major dental specialties.
0740.5.1	Research, identify and differentiate major dental specialties, such as orthodontics, endodontics, and periodontics.
0740.6	Research and identify the basic components of the dental health care delivery system including public, private, government and non-profit.
0740.6.1	Explore the structure and functions of the dental health care delivery system, including public, private, government, and non-profit sectors.
0740.6.2	Understand the roles and interactions of different stakeholders within the dental healthcare system.
0740.7	Explain the cause and effects of factors that influence the current delivery system of dental healthcare.

0740.7.1	Identify socioeconomic, demographic, and legislative factors influencing the current delivery system of dental healthcare.
0740.7.2	Discuss the implications of access to care issues and disparities in oral health outcomes.
0740.7.3	Propose potential solutions for addressing challenges in dental healthcare delivery.
0740.8	Research and identify the roles and responsibilities of the consumer within the dental healthcare system.
0740.8.1	Explain the rights and responsibilities of client/patients within the dental healthcare system.
0740.8.2	Discuss strategies for promoting client/patient education and empowerment.
0740.8.3	Explore avenues for client/patient advocacy and engagement in improving dental healthcare services.
0740.9	Research and explain the impact of emerging issues including technology, epidemiology, bioethics, and socioeconomics on the dental healthcare delivery system.
0740.9.1	Analyze the impact of technological advancements on dental practice and client/patient care.
0740.9.2	Explore trends in epidemiology and their implications for oral health promotion and disease prevention.
0740.9.3	Discuss bioethical considerations arising from emerging issues in dental healthcare, such as genetic testing and informed consent.
0740.10	Research and discuss the history of dentistry.
0740.10.1	Trace the historical development of dentistry from ancient civilizations to modern times.
0740.10.2	Explore key milestones and figures in the evolution of dental science and practice.
0740.10.3	Understand the cultural, social, and technological influences shaping the history of dentistry.

Communication Skills and Business Office Procedures

0740.11	Maintain procedures for legal access to client/patient records according to HIPAA standards.
0740.11.1	Demonstrate comprehension of HIPAA regulations specific to dental practices and client/patient record management.
0740.11.2	Develop and apply protocols specific to dental offices to ensure compliance with HIPAA standards for accessing client/patient records.
0740.11.3	Identify and address potential risks related to unauthorized access to client/patient records, ensuring compliance and client/patient confidentiality.
0740.11.4	Implement appropriate measures to safeguard client/patient records, including digital and physical security protocols, as required by HIPAA.
0740.11.5	Maintain accurate documentation of client/patient record access and changes, adhering to HIPAA-mandated documentation standards.
0740.11.6	Uphold ethical principles in handling client/patient records, promoting respect for client/patient privacy and confidentiality within the dental assisting team.
0740.11.7	Regularly review and update procedures to align with changes in HIPAA regulations specific to dental practices, ensuring ongoing compliance.
0740.12	Demonstrate effective communication, observation, and documentation skills, utilizing proper dental terminology and adapting to diverse cultural contexts in dental settings.
0740.12.1	Apply basic speaking and active listening skills including reflection, restatement, and clarification techniques.
0740.12.2	Develop basic observational skills and related documentation strategies in written and oral form.
0740.12.3	Identify characteristics of successful and unsuccessful communication including communication styles and barriers.
0740.12.4	Compose written communication using correct spelling, grammar, formatting and confidentiality and specific formats of letter writing.
0740.12.5	Recognize components of medical and dental terminology and abbreviations.

0740.12.6	Recognize the importance of courtesy and respect for client/patients and other health care workers and maintain good interpersonal relationships.
0740.12.7	Adapt communication skills to varied levels of understanding and cultural orientation including diverse age, cultural, economic, ethnic, and religious groups.
0740.12.8	Identify psychological considerations influencing communication and behaviors.
0740.12.9	identify and define common dental terms.
0740.12.10	demonstrate the use of proper dental terminology in the dental environment.
0740.12.11	Apply basic speaking and active listening skills including reflection, restatement, and clarification techniques.
0740.12.12	Develop basic observational skills and related documentation strategies in written and oral form.

Infection Control and Hazard Management

0740.13	Interpret, maintain, and use SDS sheets
0740.13.1	Interpret SDS sheets accurately to identify hazards, safety precautions, and proper handling procedures for chemicals used in the dental office.
0740.13.2	Maintain an organized system for storing and updating SDS sheets to ensure accessibility and compliance with regulatory requirements.
0740.13.3	Utilize SDS sheets to inform staff members about the potential hazards associated with chemicals and to train them on appropriate safety measures.
0740.13.4	Implement measures based on information from SDS sheets to mitigate risks and ensure safe handling, storage, and disposal of hazardous materials.
0740.13.5	Regularly review and update SDS sheets as needed to reflect changes in chemical composition, safety guidelines, or regulatory requirements.
0740.13.6	Communicate information from SDS sheets effectively to dental team members to promote awareness and adherence to safety protocols.
0740.13.7	Document the use and maintenance of SDS sheets as part of the dental office's record-keeping process to demonstrate compliance with safety regulations during inspections or audits.

Legal and Ethical Responsibilities

0740.14	Demonstrate comprehension of legal obligations relevant to dental assisting and consistently adhere to them.
0740.14.1	Identify areas of West Virginia Board of Dentistry applicable to practice by the dental health workers.
0740.14.2	Explain practices that could result in malpractice, liability, negligence, abandonment, false imprisonment, and fraud.
0740.14.3	Demonstrate procedures for accurate documentation and record keeping.
0740.14.4	Interpret healthcare facility policy and procedures.
0740.14.5	Explain the client/patients' "Bill of Rights".
0740.14.6	Distinguish between express, implied, and informed consent.
0740.14.7	Explain the laws governing harassment, labor, and employment.
0740.15	Demonstrate comprehension of ethical principles relevant to dental assisting practice.
0740.15.1	Differentiate between legal and ethical issues in dentistry.
0740.15.2	Describe a Code of Ethics consistent with the dental assisting profession.

Anatomy and Physiology

0740.16	Demonstrate comprehension of human anatomy and physiology principles.
0740.16.1	Develop a basic understanding of the structure and function of the body systems.

0740.16.2	Identify common disorders related to each of the body systems.
0740.16.3	Explain basic concepts of positive self-image, wellness, and stress.
0740.16.4	Develop a wellness and stress control plan that can be used in personal and professional life.

Safety

0740.17	Proficiently maintain safety in dental assisting through regulatory compliance, error reduction, emergency preparedness, and proper hygiene practices while upholding essential certifications.
0740.17.1	Describe and adhere to personal and jobsite safety regulations ensuring a safe work environment in dental assisting.
0740.17.2	Identify and apply methods for reducing and preventing medical errors within the dental healthcare setting.
0740.17.3	Demonstrate understanding and implementation of personal safety procedures based on OSHA and CDC regulations, including standard precautions.
0740.17.4	Safely transport and transfer client/patients following established procedures.
0740.17.5	Explain fire safety protocols, disaster response, and evacuation procedures in the dental office.
0740.17.6	Describe emergency procedures for workplace accidents and respond accordingly.
0740.17.7	Demonstrate proper handwashing techniques and the use of personal protective equipment specific to dentistry.
0740.17.8	Recognize and appropriately respond to emergency situations as they arise in the dental setting.
0740.17.9	Take and accurately record vital signs of client/patients.
0740.17.10	Explain legal considerations regarding the administration of emergency care in dental assisting.
0740.17.11	Obtain and maintain certifications in CPR, AED, FBAO, and first aid.

Technology Skills

0740.18	Master computer basics, interpret electronic medical documents, and utilize technology for efficient dental office operations in dental assisting.
0740.18.1	Define key computer terms and demonstrate basic computer skills necessary for dental assisting.
0740.18.2	Interpret information from electronic medical documents commonly used in dental offices.

Employability Skills

0740.19	Demonstrate professionalism in dental assisting through desirable traits, adherence to standards, effective career planning, and development of an industry-relevant resume.
0740.19.1	Identify desirable personal traits and attitudes conducive to effective teamwork in the healthcare environment.
0740.19.2	Exhibit basic professional standards in hygiene, dress, language, confidentiality, and behavior relevant to dental healthcare workers, including telephone etiquette and self-introductions.
0740.19.3	Maintain a comprehensive career portfolio documenting knowledge, skills, and experiences relevant to dental assisting.
0740.19.4	Navigate a job search process and accurately complete job application forms for positions in dental assisting.
0740.19.5	Demonstrate proficiency in job interview techniques tailored to the field of dental assisting.
0740.19.6	Explore educational pathways, credentialing requirements, employment prospects, workplace dynamics, and opportunities for career advancement in dental assisting.
0740.19.7	Investigate licensing, certification, and industry credentialing requirements relevant to dental assisting.
0740.19.8	Develop and refine a professional resume tailored to the field of dental assisting.

Bloodborne Pathogens

0740.20	Effectively address diseases caused by bloodborne pathogens in dental assisting, including infection control techniques, resource identification, and legal considerations.
0740.20.1	Recognize emerging diseases and disorders relevant to dental assisting.
0740.20.1	Differentiate between factual information and myths regarding the transmission and treatment of diseases caused by bloodborne pathogens, including Hepatitis B.
0740.20.2	Identify "at-risk" behaviors contributing to the spread of bloodborne pathogen diseases and understand the importance of public education in disease prevention.
0740.20.3	Identify community resources and services available to individuals affected by diseases caused by bloodborne pathogens.
0740.20.4	Apply infection control techniques following CDC guidelines to prevent the spread of bloodborne pathogen diseases during client/patient care.
0740.20.5	Demonstrate understanding of the legal considerations surrounding AIDS, including testing protocols.

Teamwork

0740.21	Exhibit leadership, teamwork, conflict management, and problem-solving in dental assisting to achieve goals and maintain productivity.
0740.21.1	Utilize leadership and teamwork skills to achieve team objectives in dental assisting.
0740.21.2	Analyze the attributes and attitudes essential for effective leadership.
0740.21.3	Recognize factors and scenarios that may lead to conflicts within a team setting.
0740.21.4	Demonstrate effective strategies for managing conflicts within a dental assisting team.

The student within the Dental Assistant Clinical Practices course will focus on knowledge and skills required for the Dental Assistant to function within the areas of radiography and emergency medical care.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Imaging System

0742.1	Imaging System
0742.1.1	Examine imaging systems used for dental purposes.
0742.1.2	Articulate the advantages to the patient and staff when using imaging systems.
0742.1.3	Relate the differences between imaging systems, digital radiography, and radiography.

Radiation Safety

0742.2	Radiation Safety
0742.2.1	Research the principles of ionizing radiation.
0742.2.2	Illustrate the production of the roentgen ray.
0742.2.3	Relate the manufacturers' responsibilities in relationship to radiation safety.
0742.2.4	Examine the federal government safety specifications for all manufacturers of dental x-ray units.
0742.2.5	Examine the responsibilities of the dentist, assistant, and patient in radiation safety.

Dental Radiographic Film

0742.3	Dental Radiographic Film
0742.3.1	Relate the composition of dental radiographic film.
0742.3.2	Contrast radiographic film speed.
0742.3.3	Determine the proper film size for radiographs.
0742.3.4	Examine the internal and external parts of radiographic film packets.
0742.3.5	Differentiate between intraoral and extraoral radiographs.
0742.3.6	Articulate proper storage for radiographic film.

Producing Quality Radiographics

0742.4	Producing Quality Radiographics
0742.4.1	Determine safety procedures before, during and after a patient is exposed to radiation.
0742.4.2	Relate infection control procedures and protocols for placing, exposing, and developing radiographs.
0742.4.3	Compare bisecting and paralleling technique.
0742.4.4	Research radiographic exposures commonly used in dentistry.
0742.4.5	Relate common radiographic errors.
0742.4.6	Assemble XCP (X-Tension Cone Paralleling) instrument for a periapical and bitewing radiograph.
0742.4.7	Assess a mock radiographic exposure on a mock patient.

Processing Quality Radiographics

0742.5	Processing Quality Radiographics
0742.5.1	Demonstrate proper darkroom procedures and room requirements.

0742.5.2	Compare manual and automatic processes.
0742.5.3	Relate the composition of processing solutions (Fixer and Developer).
0742.5.4	Determine processing errors and methods of correction.

Evaluation of Radiographs

0742.6	Evaluation of Radiographs
0742.6.1	Choose facial landmarks associated with roentgenology to the correct definitions.
0742.6.2	Recognize the film requirements for a full mouth series of radiographs for adults and children.
0742.6.3	Mount and file radiographs.
0742.6.4	Examine characteristics, uses and indications for oral radiographs.

Emergency Medical Care

0742.7	Emergency Medical Care
0742.7.1	Recognize common medical emergencies including the symptoms and treatment protocol for each.
0742.7.2	Determine the role of the assistant in the administration of oxygen.
0742.7.3	Secure certification for adult, child and infant CPR and Foreign Body Airway Obstruction (FBAO) from the American Red Cross or American Heart Association.
0742.7.4	Relate the importance of periodic checks of expiration dates and updating medications in the emergency kit.

Vital Signs

0742.8	Vital Signs
0742.8.1	Relate the importance of reviewing the patient's medical history and performing the physical assessment before dental treatment begins.
0742.8.2	Distinguish between characteristics of vital signs.
0742.8.3	Determine the instruments used to measure vital signs.
0742.8.4	Measure and record vital signs, reporting abnormal measurements.

The student completing this course will be able to use knowledge from previously required courses to perform and practice all aspects of Dental Laboratory Assisting in a clinical setting. Students will obtain the knowledge and skills necessary to assist and/or perform basic laboratory and diagnostic procedures. With participation and input of dental services professionals, instructional content will incorporate project and problem-based dental assisting practices and procedures to demonstrate the criticality of these skills.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Communication Skills and Business Office Procedures

0743.1	Process and maintain inventory control systems.
0743.1.1	Demonstrate proficiency in inventory management software or systems commonly used in dental practices.
0743.1.2	Execute procedures for tracking and documenting inventory levels of dental supplies and equipment.
0743.1.3	Implement protocols for ordering, receiving, and storing dental materials and instruments.
0743.1.4	Conduct regular inventory audits to ensure accuracy and identify any discrepancies.
0743.1.5	Collaborate with team members to develop efficient inventory control strategies and streamline workflow processes.
0743.1.6	Adhere to safety and regulatory guidelines when handling and storing dental supplies and equipment.
0743.1.7	Communicate effectively with suppliers and vendors to maintain adequate inventory levels and facilitate timely replenishment of stock.
0743.1.8	Troubleshoot inventory-related issues and implement corrective actions as needed to optimize inventory control systems.

Clinical Procedures

0743.2	Take alginate impressions.
0743.2.1	Properly prepare the client/patient for impression taking.
0743.2.2	Ensure correct mixing of alginate material.
0743.2.3	Position and manipulate the tray to achieve accurate impressions of dental arches.
0743.2.4	Remove the impression without distortion or discomfort to the client/patient.
0743.3	Pour impressions; trim and articulate cast models.
0743.3.1	Pour dental stone into the impression to create a cast model.
0743.3.2	Trim excess material from the cast model to achieve proper shape and size.
0743.3.3	Articulate the cast models to simulate the client's/patient's occlusal relationship accurately.
0743.4	Prepare and assist with armamentarium relating to composite resin and amalgam restorations.
0743.4.1	Organize and set up instruments and materials required for composite resin and amalgam restorations.
0743.4.2	Assist the dentist during procedures by passing instruments and materials promptly.
0743.4.3	Maintain a clean and organized work area throughout the restoration process.
0743.5	Prepare various temporary and permanent dental materials.
0743.5.1	Follow proper procedures for preparing temporary and permanent dental materials, such as cement and bonding agents.
0743.5.2	Ensure accurate mixing and handling of materials to achieve desired consistency and properties.

0743.5.3	Store prepared materials appropriately to maintain their integrity until use.
0743.6	Fabricate provisional coverage for crown and bridge (C&B) prosthetics
0743.6.1	Select suitable materials for fabricating provisional coverage based on the client's/patient's needs and treatment plan.
0743.6.2	Shape and contour the provisional coverage to fit the prepared tooth or teeth accurately.
0743.6.3	Ensure proper occlusal alignment and client/patient comfort before finalizing the provisional restoration.
0743.7	Prepare and mix various elastomeric impression materials or fixed and removable prosthetics.
0743.7.1	Follow manufacturer instructions for preparing and mixing elastomeric impression materials accurately.
0743.7.2	Handle fixed and removable prosthetic materials with care to avoid contamination or improper handling.
0743.7.3	Ensure proper consistency and working time of impression materials to achieve accurate impressions.

Radiological and Digital Imaging Procedures

0743.8	Mount and label dental intraoral and extraoral radiographs.
0743.8.1	Properly mount and label intraoral and extraoral radiographs for accurate interpretation and documentation.
0743.9	Practice client/patient and operator safety measures for radiation.
0743.9.1	Implement safety protocols to minimize radiation exposure for both clients/patients and operators during radiographic procedures.
0743.10	Demonstrate infection control protocol specific to radiologic procedures.
0743.10.1	Follow infection control guidelines specific to radiographic procedures to prevent cross-contamination and ensure client/patient safety.
0743.11	Maintain quality assurance specific to radiologic procedures, solutions, film, and equipment.
0743.11.1	Conduct regular quality assurance checks on solutions, film, and equipment to maintain the accuracy and reliability of radiographic images.
0743.12	Demonstrate appropriate techniques for film and/or digital imagery placement and exposure.
0743.12.1	Demonstrate proper techniques for positioning and exposing dental film or digital sensors to capture diagnostic-quality images.
0743.13	Expose diagnostic quality intraoral radiograph using parallel or bisecting techniques.
0743.13.1	Expose intraoral radiographs using parallel or bisecting angle techniques to achieve diagnostic-quality images.
0743.14	Identify, select, and assemble radiographic equipment used in extraoral and intraoral procedures.
0743.14.1	Identify and assemble the necessary equipment for both intraoral and extraoral radiographic procedures.
0743.15	Differentiate between the normal and abnormal appearance of tooth structure and supporting structures.
0743.15.1	Differentiate between normal and abnormal appearances of tooth structures and supporting tissues on radiographs.
0743.16	Identify and troubleshoot exposure and processing errors.
0743.16.1	Recognize exposure and processing errors in radiographs and troubleshoot to ensure image quality and accuracy.

Technical Skills

0743.17	Demonstrate knowledge of properties, uses and manipulation of dental materials.
0743.17.1	Identify properties/uses and manipulate gypsum.
0743.17.2	Identify properties/uses and manipulate restorative materials.
0743.17.3	Identify properties/uses and manipulate dental cements.

0743.17.4	Identify properties/uses and manipulate impression materials.
0743.17.5	Identify properties/uses and manipulate acrylics and/or thermoplastics.
0743.17.6	Identify properties/uses and manipulate waxes.
0743.17.7	Perform dental laboratory procedures to include assisting with and/or placing/removing rubber dam, preliminary impressions, study casts and occlusal registrations.
0743.17.8	Perform dental laboratory procedures to include the fabrication of casts, custom trays and/or temporary crowns and bridges.
0743.17.9	Clean and polish removable dental appliances.
0743.17.10	Identify properties and uses of abrasive agents used to polish coronal surfaces and appliances.
0743.17.11	Identify properties/uses and manipulate gypsum.
0743.18	Demonstrate safety in the dental setting.
0743.18.1	Identify and manage hazardous dental materials and wastes in accordance with the OSHA Hazard Communications and Environmental Protection Agency regulations.
0743.18.2	Describe history, physics, and biological effects of ionizing radiation.
0743.18.3	Identify parts of the X-ray machine including accessories.
0743.18.4	Describe the proper disposal of hazardous radiographic waste.
0743.19	Perform dental and carpal radiographic procedures.
0743.19.1	Place and expose dental radiographic films and digital sensors.
0743.19.2	Perform carpal radiography as required for dental diagnostic procedures.
0743.19.3	Identify radiographic anatomical landmarks and pathologies.
0743.20	Perform general dental business office procedures.
0743.20.1	Apply principles of four handed dentistry.
0743.20.2	Evacuate and maintain the operating field.
0743.20.3	Perform expanded functions as permitted by the West Virginia statute/law pertaining to dentistry.
0743.20.4	Choose appropriate evaluation tools to assess dental client/patient response to treatment plan.
0743.21	Collect diagnostic data.
0743.21.1	Assemble instruments and assist in general and specialty dental procedures.
0743.21.2	Prepare tray set-ups for specific specialty procedures.
0743.21.3	Select, prepare, mix, and manipulate correct dental materials for general and specialty procedures.
0743.21.4	Assist with and/or perform extra/intra oral examinations.
0743.21.5	Perform a visual assessment of existing oral conditions.
0743.21.6	Demonstrate appropriate client/patient management skills.

Treatment Planning and Implementation Practices

0743.22	Demonstrate knowledge of collaborative planning, procedure alignment with treatment goals, and clinical support.
0743.22.1	Interpret a treatment plan using a problem-solving model and evaluate for intervention opportunities.
0743.22.2	Select appropriate resources to implement treatment plan.
0743.22.3	Evaluate priorities to organize work.
0743.22.4	Implement procedures within their scope of practice.
0743.22.5	Document actions according to facility protocol and regulatory guidelines.

Monitoring Client/Patient Status

0743.23	Monitor dental health, report response, and assess for need to follow up.
0743.23.1	Evaluate client/patient and client/patient response to administered treatments and procedures
0743.23.2	Analyze and report client/patient and other client response

0743.23.3	Assess need for follow up and alternative care

Client/Patient Status Evaluation

0743.24	Evaluate client's/patient's needs, strengths, and problems.
0743.24.1	Analyze information gathered regarding client/patient needs, strengths, and problems

Clinical Application

0743.25	Prior to clinical assignment, demonstrate minimum competence in performing procedures in a laboratory setting.
0743.25.1	Understand and practice basic laboratory techniques and procedures.
0743.25.2	Master essential skills necessary for safe and effective performance in a laboratory setting.
0743.25.3	Demonstrate proficiency in handling laboratory equipment and materials.
0743.25.4	Ensure adherence to safety protocols and guidelines.
0743.26	Perform skills listed and obtained through mastery of theory content.
0743.26.1	Apply theoretical knowledge to practical skills in a clinical setting.
0743.26.2	Integrate classroom learning with hands-on experience to achieve mastery.
0743.26.3	Ensure alignment between theoretical understanding and practical application.
0743.26.4	Demonstrate proficiency in performing clinical procedures based on theoretical principles.
0743.27	Perfect individual competency in performing dental assisting functions.
0743.27.1	Demonstrate proficiency in performing a wide range of dental assisting functions.
0743.27.2	Execute dental assisting tasks with accuracy, precision, and attention to detail.
0743.27.3	Adapt to changes in dental procedures, technologies, and practices to maintain competency in the field.
0743.28	Assist with and participate in client/patient care.
0743.28.1	Engage actively in client/patient care under supervision.
0743.28.2	Assist with procedures and treatments to support client/patient well-being.
0743.28.3	Demonstrate empathy, professionalism, and respect in client/patient interactions.
0743.28.4	Collaborate effectively with the dental team to provide comprehensive care.
0743.29	Assist a dentist.
0743.29.1	Support dentists during clinical procedures by aiding and instrumentation.
0743.29.2	Anticipate the needs of the dentist and ensure a smooth workflow.
0743.29.3	Follow instructions accurately and efficiently to facilitate client/patient care.
0743.29.4	Maintain clear communication with the dentist and other team members.

The student in the Dental Assisting Clinical Mentoring course will participate in a school and community partnership that allows students to participate in practical “hands-on” training under the supervision of a career related professional. The partnership will take place in a clinical facility, whose staff shares insight, knowledge, and skills instruction. In addition to the clinical externship, instructional content will focus on employability skills necessary for job seeking and keeping.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Clinical Internship

0745.1	Clinical Internship
0745.1.1	Demonstrate knowledge of the internship eligibility requirements.
0745.1.2	Comply with the required facility health regulations.
0745.1.3	Provide proof of personal health insurance.
0745.1.4	Wear proper clinical attire.
0745.1.5	Report to clinical site on time prepared to work.
0745.1.6	Adhere to attendance requirements.
0745.1.7	Notify clinical site and instructor when absent.
0745.1.8	Correctly and safely perform entry-level procedures under the supervision of an instructor or clinical preceptor.
0745.1.9	Request assistance or clarification as needed.
0745.1.10	Adhere to the chain of command/lines of authority in the work setting.
0745.1.11	Demonstrate the characteristics needed for advancement.
0745.1.12	Establish the importance of participating in continuing education programs.
0745.1.13	Organize and effectively manage time.
0745.1.14	Complete documentation required of clinical internship accurately.
0745.1.15	Participate in clinical internship evaluation process.
0745.1.16	Utilize healthcare facility resources.
0745.1.17	Meet entry-level requirements for certification or registration (where available) for the specialized occupational area.

Legal Responsibility

0745.2	Legal Responsibility
0745.2.1	Apply procedures for accurate documentation and record keeping.
0745.2.2	Implement established procedures based on risk management criteria.
0745.2.3	Comply with non-discriminatory laws.
0745.2.4	Recognize and comply with healthcare facilities policies and procedures.
0745.2.5	Perform duties according to regulations, policies, and procedures.
0745.2.6	Maintain clients’ rights according to the Patients’/Residents’ Bill of Rights.
0745.2.7	Maintain confidentiality.
0745.2.8	Practice within licensure, certification, registration, and legislated scope of practice.
0745.2.9	Apply the doctrine of informed consent.
0745.2.10	Follow mandated standards for workplace safety.

0745.2.11	Implement mandated standards for harassment, labor, and employment laws.
0745.2.12	Interpret technological threats to confidentiality.

Ethics

0745.3	Ethics
0745.3.1	Demonstrate professionalism when interacting with peers, instructors, patients/residents, facility, and staff.
0745.3.2	Respect interdisciplinary roles of team members.
0745.3.3	Apply procedures for reporting activities and behavior that affect the health, safety, and welfare of others.
0745.3.4	Recognize accepted ethical practices with respect to cultural, social, and ethnic differences within the health care environment.

This course introduces dental laboratory techniques and procedures while preparing the student for entry-level employment as a dental laboratory assistant. Students will obtain the knowledge and skills necessary to assist and/or perform basic laboratory and diagnostic procedures. With participation and input of therapeutic services professionals, instructional content will incorporate project and problem-based therapeutic practices and procedures to demonstrate the criticality of these skills.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Communication Skills and Business Office Procedures

0746.1	Communicate with clients/patients, dental team members, other health professionals, and the public.
0746.1.1	Effectively communicate with clients/patients to obtain medical histories, explain treatment plans, and address concerns or questions.
0746.1.2	Collaborate with dental team members to coordinate client/patient care, share information, and ensure smooth workflow.
0746.1.3	Interact with other healthcare professionals to discuss client/patient referrals, coordinate treatment plans, and provide updates on client/patient progress.
0746.1.4	Engage with the public through educational programs, community outreach events, and social media platforms to promote oral health awareness and preventive care.
0746.2	Obtain, update, and file current documentation of client/patient record, status, and treatment.
0746.2.1	Understand the importance of accurate and up-to-date client/patient records in providing quality dental care.
0746.2.2	Obtain comprehensive client/patient information, including medical history, dental history, and treatment preferences.
0746.2.3	Update client/patient records with relevant clinical findings, treatment plans, and progress notes during each visit.
0746.2.4	File and organize client/patient records securely to maintain confidentiality and comply with regulatory requirements.
0746.3	Schedule and maintain appointment book, using computer and manual appointment systems.
0746.3.1	Utilize computerized and manual appointment systems to schedule and manage client/patient appointments effectively.
0746.3.2	Coordinate appointment times based on client/patient availability, treatment needs, and practitioner schedules.
0746.3.3	Confirm appointments with clients/patients via phone, email, or text message to reduce no-show rates and optimize clinic efficiency.
0746.3.4	Maintain an organized appointment book, ensuring accurate documentation of scheduled appointments and any changes or cancellations.

Clinical Procedures

0746.4	Chart oral condition as dictated by the dentist
0746.4.1	Understand the importance of accurate charting in documenting oral health status and treatment plans.
0746.4.2	Learn how to use dental charting software or manual charting methods to record dental findings, including caries, periodontal measurements, and existing restorations.

0746.4.3	Recognize common dental charting symbols and abbreviations used to represent dental conditions and treatments.
0746.4.4	Follow the dentist's dictation carefully to accurately document oral conditions and treatment recommendations in client/patient charts.
0746.5	Prepare and assist with administration of local and topical anesthesia.
0746.5.1	Understand the pharmacology and mechanism of action of local anesthetics used in dentistry.
0746.5.2	Learn proper techniques for preparing local anesthetic solutions and administering them safely and effectively.
0746.5.3	Assist the dentist during local anesthesia administration by preparing the injection site, assisting with equipment setup, and providing client/patient support.
0746.5.4	Understand the indications, contraindications, and potential complications associated with local anesthesia administration.
0746.5.5	Be familiar with topical anesthetics and their applications in providing pain relief during dental procedures, including their preparation and administration procedures.

Dental Sciences

0746.6	Describe the body systems of general human anatomy.
0746.6.1	Understand the organization and functions of major body systems, including the cardiovascular, respiratory, digestive, nervous, muscular, skeletal, and endocrine systems.
0746.6.2	Recognize the interdependence and interactions between different body systems to maintain homeostasis and support overall health and function.
0746.7	Describe head and neck anatomy (e.g., muscles, cranial nerves, facial and cranial bones).
0746.7.1	Describe the muscles, cranial nerves, facial bones, and cranial bones that comprise the head and neck region.
0746.7.2	Identify the structures and landmarks of the head and neck anatomy, including their functions and relationships to neighboring structures including muscles, sinuses, salivary glands, and blood vessels.
0746.7.3	Understand the innervation patterns of cranial nerves and their importance in controlling facial expressions, sensation, and motor functions.
0746.7.4	describe common pathologies of dental and general head and neck anatomy.
0746.7.5	identify embryonic development of head, oral cavity, and teeth.
0746.8	Name and identify the location of teeth and their surfaces.
0746.8.1	Name and locate the different types of teeth in the oral cavity, including incisors, canines, premolars, and molars, in both the permanent and primary dentitions.
0746.8.2	Identify the surfaces of teeth, including occlusal, buccal, lingual, mesial, and distal surfaces, and understand their functions in chewing and mastication.
0746.9	Describe the tissues of the tooth, functions, and landmarks of the oral cavity.
0746.9.1	Describe the tissues that make up the tooth structure, including enamel, dentin, pulp, cementum, and periodontal ligament, and their respective functions.
0746.9.2	Recognize landmarks of the oral cavity, such as the gingiva, palate, tongue, and oral mucosa, and understand their roles in speech, swallowing, and taste sensation.
0746.10	Define numbering systems of permanent and primary dentitions.
0746.10.1	Define the numbering systems used to identify teeth in both the permanent and primary dentitions, such as the Universal Numbering System, Palmer Notation System, and FDI World Dental Federation notation.
0746.10.2	Understand the significance of dental numbering systems in dental charting, treatment planning, and communication between dental professionals.

Academic Foundations

0746.11	Demonstrate knowledge of oral pathology and nutritional implications.
0746.11.1	Recognize and describe oral pathological conditions.
0746.11.2	Identify the elements of nutrition, basic food groups and therapeutic diets.
0746.11.3	Identify dietary deficiencies and dietary practices that contribute to the manifestation of symptoms in the oral cavity.

Technical Skills

0746.12	Exhibit knowledge of dental instruments and equipment.
0746.12.1	Identify various types, functions, and operation of dental operator and laboratory equipment.
0746.12.2	Identify types and functions of operative, restorative, surgical, prosthodontic, orthodontic, and endodontic dental instruments.
0746.12.3	Maintain dental operator equipment and instruments.
0746.12.4	Identify types and functions of specific dental hygiene instruments with emphasis on category rather than individual instruments.
0746.12.5	Prepare and set up for oral prophylaxis.
0746.12.6	Apply prophylactic treatments.
0746.13	Display understanding of pharmacology and anesthesia related to dentistry.
0746.13.1	Identify drug requirements, agencies, and regulations.
0746.13.2	Demonstrate how to record a drug prescription in a client/patient chart.
0746.13.3	Identify drug actions, side effects, indications, and contraindications; verify with Physician's Desk Reference or its equivalent.
0746.13.4	Identify drugs and agents used for treating dental-related infection.
0746.13.5	Identify common drugs used in dentistry including properties of anesthetics.
0746.13.6	Prepare and apply topical anesthetic agent.
0746.13.7	Prepare syringes for the administration of local anesthetics.
0746.13.8	Monitor/identify precautions in use of nitrous oxide-oxygen conscious sedation.
0746.14	Demonstrate knowledge of dental and medical emergency management.
0746.14.1	Apply skills to obtain training and/or certification in Health Care Provider or Professional Rescuer CPR, AED and FBAO.
0746.14.2	Describe dental office emergencies and their prevention.

Communication

0746.15	Use proper dental terminology and relate to consumers of dental care.
0746.15.1	Describe the responsibilities of consumers within the dental care system.
0746.15.2	Identify and define common dental terms.
0746.15.3	Demonstrate the use of proper dental terminology in the dental environment.

Information Collection

0746.16	Document client/patient assessment and treatment.
0746.16.1	Take and record medical-dental histories.
0746.16.2	Record assessment of existing oral conditions.
0746.16.3	Record conditions diagnosed by the dentist.
0746.16.4	Record treatment-related data on the client's/patient's clinical record.
0746.16.5	Record treatment plan and treatment in client's/patient's chart.
0746.17	Conduct general dental business office procedures.

0746.17.1	Maintain appointment control.
0746.17.2	Maintain an active recall system.
0746.17.3	Prepare and maintain accurate client/patient records.
0746.17.4	Prepare and maintain client/patient financial records and collect fees.
0746.17.5	Prepare and maintain office financial records.
0746.17.6	Prepare and maintain dental office inventory control and purchasing.
0746.17.7	Demonstrate public relations responsibilities of the secretary/receptionist.
0746.17.8	Demonstrate skills in use of office equipment.
0746.17.9	Maintain the dental business office environment.
0746.17.10	Receive, prepare, and dismiss clients/patients and visitors.

Treatment Planning and Implementation Practices

0746.18	Understand the general purpose and components of the treatment plan and relate healthy behaviors to dental care.
0746.18.1	Explain the treatment plan incorporating client/patient input.
0746.18.2	Apply behaviors that promote health and wellness to dental science.
0746.18.3	Describe strategies for the prevention of diseases including health screenings and examinations as they relate to dental science.
0746.18.4	Discuss complementary (alternative) health practices as they relate to wellness and disease prevention in dental science.
0746.18.5	Identify psychological considerations influencing behaviors of dental clients/patients.
0746.18.6	Prepare and maintain aseptic working area and sterile instruments for intraoral procedures.

Monitoring Client/Patient Status

0746.19	Assess and monitor client/patient health status as it relates to dental science.
0746.19.1	Evaluate client/patient response to administered treatments and procedures.
0746.19.2	Analyze and report client/patient and other client/patient response.

Client/Patient Status Evaluation

0746.20	Use dental instruments and equipment to evaluate client/patient.
0746.20.1	Choose appropriate evaluation tools to assess a dental client/patient and other client/patient response to treatment plan.
0746.20.2	Perform a visual assessment of existing oral conditions.

This course contains the beginning concepts and skills students will need for entry-level employment as a dental assistant in a specialty office. Major instructional concepts include orientation to specialty areas, instrumentation, and procedures. Students are required to complete a work-based clinical experience in each of the specialty areas within this course.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Orientation to Oral Maxillofacial Surgery

0747.1	Orientation to Oral Maxillofacial Surgery
0747.1.1	Compare the specialty of oral maxillofacial surgery with general dentistry.
0747.1.2	Determine indications for oral maxillofacial surgery.
0747.1.3	Differentiate between the role of a general assistant and the oral surgery assistant.
0747.1.4	Relate safety practices and procedures for an oral surgery assistant.
0747.1.5	Articulate terms associated with oral maxillofacial surgery and their definitions.

Instrumentation and Procedures in Oral Maxillofacial Surgery

0747.2	Instrumentation and Procedures in Oral Maxillofacial Surgery
0747.2.1	Relate the importance of the chain of asepsis during a surgical procedure.
0747.2.2	Classify the use of instruments designed for oral surgery.
0747.2.3	Compare hand washing technique with the surgical scrub technique.
0747.2.4	Demonstrate the surgical scrub technique.
0747.2.5	Report the type of postoperative care given to a patient after a surgical procedure.

Orientation to Endodontics

0747.3	Orientation to Endodontics
0747.3.1	Compare the duties and responsibilities of the endodontic assistant with the general chair side assistant.
0747.3.2	Examine the indications and contraindications for endodontic treatment.
0747.3.3	Choose examination and diagnostic procedures for endodontic emergencies.
0747.3.4	Relate the importance of ethical practices in the endodontic office.

Instrumentation and Procedures in Endodontics

0747.4	Instrumentation and Procedures in Endodontics
0747.4.1	Examine the types of endodontic procedures.
0747.4.2	Demonstrate the use of instrumentation designed for endodontic procedures.
0747.4.3	Determine the medicaments and dental materials used in endodontics.
0747.4.4	Relate procedures considered to be surgical endodontics.

Orientation to Orthodontics

0747.5	Orientation to Orthodontics
0747.5.1	Compare the environment of an orthodontic practice to a general dental office.
0747.5.2	Examine types of malocclusions.

0747.5.3	Choose types of diagnostic records used to assess orthodontic problems.
0747.5.4	Relate corrective orthodontics and applicable treatment.
0747.5.5	Recognize terms associated with orthodontics.
0747.5.6	Determine the role of the orthodontic assistant in preparing diagnostic records.
0747.5.7	Establish causes of malocclusion and dentofacial deformities.

Instrumentation and Procedures in Orthodontics

0747.6	Instrumentation and Procedures in Orthodontics
0747.6.1	Examine the function of common orthodontic instruments.
0747.6.2	Distinguish between the components of the fixed appliance.
0747.6.3	Relate the use and function of orthodontic head gear.
0747.6.4	Demonstrate methods to communicate the importance of good dietary and oral hygiene habits in orthodontic treatment.

Clinical Internship in Dental Specialties

0747.7	Clinical Internship in Dental Specialties
0747.7.1	Demonstrate a working knowledge of internship eligibility requirements.
0747.7.2	Comply with required health regulations such as proof of physical examination and immunization status.
0747.7.3	Provide proof of personal health insurance.
0747.7.4	Wear proper clinical attire.
0747.7.5	Conform to policies regarding performance of skills and scope of responsibility.
0747.7.6	Correctly and safely perform procedures under the direct supervision of an instructor or clinical site preceptor.
0747.7.7	Maintain professional standards including patient confidentiality.
0747.7.8	Organize and effectively manage time.
0747.7.9	Participate in internship evaluation process.

This course contains the dental skills needed for entry-level employment as a Dental Assistant within both clinical and administrative areas. The course includes an overview of the role, function, and utilization of dental assisting. Major instructional components include the use of dental terminology and skills in the following areas: odontology and anatomical landmarks, infection control, chair side assisting, radiography, dental laboratory, pharmacology and emergency care, business office procedures and dental specialties.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Infection Control and Hazard Management

0748.1	Demonstrate understanding of steps to be followed after a bloodborne pathogen exposure incident.
0748.1.1	Identify immediate steps to take following exposure to bloodborne pathogens, such as washing the affected area with soap and water.
0748.1.2	Understand the importance of reporting the incident to a supervisor or designated authority promptly.
0748.1.3	Recognize the need for post-exposure prophylaxis (PEP) and seeking medical evaluation and treatment, as necessary.
0748.2	Dispose of waste and hazardous material in compliance with federal regulations.
0748.2.1	Understand federal regulations governing the disposal of biomedical waste, sharps, and hazardous materials generated in dental settings.
0748.2.2	Implement proper waste segregation, packaging, labeling, and disposal procedures to prevent environmental contamination and minimize health risks.
0748.2.3	Follow protocols for handling and disposing of hazardous chemicals, amalgam waste, and other materials according to EPA and OSHA guidelines.
0748.3	Maintain personal safety and hygiene according to CDC, EPA, and OSHA guidelines.
0748.3.1	Adhere to CDC guidelines for hand hygiene, including proper handwashing techniques and the use of hand sanitizers in dental practice.
0748.3.2	Implement personal protective measures, such as wearing gloves, masks, protective eyewear, and gowns, to minimize exposure to infectious agents and hazardous materials.
0748.3.3	Understand OSHA regulations related to workplace safety, including hazard communication, bloodborne pathogens, and respiratory protection standards.
0748.4	Understand pre-cleaning, disinfection, and sterilization procedures according to federal guidelines.
0748.4.1	Differentiate between cleaning, disinfection, and sterilization processes and their importance in preventing cross-contamination and infection transmission.
0748.4.2	Follow manufacturer instructions and federal guidelines for the proper use of disinfectants, sterilizers, and other infection control products in the dental office.
0748.4.3	Implement protocols for cleaning and disinfecting dental instruments, equipment, and environmental surfaces before sterilization to ensure client/patient safety.
0748.5	Understand disease transmission and asepsis procedures.
0748.5.1	Explore modes of disease transmission in dental settings, including direct contact, droplet transmission, and airborne transmission.
0748.5.2	Recognize the role of aseptic techniques in preventing the spread of infections and maintaining a sterile environment during dental procedures.

0748.5.3	Implement standard precautions, such as hand hygiene, use of barriers, and proper handling of contaminated instruments, to minimize the risk of infection transmission to client/patients and healthcare workers.
0748.5.4	Examine signs, symptoms and sources related to common disease conditions.

Clinical Procedures

0748.6	Seat and dismiss the client/patient.
0748.6.1	Greet client/patients warmly and escorting them to the treatment area.
0748.6.2	Ensure client/patients are comfortable and properly positioned in the dental chair.
0748.6.3	Provide instructions for post-treatment care and scheduling follow-up appointments.
0748.6.4	Escort client/patients safely out of the treatment area and addressing any concerns or questions they may have.
0748.7	Maintain moisture control during dental procedures.
0748.7.1	Use appropriate isolation techniques such as dental dams or cotton rolls to control saliva and blood during procedures.
0748.7.2	Ensure a dry field for accurate dental work and prevention of contamination.
0748.7.3	Recognize the importance of moisture control in achieving successful treatment outcomes and minimizing the risk of infection.
0748.8	Demonstrate instrument and material transfer.
0748.8.1	Understand the proper handling and transfer of dental instruments and materials between the dentist and dental assistant.
0748.8.2	Utilize aseptic techniques to prevent contamination during instrument transfer.
0748.8.3	Maintain organization and efficiency in instrument transfer to facilitate smooth workflow during dental procedures.
0748.9	Identify various handpieces and associated rotary instruments.
0748.9.1	Recognize different types of dental handpieces, including high-speed and low-speed handpieces.
0748.9.2	Identify rotary instruments commonly used with each type of handpiece, such as burs, discs, and polishing attachments.
0748.9.3	Understand the function and appropriate use of each handpiece and rotary instrument in dental procedures.
0748.10	Identify and assist with various types of medical and dental emergencies.
0748.10.1	Recognize signs and symptoms of common medical emergencies such as syncope, allergic reactions, or diabetic emergencies.
0748.10.2	Understand protocols for managing dental emergencies such as tooth avulsion, soft tissue injuries, or broken restorations.
0748.10.3	Demonstrate readiness to assist the dentist in providing prompt and appropriate care during emergency situations.
0748.10.4	Research equipment and materials needed in prevention and treatment of emergencies.
0748.10.5	Articulate terms related to CPR and other common medical emergencies.
0748.10.6	Examine common emergencies occurring in a dental office.
0748.11	Demonstrate ergonomic positioning of the client/patient, dental team, and dental unit.
0748.11.1	Ensure proper positioning of the client/patient in the dental chair for optimal access and comfort during treatment.
0748.11.2	Maintain ergonomic posture and positioning of the dental team members to prevent musculoskeletal strain and injury.

0748.11.3	Adjust the dental unit and equipment to facilitate efficient workflow and minimize physical stress on the dental team.

Dental Terminology

0748.12	Master dental terminology, analyze acronyms, and accurately use terms and abbreviations.
0748.12.1	Use dental terminology in oral and written communication.
0748.12.2	Determine the steps in analyzing the definition of dental acronyms.
0748.12.3	Pronounce commonly used dental terms.
0748.12.4	Spell and pronounce commonly used dental root words, prefixes, and suffixes.
0748.12.5	Recognize commonly used acronyms and abbreviations.
0748.12.6	Use dental terminology in oral and written communication.

Odontology and Anatomical Landmarks

0748.13	Master facial anatomy, muscles, salivary glands, and identify oral landmarks, dentitions, and tooth surfaces accurately.
0748.13.1	Describe the primary bones of the face and skull.
0748.13.2	Explain the major muscles involved in chewing and demonstrate their placement.
0748.13.3	Identify the position and role of salivary glands.
0748.13.4	Locate and correctly pronounce landmarks in the oral cavity.
0748.13.5	Define dentitions and associated terminology.
0748.13.6	Investigate the tissues and membranes comprising the periodontium.
0748.13.7	Inspect tooth surfaces and distinguish characteristic landmarks.

Chair Side Assisting

0748.14	Understand dental terminology, chairside procedures, restorative materials, and treatment area preparation.
0748.14.1	Recognize terminology related to diseases associated with teeth, tissues, and structures of the head.
0748.14.2	Articulate commonly used dental terms related to chair side procedures.
0748.14.3	Differentiate between types and properties of dental restorative materials.
0748.14.4	Understand and pronounce terms related to the preparation and isolation of the operative area.

Radiography

0748.15	Understand, apply, and evaluate aspects of dental radiography.
0748.15.1	Articulate terms associated with the production and properties of roentgen rays.
0748.15.2	Demonstrate acceptable methods for radiation protection.
0748.15.3	Determine types of radiographs and qualities necessary for diagnosis.
0748.15.4	Implement steps to process dental radiographs.
0748.15.5	Assess common radiographic errors and the causes of each.

Dental Laboratory

0748.16	Identify materials used in the dental laboratory and give examples of their uses.
0748.16.1	Understand the properties and applications of various materials used in dental laboratories.
0748.16.2	Recognize common dental laboratory materials such as dental alloys, ceramics, gypsum products, waxes, and impression materials.
0748.16.3	Identify specific uses for each material, such as casting alloys for crowns and bridges, dental ceramics for veneers and crowns, gypsum products for dental models, and waxes for patterns and prototypes.

0748.17	Relate characteristics of descriptive or manipulative dental materials.
0748.17.1	Explain the physical and mechanical properties of descriptive and manipulative dental materials.
0748.17.2	Describe properties such as strength, hardness, elasticity, viscosity, and thermal conductivity.
0748.17.3	Understand how these properties influence the selection and application of dental materials in various clinical situations.
0748.18	Demonstrate the major fixed and removable prosthodontic appliances.
0748.18.1	Identify major fixed prosthodontic appliances such as crowns, bridges, and implant-supported restorations.
0748.18.2	Recognize major removable prosthodontic appliances such as complete and partial dentures.
0748.18.3	Understand the design, fabrication, and clinical indications for each type of prosthodontic appliance.
0748.18.4	Demonstrate the proper placement and adjustment of fixed and removable prostheses to restore dental function and aesthetics.

Pharmacology and Emergency Care

0748.19	Study pharmacology in dental assisting.
0748.19.1	Examine regulatory bodies concerned with the control of medications/drugs.
0748.19.2	Determine effects of drugs on the body.
0748.19.3	Examine parts of a prescription and explain routes of drug administration.
0748.19.4	Distinguish the classification of drugs commonly used in dentistry.

Business Office Procedures

0748.20	Understand and effectively implement dental office procedures.
0748.20.1	Demonstrate oral and written communications related to office procedures.
0748.20.2	Compare types of appointments and correlated scheduling terms.
0748.20.3	Examine dental insurance terms and discuss types of dental insurance plans.
0748.20.4	Examine common banking terms and discuss types of financial disbursements used in a dental office.
0748.20.5	Select terms related to purchasing and inventory of supplies.
0748.20.6	Relate legal and ethical terms and definitions used in a dental business office.

The student within the Supervised Dental Assistant Experience course will focus on instructional components that will enable him/her to work as an effective member of the dental team. Students will be introduced to the specialties of dentistry and the requirements necessary to function as an administrative and chair side assistant in a dental office.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Practice Management

0749.1	Practice Management
0749.1.1	Demonstrate knowledge of protocol and procedures used by the dental office receptionist.
0749.1.2	Differentiate between verbal and non-verbal language using role play.
0749.1.3	Evaluate the importance of the first impression a patient should receive upon entering a dental office.
0749.1.4	Demonstrate proper protocol for answering an incoming call.
0749.1.5	Critique proper protocol for handling a difficult patient via telephone and/or in person.
0749.1.6	Examine the information all messages should contain.
0749.1.7	Compare effective ways of scheduling patients.

Administrative Office Dental Assistant

0749.2	Administrative Office Dental Assistant
0749.2.1	Demonstrate knowledge of protocol and procedures used by the administrative office manager.
0749.2.2	Differentiate dental office staff and their areas of responsibility.
0749.2.3	Examine marketing ideas for the dental office.
0749.2.4	Differentiate between accounts payable and accounts receivable.
0749.2.5	Establish uses of telephone and business office technology.
0749.2.6	Recognize the need to be fluent with computerized and manual systems for patient management.
0749.2.7	Illustrate filing procedures.
0749.2.8	Examine correspondence within the dental office, with other dental professionals and with insurance companies.

Dental Specialties/Endodontics

0749.3	Dental Specialties/Endodontics
0749.3.1	Demonstrate knowledge of procedures and processes used in endodontics.
0749.3.2	Examine endodontics and endodontist.
0749.3.3	Establish the definition of pulpal disease.
0749.3.4	Select instruments and materials used in endodontics, examining the function of each.
0749.3.5	Examine endodontic surgical procedures.

Dental Specialties/Oral and Maxillofacial Surgery

0749.4	Dental Specialties/Oral and Maxillofacial Surgery
0749.4.1	Demonstrate knowledge of procedures and processes used in oral and maxillofacial surgery.
0749.4.2	Select instruments used in surgery and interpret their use.
0749.4.3	Recognize the importance of aseptic procedures prior to and following surgery in the dental office.

0749.4.4	Determine the written and oral postoperative instructions to be given to patients.
0749.4.5	Differentiate between surgical procedures performed in the dental office and the hospital.

Dental Specialties/Orthodontics

0749.5	Dental Specialties/Orthodontics
0749.5.1	Demonstrate knowledge of procedures and processes used in orthodontics.
0749.5.2	Characterize the orthodontic setting.
0749.5.3	Outline the critical roles and duties of a dental assistant in the orthodontic office.
0749.5.4	Examine the causes of malocclusion.
0749.5.5	Differentiate between preventive, interceptive, and corrective orthodontics.
0749.5.6	Distinguish between fixed and removable appliances.
0749.5.7	Assess the stages of orthodontic treatment.
0749.5.8	Evaluate how teeth are retained in position after orthodontic treatment is complete.

Dental Specialties/Pediatrics

0749.6	Dental Specialties/Pediatrics
0749.6.1	Demonstrate knowledge of procedures and processes used in pediatrics.
0749.6.2	Characterize the importance of teamwork in the pediatric office.
0749.6.3	Determine common behavior of children throughout the stages of growth and development.
0749.6.4	Establish the role of parent/guardian/family members in the treatment of a child.
0749.6.5	Relate the unique equipment geared toward pediatric dentistry.
0749.6.6	Recognize signs of child abuse and the procedure for reporting suspected child abuse.

Dental Specialties/Periodontics

0749.7	Dental Specialties/Periodontics
0749.7.1	Demonstrate knowledge of procedures and processes used in periodontics.
0749.7.2	Differentiate between the members of the periodontal team and their roles.
0749.7.3	Examine the diagnostic procedure from start to completion and follow-up for periodontic patients.
0749.7.4	Differentiate between surgical and non-surgical treatment procedures.
0749.7.5	Establish the role of the patient in maintaining the arrest of periodontal disease.

Dental Specialties/Prosthodontics

0749.8	Dental Specialties/Prosthodontics
0749.8.1	Demonstrate knowledge of procedures and processes used in prosthodontics.
0749.8.2	Pour, trim and articulate models.
0749.8.3	Construct custom trays (i.e., Night guard, bleaching tray, mouthpiece).
0749.8.4	Differentiate between waxes and their use.
0749.8.5	Outline the procedure for preparing a fixed crown/bridge for patients.
0749.8.6	Outline the procedure for preparing a removable appliance for patients.
0749.8.7	Relate the importance of following safety precautions during all lab procedures.

Dental Specialties/Public Health

0749.9	Dental Specialties/Public Health
0749.9.1	Demonstrate knowledge of procedures and processes used in public health.
0749.9.2	Assess the role of a dental health provider.

Dental Specialties/Oral and Maxillofacial Radiologist

0749.10	Dental Specialties/Oral and Maxillofacial Radiologist
0749.10.1	Demonstrate knowledge of procedures and processes used in oral and maxillofacial radiology.
0749.10.2	Assess the role of the oral and maxillofacial radiologist.

Dental Specialties/Oral Pathologist

0749.11	Dental Specialties/Oral Pathologist
0749.11.1	Students will demonstrate knowledge of procedures and processes used in oral pathology.
0749.11.2	Examine the career and duties of the oral pathologist.

This course is designed to equip high school students with the foundational skills and knowledge necessary for a career in medical laboratory settings. The course emphasizes multidisciplinary communication, client/patient interaction, laboratory safety, and technical proficiency in laboratory procedures. Students will learn to perform a variety of tasks essential to the operation of medical laboratories, ensuring the accuracy and efficiency of laboratory tests and the safety and well-being of clients/patients and staff.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Multidisciplinary Communication

0755.1	Understand the importance of proper communication of information within a healthcare environment.
0755.1.1	Report relevant information in a timely manner.
0755.1.2	Distinguish between subjective and objective information when reporting.
0755.1.3	Analyze communication for appropriate response and provide feedback.
0755.1.4	Organize, write, and compile technical information and summaries.
0755.1.5	Use medical terminology to interpret, transcribe and communicate information, data, and observations.
0755.1.6	Review patient bill of rights and know right to refuse treatment.
0755.1.7	Ensure practice of professionalism, legal and ethical conduct, and appropriate verbal and nonverbal communication.

Client/Patient Interaction

0755.2	Understand and demonstrate proper client/patient assessment and preparation for laboratory procedures.
0755.2.1	Demonstrate proper client/patient identification using two identifiers (e.g., Name and date of birth).
0755.2.2	Obtain client/patient informed consent if applicable.
0755.2.3	Assess client/patient comprehension.
0755.2.4	Clearly communicate proper routine and special collection procedures and storage requirements.
0755.2.5	Understand common client/patient complications, concerns, and hazards during specimen collection and take appropriate action.
0755.2.6	Evaluate client/patient response to treatment and/or procedure.
0755.2.7	Obtain correct vital sign measurements (pulse, respirations, temperature, and blood pressure) using automated and manual methods.

Medical Laboratory Safety

0755.3	Demonstrate understanding of laboratory safety procedures.
0755.3.1	Demonstrate understanding of infection control and prevention.
0755.3.2	Discuss/follow HIPAA policies and procedures.
0755.3.3	Practice appropriate client/patient safety.
0755.3.4	Prevent injury by using proper safety equipment and techniques.
0755.3.5	Choose engineering controls as appropriate.
0755.3.6	Evaluate equipment for possible hazards.
0755.3.7	Efficiently perform activities without injury to client/patient or self.

0755.4	Understand the role of regulatory agencies in accordance with the laboratory. (e.g., OSHA, TJC, CAP, CLSI, CAP, CDC).
0755.4.1	Practice laboratory safety in accordance with regulatory agency requirements.
0755.4.2	Discuss proper public health reporting for national and state-notifiable diseases.
0755.4.3	Understand and practice proper biohazardous and chemical waste disposal.
0755.4.4	Follow documentation procedures for work related accidents.

Medical Laboratory Procedures

0755.5	Demonstrate proficiency in general laboratory protocols.
0755.5.1	Comprehend scope of practice.
0755.5.2	Understand CLIA waived testing, kit tests, and the significance of "off-label use".
0755.5.3	Understand point of care testing.
0755.5.4	Perform proper specimen labeling.
0755.5.5	Identify and comprehend terminology and abbreviations related to laboratory procedures and departments.
0755.5.6	Comprehend laboratory information systems (LIS).
0755.5.7	Understand the importance of proper inventory procedures and expiration dates.
0755.5.8	Understand the importance of Lot Numbers.
0755.5.9	Define and understand confirmatory testing.
0755.5.10	Explain the categories of testing personnel established by CLIA regulations.
0755.5.11	Describe the basic educational and/or experiential qualifications for each category.
0755.5.12	Explain the differences in requirements for a physician practice laboratory, hospital laboratory, reference laboratory and an independent clinical laboratory.
0755.5.13	Describe Alternate Site/ reference laboratory requirements as they apply to hospitals in West Virginia.
0755.5.14	Demonstrate proper knowledge and use of laboratory instruments including but not limited to: • Microscopes • Centrifuges • Pipettes • Thermometers • Incubators • Spectrophotometers • Refractometers
0755.5.15	Understand regulations regarding provider-performed microscopy (PMM).
0755.6	Practice proper QA and QC procedures.
0755.6.1	Identify the difference between quality assurance and quality control.
0755.6.2	Identify and understand terminology related to QA & QC, including but not limited to: • Shift • Trend • Standard deviation • Precision • Accuracy • Qualitative • Quantitative
0755.6.3	Understand and perform quality control procedures within the laboratory assistant's scope of practice.
0755.6.4	Understand the significance of QC/ QA documentation logs and perform appropriate corrective measures for "out-of-range" readings.

0755.6.5	Understand the concepts of calibration.
0755.6.6	Properly perform QC on required instrumentation.
0755.6.5	Understand and follow proper QA procedures for specimens used as legal evidence.

0755.7	Proficiently perform pre-analytical laboratory practices.
0755.7.1	Complete all requirements for phlebotomy curriculum.
0755.7.2	Understand specimen processing and handling procedures, including time and temperature requirements.
0755.7.3	Demonstrate proficiency in identifying various types of laboratory equipment, understanding their functions, and performing basic operations.
0755.7.4	Understand how specimens are accessioned, what factors warrant a specimen rejection and appropriate specimen rejection procedures.
0755.7.5	Understand proper distribution of specimens to appropriate departments based on testing ordered.
0755.8	Proficiently perform analytical laboratory practices.
0755.8.1	Understand types of testing procedures.
0755.8.2	Understand confirmatory testing.
0755.8.3	Demonstrate knowledge of the types of automated instrumentation found in a laboratory setting.
0755.8.4	Understand the concept of trouble shooting.
0755.8.5	Proficiently perform specimen testing, producing viable results.
0755.9	Proficiently perform post analytical practices.
0755.9.1	Assess and evaluate the quality of results.
0755.9.2	Comprehend confirmatory testing practices and procedures.
0755.9.3	Understand the significance of critical results.
0755.9.4	Provide analysis, construct, and apply appropriate corrective measures/actions.
0755.9.5	Report test results in a timely manner utilizing appropriate communication channels.
0755.9.6	Use written, oral and electronic communication skills to produce reports.
0755.9.7	Deliver reports to all appropriate parties and confirm all relevant parties receive necessary information.
0755.9.8	Ensure specimens are stored appropriately.

Technical Skills

0755.10	Understand and perform lab assisting procedures within the hematology department.
0755.10.1	Review basic anatomy and physiology for cardiovascular system.
0755.10.2	Understand blood composition.
0755.10.3	Correctly perform peripheral slide preparation and staining.
0755.10.4	Correctly perform point of care hemoglobin testing.
0755.10.5	Correctly perform manual hematocrit.
0755.10.6	Understand automated complete blood count testing.
0755.10.7	Correctly perform manual differential counts.
0755.11	Understand and perform lab assisting procedures within the coagulation department.
0755.11.1	Understand the concept of hemostasis.
0755.11.2	Comprehend anticoagulants and their purpose.
0755.11.3	Understand the purpose of PT/APTT testing and what medications are being monitored.
0755.11.4	Perform point of care PT/INR correctly.
0755.11.5	Understand the International Normalized Ratio and its importance.
0755.12	Demonstrate knowledge of the urinalysis department and clinical laboratory Waived Tests.
0755.12.1	Know terminology related to urinalysis including but not limited to:

	• Crystals • Artifact • Midstream • Clean-catch • Specific gravity • Sediment • Trichomonas	• Supernatant • Ketones • Cast • Mucus • Proteinuria • Hematuria • Pyuria
0755.12.2	Understand normal and abnormal components of the urine.	
0755.12.3	Perform urinalysis procedures related to collection and preservation of specimens.	
0755.12.4	Perform urinalysis techniques related to macro and micro analysis of urine.	
0755.12.5	Perform urinalysis techniques related to manual dipstick methods.	
0755.12.6	Understand specific gravity and how it relates to urinalysis.	
0755.12.7	Perform automated urinalysis dipstick testing accurately.	
0755.12.8	Correctly perform confirmatory urinalysis testing (e.g., Ictotest, Acetest, & Clinitest).	
0755.12.9	Discuss and perform correct testing procedures for fecal occult blood cards.	
0755.12.10	Correctly prepare specimens for testing within the microbiology department.	

The instructional content will focus on advanced procedures necessary for entry-level employment in the physician's office and the medical laboratory. Course content will include chemistry, immunohematology, and microbiology departments. Additional instruction will provide students with key employability skills for job seeking and keeping. Eligible students will participate in a clinical internship and upon successful completion will prepare for credentialing, postsecondary education, and/or employment opportunities. A review of guidelines for test taking and an exploration of the college requirements for the laboratory occupation and other healthcare careers will be provided. All standards and objectives must be mastered before the student is approved to pursue credentialing and/or industry validation.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Multidisciplinary Communication

0756.1	Examine federal and state laws which serve to regulate the provision of laboratory services under the Medicare program.
0756.1.1	Describe the concept of medical necessity as set forth in National or Local coverage Decisions (NCD and LCD) for lab testing under the Medicare Program.
0756.1.2	Review the concept of congressionally mandated screening tests under the Medicare Program.
0756.2	Demonstrate a basic understanding of ICD and CPT coding systems.
0756.2.1	Explain the characteristics of the International Classification of Disease System (ICD) and its function in substantiating the clinical record.
0756.2.2	Explain the differences between analyte method and unlisted procedure CPT codes and the hierarchy for selecting CPT codes for reporting laboratory tests.

Technical Skills

0765.3	Demonstrate understanding of the microbiology department and clinical laboratory Waived Tests.
0765.3.1	Know terminology related to microbiology including but not limited to: • bacteria • aerobic • anaerobic • yeast • culture • resistance • gram-negative • agar • incubator • inoculating loop • gram-positive • colony • alpha, beta, gamma hemolysis • agglutination • spores • wet prep • culture and sensitivity (C&S)
0765.3.2	Recognize specimen for type of microbiological test ordered.
0765.3.3	Practice safety procedures and aseptic, isolation, and sterilization techniques required for processing microbiological specimens.
0765.3.4	Demonstrate proper preparation, storage, transport, and disposal of specimens for microbiological testing.
0765.3.5	Understand reagents, standards, and controls used for microbiological procedures.
0765.3.6	Prepare and stain slides for microbiological testing.

0756.4	Demonstrate understanding of clinical chemistry concepts and clinical laboratory "Waived Tests".
	Know terminology related to clinical chemistry including but not limited to: • hepatic (liver) function tests • metabolism tests • kidney (renal) function tests • general chemistry tests • supernatant • electrolytes • toxicology
0756.4.1	Know use of instrumentation falling within the laboratory assistant's scope of practice.
0756.4.2	Understand the importance of instrumentation maintenance.
0756.4.3	Perform maintenance on available chemical analyzers.
0756.4.4	Know the operation and methodology of commonly used analyzers.
0756.4.5	Know what toxicology tests are within the laboratory assistant's scope of practice.
0756.4.6	Perform toxicology tests within the laboratory assistant's scope of practice.
0756.4.7	Perform point-of-care and waived clinical chemistry tests.
0756.5	Demonstrate understanding of immunohematology concepts and clinical laboratory "Waived Tests".
0756.5.1	Know terminology related to immunology, serology, and immunohematology including but not limited to: • antigen • Strep A test • HIV test • antibody • agglutination • RPR • RSV test • influenza A and B test • heterophile agglutination (mono test) • fibrinogen • latex agglutination
0756.5.2	Understand the principles of antigen-antibody reaction.
0756.5.3	Demonstrate knowledge of blood types, Rh types, and other antigens.
0756.5.4	Perform immunological, serological, and immunohematology procedures within the laboratory assistant's scope of practice.

Clinical Application

0756.6	Perform skills required for learning experiences in the clinical setting.
0756.6.1	Observe and participate as appropriate in skills outlined in outcomes for medical lab assisting.
0756.6.2	Complete clinical rotations.
0756.6.3	Understand the importance of active observation and participation in clinical settings.
0756.6.4	Learn to engage effectively with medical professionals and patients during clinical rotations.
0756.6.5	Comprehend the objectives and expectations of clinical rotations.
0756.6.6	Demonstrate professionalism and adherence to ethical guidelines during rotations.

This course offers fundamental education and expertise in anatomy and physiology, clinical medicine, and laboratory research. It actively involves students in understanding how these are relevant to real-world situations, cases, and dilemmas. Through interviews, challenges, and testimonials with professionals in biomedical fields across clinical, research, and public health settings, the HBS course provides a holistic learning experience.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

This course aligns with Project Lead the Way (PLTW) Biomedical Science. To teach PLTW courses, teachers must attend and successfully complete a course-specific training session sponsored by PLTW. Required skillsets are dispersed at that time.

Laboratory Knowledge and Skills

0766.1	Demonstrate competency in validating and using laboratory equipment.
0766.1.1	Develop a comprehensive understanding of the structure and function of the human body's organ systems, including the skeletal, muscular, cardiovascular, respiratory, digestive, nervous, endocrine, urinary, and reproductive systems.
0766.2	Demonstrate competency in using computer office applications.
0766.2.1	Acquire proficiency in medical terminology related to human body systems, including anatomical structures, physiological processes, diseases, and treatments, to effectively communicate within healthcare and biotechnology settings.
0766.3	Perform basic laboratory math skills; Apply statistical analysis to interpret data.
0766.3.1	Gain insight into the mechanisms of disease and disorders affecting human body systems, including etiology, pathogenesis, clinical manifestations, diagnostic techniques, and treatment modalities.
0766.4	Demonstrate the ability to use the scientific method.
0766.4.1	Explore factors influencing human health and wellness, such as nutrition, exercise, stress management, environmental factors, genetic predispositions, and preventive healthcare measures.
0766.5	Perform Polymerase Chain Reaction (PCR).
0766.5.1	Investigate various medical interventions used in the diagnosis, treatment, and management of diseases and disorders affecting human body systems, including pharmaceuticals, surgical procedures, medical devices, and lifestyle modifications.

Ethics

0766.6	Demonstrate the knowledge of bioethics.
0766.6.1	Understand the ethical principles and guidelines governing biomedical research involving human subjects, including informed consent, confidentiality, privacy, beneficence, non-maleficence, and respect for autonomy.
0766.7	Demonstrate the knowledge of professional ethics.
0766.7.1	Recognize the importance of professional ethics in healthcare practice, including integrity, honesty, accountability, confidentiality, respect for client's/ patients' rights, and adherence to legal and regulatory standards.

Safety in the Biotechnology Laboratory

0766.8	Demonstrate general requirements for laboratory safety.
0766.8.1	Understand and implement biosafety and biosecurity measures when working with human biological materials, infectious agents, genetically modified organisms (GMOs), and potentially hazardous substances.
0766.9	Identify and use personal protective equipment (PPE).
0766.9.1	Demonstrate knowledge of general laboratory safety protocols and procedures, including hazard identification, risk assessment, personal protective equipment (PPE) use, chemical handling, emergency response, and waste disposal.

Working in a Highly Regulated Environment

0766.10	Perform documentation according to regulatory agency standards.
0766.10.1	Navigate regulatory requirements and compliance standards governing biomedical research involving human subjects, clinical trials, Institutional Review Boards (IRBs), Good Clinical Practice (GCP), and applicable federal, state, and local regulations.
0766.11	Document lab activities and findings according to guidelines.
0766.11.1	Maintain accurate and detailed documentation of research activities, experimental data, client/patient records, regulatory approvals, and compliance documentation in accordance with legal and professional standards.

Interconnections Among Body Systems

0766.12	Investigate the basic and complex commonalities between all humans.
0766.12.1	List the major organs within each human body system and the functions of the different human body systems.
0766.12.2	Describe how multiple body systems are interconnected.
0766.12.3	Describe how the interconnections and interactions of multiple body systems are necessary for life.
0766.12.4	Explain how directional terms and regional terms can be used to identify locations on the body.
0766.12.5	Demonstrate key directional terms on a model of the human body.
0766.12.6	Apply knowledge of human body systems to indicate how damage to one system can impact function in another system.
0766.12.7	Discuss similarities between all humans and relate this discussion to human identity.
0766.12.8	Reflect on student's own identity.

Human Tissues and Cells

0766.13	Explore the individual differences in tissues and cells between humans and its significance to individual identity.
0766.13.1	Describe the differences in the appearance and function of epithelial, nervous, muscle, and connective tissues.
0766.13.2	Explain the basic structure and function of the skeletal system.
0766.13.3	Model tissue placement in the face around the eyes and mouth.

DNA and Identity

0766.14	Investigate the significance of DNA in relation to individual identity.
0766.14.1	Explain in general how restriction enzymes cut DNA.
0766.14.2	Explain how gel electrophoresis separates DNA fragments by size.
0766.14.3	Analyze DNA by interpreting gel electrophoresis results.
0766.14.4	Define biometrics and the ethical issues associated with it.

Nervous System - Brain

0766.15	Investigate the role the brain plays in the communication system of the human body.
0766.15.1	Describe the general structure and function of the central nervous system.
0766.15.2	Interpret how a breakdown in communication would impact the function of the human body.
0766.15.3	Determine the region of the brain responsible for specific actions, emotions, or functions of humans.
0766.15.4	Apply knowledge of brain function to determine the parts of the brain used to complete a list of daily activities.

Nervous System

0766.16	Determine how electrical communication works in the body and its effects.
0766.16.1	Explain the basics of how electrical signals are created and transmitted in the human body.
0766.16.2	Explain the roles of ions in creating electrical impulses in the human body.
0766.16.3	Explain in general terms how neurotransmitters help propagate electrical impulses.
0766.16.4	Describe neuron structure and function.
0766.16.5	Discuss the generalities of ascending and descending pathways of the CNS.
0766.16.6	Understand how reflex versus reaction time applies to pathways of processing in the brain.
0766.16.7	Demonstrate an understanding of how a serious nervous system disorder impacts quality of life.
0766.16.8	Research and report on biomedical professionals who can improve the quality of life for those coping with nervous system dysfunction.
0766.16.9	Using data acquisition software to complete a laboratory investigation on the reflexes in the human body and reaction time.

Endocrine System

0766.17	Determine how chemical communication works in the body and its effects.
0766.17.1	Explain the basics of how hormones interact with target cells.
0766.17.2	Explain the difference between endocrine and exocrine glands.
0766.17.3	Use the internet to research and use the research to interpret the symptoms and physical characteristics of a given client/patient to determine an endocrine system malfunction.
0766.17.4	Explain in general how hormones contribute to maintain homeostasis.
0766.17.5	Understand how a team of medical professionals use an evidence board to help in solving a medical case.

Nervous System-Human Sight

0766.18	Investigate how the human body communicates with the outside world.
0766.18.1	Describe the structures and function of the eye.
0766.18.2	Describe how the eye and the brain work together to allow a person to see.

Digestive System

0766.19	Describe the role food plays in the conversion and use of energy in the body.
0766.19.1	Describe the human body systems that absorb process and distribute oxygen, water, and food.
0766.19.2	Describe the structure and function of organs in the human digestive system.
0766.19.3	Explain that energy is stored and released from ATP.
0766.19.4	Assess overall health through analysis of calories consumed and calories expended in daily activities.
0766.19.5	Explain the structure and function of, enzymes and co enzymes and how they all work together.
0766.19.6	Explain the importance of enzymes on maintaining homeostasis in the human body.

0766.19.7	Demonstrate an understanding of both lock and key models and induced fit models of enzyme function.
0766.19.8	Interpret enzyme function in the digestive system through laboratory experiments.
0766.19.9	Build a model of the human digestive system.
0766.19.10	Design and perform an experiment to determine optimal conditions for digestive enzyme reactions.

Respiratory System

0766.20	Describe the role that oxygen plays in the conversion and use of energy in the body.
0766.20.1	Describe the structure and function of the human respiratory system.
0766.20.2	Explain that oxygen and carbon dioxide are exchanged in the lungs and where this occurs.
0766.20.3	Explain the transport of oxygen to all cells in the body through the close connection between the respiratory and cardiovascular systems.
0766.20.4	Interpret data charts and graphs to determine tidal volume, respiratory reserve volume, expiratory reserve volume, and vital capacity of lungs.
0766.20.5	Understand the difference between short term control and long-term control via medication and that there are different administration routes for each.
0766.20.6	Explore the education and career path of a respiratory therapist.

Excretory System

0766.21	Describe the role that water plays in the conversion and use of energy in the body.
0766.21.1	Describe the structure and function of the human urinary system.
0766.21.2	Describe the structure and function of the kidney.
0766.21.3	Describe and illustrate the movement of fluids and ions in and out of the various parts of the nephron.
0766.21.5	Illustrate the composition of normal blood and normal urine.
0766.21.6	Build a model of the urinary system.
0766.21.7	Test simulated urine sample and apply knowledge to diagnose disease.
0766.21.8	Analyze the use of urinalysis as a medical intervention.

Skeletal System

0766.22	Demonstrate an understanding of how joints directly contribute to the movement of the human body.
0766.22.1	Describe the structure and function of the three types of human body joints.
0766.22.2	Describe using appropriate vocabulary, the motion of bones in the different joint types.
0766.22.3	Identify range of motion measurements to specific joint actions and develop a plan to measure the range of motion.
0766.22.4	Compare the structure of a cow elbow to a human elbow.
0766.22.5	Discuss differences in an individual's range of motion and the reason for these differences.
0766.22.6	Discuss ways to improve joint flexibility such as stretching and other lifestyle modifications.

Muscular System

0766.23	Demonstrate an understanding of how muscles directly contribute to the movement of the human body.
0766.23.1	Describe the structure and function of the three types of muscle tissue.
0766.23.2	Identify specific muscles by deciphering muscle names.
0766.23.3	Describe the requirements for muscle contraction.
0766.23.4	Explain the sliding filament mechanism of muscle contraction.
0766.23.5	Explain the connection between nerves and muscle.
0766.23.6	Interpret muscle function by examining structure and attachment to bone.

0766.23.7	Build a model of a muscle group.
0766.23.8	By using the sliding filament theory, explain why rigor mortis occurs.
0766.23.9	Discuss how muscle contributes to human identity.
0766.23.10	Identify some of the many roles of calcium in the body.

Circulatory System

0766.24	Demonstrate an understanding of how blood flow aides in the movement of the substances through the human body.
0766.24.1	Explain the relationship between the heart and lungs and the path of blood flow through these organs.
0766.24.2	Define pulse and blood pressure and locate pulse points on the body.
0766.24.3	Identify major arteries and veins and specify the body region each supply.
0766.24.4	Interpret ankle brachial index (ABI) to determine possible blood vessel blockages.
0766.24.5	Understand the relationship between the amount of blood pumped by the heart, through analysis of cardiac output values, and the health of other body organs and systems.
0766.24.6	Explore peripheral artery disease through the analysis of client/patient symptoms and diagnostic test results.
0766.24.7	Explain the structure and function of veins and explain how varicose veins form.
0766.24.8	Build a model of the major circulatory routes.
0766.24.9	Analyze self-risk for cardiovascular disease.

Metabolic System

0766.25	Using knowledge of power and movement in the human body, describe how the body fuels and responds to exercise.
0766.25.1	Explain that the human body generates ATP for energy estimate and the time that this energy will last.
0766.25.2	Assess muscle fatigue through interpretation of EMG and grip strength.
0766.25.3	Design experiments to test ability to overcome muscle fatigue.
0766.25.4	Describe the major things that happen in the major body systems while running a race.
0766.25.5	Understand how a training plan is designed for a fictional client, incorporating the specific health situation of the client.
0766.25.6	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.

Integumentary System

0766.26	Describe the composition of skin and how the integumentary system serves as a protection for the human body.
0766.26.1	Describe the structure and function of human skin.
0766.26.2	Discuss the integumentary system as part of the immune system, offering both innate and adaptive immunity.

Skeletal System

0766.27	Describe the composition of bones and how the skeletal system serves as a protection for the human body.
0766.27.1	Describe and compare the structure and function of compact and spongy bone.
0766.27.2	Describe types of bone fractures.
0766.27.3	Identify bone fractures on x-rays and describe possible damage to internal organs.
0766.27.4	Understand that the hormones calcitonin and parathyroid hormone influence calcium balance and thus the strength of bone in the human body

0766.27.5	Identify the stages of bone remodeling.
0766.27.6	Identify lifestyle choices that affect development and maintenance of healthy bones.

Immune System

0766.28	Describe the composition the immune system and how it serves as a protection for the human body
0766.28.1	Describe the general structure and function of the lymphatic and immune system.
0766.28.2	Describe in general the interaction between antigens and antibodies.
0766.28.3	Explain the role of specified blood cells in specific immunity.
0766.28.4	Use pedigrees to predict inheritance of genetic disorders within a family.
0766.28.5	Interpret data on antibody concentrations after an infection.
0766.28.6	Determine potential blood donors for a transfusion through the analysis of blood types and Rh compatibility.
0766.28.7	Identify blood types and use them to identify transfusion donors and recipients.

Homeostasis

0766.29	Examine the connection between all the human body systems and how these systems work together to maintain health and homeostasis.
0766.29.1	Describe the effects of an extreme external environment on human body systems.
0766.29.2	Explain in general how body systems work together to maintain homeostasis and complete basic functions.
0766.29.3	Understand how initial symptoms of an illness can lead to diagnosis and treatment.
0766.29.4	Understand the need to valuate medical data to create a unique case study.
0766.29.5	Understand that different diseases require different medical interventions.
0766.29.6	Research the role of various medical professionals to diagnose and treat a fictional client/patient.
0766.29.7	Reflect on self-identity.
0766.29.8	Write a summary of career goals.

This comprehensive Pharmacy Technician course offers an in-depth exploration of essential concepts and skills vital to pharmacy technicians. Students will grasp the intricacies of certification, licensure, and registration processes, federal laws governing the pharmacy industry, and medication review. Additionally, they will develop a thorough understanding of drug classification, aseptic techniques, pharmaceutical calculations, and pharmacy operations, including prescription processing and medication dispensing. Emphasis is placed on client/patient safety, confidentiality, and error reporting protocols, ensuring students are well-prepared for success in the field of pharmacy technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Pharmacy Tech Orientation

0771.1	Understand certification, licensure, and registration in the field of pharmacy.
0771.1.1	Differentiate certification, licensure, and registration.
0771.1.2	Determine certification requirements for the pharmacy technician.
0771.1.3	Recognize the origin and goal of the Pharmacy Technician Certification Board (PTCB).
0771.1.4	Examine the role of the PTCB.
0771.1.5	Distinguish professional organizations related to the field of pharmacy.
0771.1.6	Characterize the functions and responsibilities of the pharmacy technician.
0771.1.7	Classify the three areas in which skills will be measured on the Pharmacy Technician Certification Exam.
0771.1.8	Determine the requirements and process needed to maintain certification.

Federal Laws

0771.2	Examine laws and legislation affecting the pharmacy industry.
0771.2.1	Examine laws and legislation affecting the pharmacy industry.
0771.2.2	Recognize the importance of the Controlled Substance Act of 1970 as it relates to the manufacturing, distribution and dispensing of controlled substances based on abuse potential.
0771.2.3	Differentiate filing procedures, maintaining records according to State and Federal Laws and drug substitution requirements.
0771.2.4	Evaluate the mission of the Drug Enforcement Administration.
0771.2.5	Determine the process by which a doctor obtains a DEA Number.
0771.2.6	Establish the purpose of a prescriber DEA Number.
0771.2.7	Illustrate the process to determine the validity of a DEA Number.
0771.2.8	Distinguish the storage requirements for Schedule II Drugs.
0771.2.9	Investigate the four phases of Investigational Drugs.

Medication Review

0771.3	Distinguish pharmacy terminology, drug nomenclature, dosage forms, and medication administration methods.
0771.3.1	Demonstrate basic terms and abbreviations used in the pharmacy.
0771.3.2	Differentiate chemical, generic and trade names of drugs.
0771.3.3	Compare dosage forms of drugs.
0771.3.4	Investigate methods of administering medications.

Drug Classification

0771.4	Develop a comprehensive understanding of nervous system drugs and their clinical applications.
0771.4.1	Examine the basic structure and functions of the nervous system.
0771.4.2	Report uses, mechanism of action, side effects, and examples of the following drug classifications for Central Nervous System: • sedative hypnotics • skeletal muscle relaxants • anticonvulsants • narcotic analgesics • antipsychotics • antidepressants • antianxiety agents • CNS stimulants • anti-Parkinson's agents • sympathomimetic agents • sympatholytic agents • parasympathomimetics agents • parasympatholytic agents • neuromuscular blocking agents
0771.5	Develop a comprehensive understanding of endocrine system drugs and their clinical applications.
0771.5.1	Chart the location of the major endocrine glands and their hormone secretion.
0771.5.2	Differentiate between local and systemic hormones.
0771.5.3	Differentiate histamine and prostaglandins.
0771.5.4	Report uses, mechanism of action, side effects, and examples of the following systemic hormones: • androgens • estrogens • progestins • corticosteroids • insulin • oral hypoglycemics • oxytocics • thyroid hormones • anti-thyroid hormones
0771.6	Develop a comprehensive understanding of cardiovascular system drugs and their clinical applications.
0771.6.1	Examine the basic structure and functions of the cardiovascular system.
0771.6.2	Determine the meaning of arrhythmia and angina.
0771.6.3	Report uses, mechanism of action, side effects, and examples of the following drug classifications for cardiovascular drugs: • cardiac glycosides • antiarrhythmics • antianginals • vasodilators • calcium channel blockers • angiotensin-converting enzyme (ACE) inhibitors • angiotensin II inhibitors

	• beta-adrenergic blockers • alpha-adrenergic blockers • antilipidemic agents
0771.7	Develop a comprehensive understanding of renal system drugs and their clinical applications.
0771.7.1	Examine the basic structure and functions of the renal system.
0771.7.2	Determine the uses and mechanism of action of diuretics.
0771.7.3	Report uses, mechanism of action, side effects, and examples of types of diuretics: • thiazides • loop • potassium sparing • combination • osmotics
0771.8	Develop a comprehensive understanding of gout agents and their clinical applications.
0771.8.1	Characterize gout.
0771.8.2	Report uses, mechanism of action, and side effects of gout agents: • allopurinol • probenecid • colchicine
0771.9	Develop a comprehensive understanding of electrolytes and their clinical applications.
0771.9.1	Examine the uses, side effects, and examples of electrolytes.
0771.10	Develop a comprehensive understanding of anti-infectives and their clinical applications.
0771.10.1	Compare bacteriostatic and bactericidal agents.
0771.10.2	Report uses, mechanism of action, and side effects of anti-infectives: • antibacterial • urinary anti-infectives • antibiotics • penicillins • cephalosporins • quinolones • macrolides • Tetracyclines • aminoglycosides • antifungals • antiparasitic agents • anthelmintics • amebicides • antitubercular agents • antiviral agents
0771.11	Develop a comprehensive understanding of chemotherapy drugs and their clinical applications.
0771.11.1	Characterize cancer.
0771.11.2	Characterize Leucovorin.
0771.11.3	Report uses, mechanism of action, and side effects of chemotherapy drugs: • antimetabolites • alkylating agents • hormones

	• vinca alkaloids • asparaginase • antibiotics
0771.12	Develop a comprehensive understanding of agents used in blood disorders and their clinical applications.
0771.12.1	Examine the composition and functions of blood.
0771.12.2	Determine the treatment for Iron Deficiency Anemia.
0771.12.3	Determine the treatment for Megaloblastic Anemia.
0771.12.4	Report uses, mechanism of action, and side effects of agents used in blood disorders: • anticoagulants • hemostatics • antithrombotics • thrombolytics • hemorrheologic agents • antianemics
0771.13	Develop a comprehensive understanding of vitamins and minerals and their clinical applications.
0771.13.1	Characterize vitamins.
0771.13.2	Determine examples and uses of fat-soluble vitamins.
0771.13.3	Determine examples and uses of water-soluble vitamins.
0771.13.4	Distinguish minerals as related to normal body functions.

Aseptic Techniques

0771.14	Demonstrate knowledge of aseptic techniques.
0771.14.1	Demonstrate aseptic technique.
0771.14.2	Determine the importance of aseptic technique to prevent contamination as it relates to personnel and the environment.
0771.14.3	Establish the role of airflow equipment to prevent contamination.
0771.14.4	Assess basic equipment for parenteral administration.
0771.14.5	Examine methods of administering parenteral medications to include: • intradermal • subcutaneous • intramuscular • intravenous
0771.14.6	Examine composition of common parenteral fluids.
0771.14.7	Examine compounding.
0771.14.8	Characterize aseptic technique utilized by personnel prior to compounding procedures.
0771.14.9	Determine the most common and important equipment for compounding.
0771.14.10	Assess specific techniques and procedures utilized to avoid contamination assuring successful sterile product mixing.
0771.14.11	Investigate the importance and process of visual inspection of parenteral products.
0771.14.12	Examine components of a parenteral product label.
0771.14.13	Characterize various solutions used in pharmacy to include: • irrigation • IV Piggyback

	Total Parenteral Nutrition (TPN)
0771.14.14	Distinguish preparation, safe handling, and administration of antineoplastic agents.
0771.14.15	Evaluate use of Class II Biological Safety Cabinets (Vertical Airflow) and personal protective coverings.
0771.14.16	Determine precautions necessary in the disposal of all items used in the preparation and administration of antineoplastic drugs.
0771.14.17	Assess stability considerations in parenteral products.
0771.14.18	Examine filtration in admixture preparation.
0771.14.19	Report examples of parenteral product reference materials.
0771.14.20	Demonstrate the steps of a typical parenteral admixture order workflow.

Calculations

0771.15	Demonstrate knowledge of mathematics in pharmacy.
0771.15.1	Solve conversions using the metric, avirdupois, apothecary and household systems.
0771.15.2	Use charts, graphic illustrations, and conversion tables to perform mathematical calculations.
0771.15.3	Determine the meaning of commonly used abbreviations in prescriptions and medication orders.
0771.15.4	Determine abbreviations, symbols or syntax that should be avoided.
0771.15.5	Demonstrate the Roman Numeral system of writing numbers.
0771.15.6	Apply placement rules when using Roman Numerals.
0771.15.7	Apply mathematical computations related to pharmacy procedures.
0771.15.8	Apply mathematical principle to conversion equations common to those used in the pharmacy.
0771.15.9	Apply rules for decimals when writing drug doses.
0771.15.10	Apply mathematical principles involving temperature, weights and measures used in the pharmacy.
0771.15.11	Apply mathematical principles to problems involving dosage calculations and other applied mathematical concepts.
0771.15.12	Apply ratios and proportions to enlarge and reduce chemical mixtures used in the pharmacy.
0771.15.13	Calculate amounts of drugs, chemical or solvents when enlarging and reducing formulas.
0771.15.14	Examine units of measurement for drugs and expressions of quantity and concentration for drugs in drug products.
0771.15.15	Differentiate methods for determining quantities of ingredients and concentration of drugs when preparing or dispensing drug products.
0771.15.16	Calculate amounts of two solutions of different strengths which must be combined to get a third solution of a specified strength.
0771.15.17	Calculate final strength of a diluted or mixed solution when given the original strength(s) and volume(s) and the final volume.
0771.15.18	Distinguish methods of expressing doses and dosage regimens.
0771.15.19	Calculate the amount of drug product to dispense a day's supply from a dosage regime.
0771.15.20	Calculate doses for pediatric client/patients using pediatric dosage information found in reference books.
0771.15.21	Apply general rules for calculating an infant's or child's dose of medication when given the age or weight of the client/patient and the normal adult dose.
0771.15.22	Determine the flow rate of an IV solution when given the total volume, total time of administration and the drops delivered per ml by the administration set.
0771.15.23	Calculate powder volume and use calculation to reconstitute dry powders for suspension or solution.
0771.15.24	Examine pricing methods used in retail pharmacy.
0771.15.25	Recognize the meaning of terms used in pricing methods.

Pharmacy Operation

0771.16	Explore pharmacy operation principles.
0771.16.1	Differentiate common pharmaceutical terms to include drug names, codes, expiration date formats, dispensing containers, and closures.
0771.16.2	Determine considerations regarding authority to prescribe.
0771.16.3	Assess possible prescribers.
0771.16.4	Characterize general processes related to the dispensing and medication distribution in a traditional pharmacy.
0771.16.5	Examine the method of transmitting prescriptions to a pharmacy.
0771.16.6	Apply required client/patient confidentiality.
0771.16.7	Articulate the required contents of a prescription and medication order.
0771.16.8	Select information obtained from client/patients when receiving refill requests.
0771.16.9	Distinguish the process and information needed when calling prescribers for refill authorization.
0771.16.10	Demonstrate receiving electronic transmission of prescriptions.
0771.16.11	Differentiate client/patient information necessary for the client/patient profile.
0771.16.12	Relate the process required when entering prescription/medication information in the client/patient profile.
0771.16.13	Validate appropriate product selection (i.e., brand vs. generic).
0771.16.14	Assist the pharmacist in preparing and dispensing medications to include: • measuring and counting • calculation and verification • compounding • weighing • reconstituting • aseptic technique/iv admixtures • controlled substances
0771.16.15	Prepare and package prescriptions and medication orders.
0771.16.16	Relate information contained on a prescription label.
0771.16.17	Report the advantages of the Unit Dose System.
0771.16.18	Examine types of Unit Dose Systems.
0771.16.19	Demonstrate the five "Rights" of medication.
0771.16.20	Demonstrate the three check points utilized during the dispensing of a prescription.
0771.16.21	Report the pharmacist's accountability during dispensing of a prescription.
0771.16.22	Articulate possible sources of medication errors.
0771.16.23	Predict reporting procedures for medication errors.
0771.16.24	Illustrate the use of supplemental client/patient information.
0771.16.25	Examine key concepts and terms used in pharmacy inventory management.
0771.16.26	Report ordering and receiving techniques.
0771.16.27	Compare methods in managing inventory.
0771.16.28	Assess ways prescription are numbered, dated, and labeled.
0771.16.29	Predict the role of the FDA in medication recall and adverse drug reaction.
0771.16.30	Assess theft and drug diversion.
0771.16.31	Examine methods of reimbursement and available payment plans.
0771.16.32	Determine claims processing procedures using Universal Claim Forms (UCFs), paper claims, on-line claims, and electronic adjudication.

PTCB Preparation**Course #: 0771****Allowable Teacher Endorsement:** 7041, 7042, 7045, 7048, 7608

0771.16.33	Relate the components of drug utilization review.
0771.16.34	Examine Reimbursement Formulary.
0771.16.35	Determine quantity restriction as it applies to preventing dispensing of unnecessary quantities.
0771.16.36	Establish steps for obtaining prior authorization.
0771.16.37	Relate the purpose of the signature log.

Students will be provided an opportunity to participate in a clinical internship, applying the knowledge and skills mastered during the PTCB Preparation course. The clinical internship will allow hands-on practice under the direction of a pharmacist. Students participate in 100-130 hours of activities that reflect current and future entry-level pharmacy technician functions and responsibilities, utilizing both the institutional and retail settings.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Introduction to Pharmacy Technician Internship

0772.1	Participate in pharmacy technician internship.
0772.1.1	Understand internship eligibility requirements.
0772.1.2	Comply with required health regulations such as proof of physical examination and immunization status.
0772.1.3	Provide proof of personal health insurance.
0772.1.4	Wear proper clinical attire.

Professional Conduct and Responsibility

0772.2	Demonstrate appropriate professional conduct and responsibility.
0772.2.1	Maintain mastery or above in attainment of standards in classroom theory and lab.
0772.2.2	Report to clinical site on time and ready to work.
0772.2.3	Notify clinical site and instructor when absent.
0772.2.4	Conform to policies regarding performance of skills and scope of responsibility.
0772.2.5	Maintain professional standards including client/patient confidentiality.
0772.2.6	Organize and effectively manage time.

Clinical Skills Development

0772.3	Develop pharmacy technician clinical skills.
0772.3.1	Correctly and safely performing entry-level procedures under supervision of a pharmacist.
0772.3.2	Request assistance or clarification as needed.
0772.3.3	Complete documentation required of clinical internship accurately.

Internship Preparation and Evaluation

0772.4	Prepare for clinical internship and evaluation.
0772.4.1	Participate in clinical internship evaluation process.
0772.4.2	Achieve mastery in the performance of course skill sets within PTCB 0771.
0772.4.3	Meet entry-level requirements as required by professional standards.
0772.4.4	Utilize facility resources (i.e., other staff members, manuals, and training updates).

Students follow the life of a fictitious family as they investigate how to prevent, diagnose, and treat disease. Students explore how to detect and fight infection; screen and evaluate the code in human DNA; evaluate cancer treatment options; and prevail when the organs of the body begin to fail. Through real-world cases, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

This course aligns with Project Lead the Way (PLTW) Biomedical Science. To teach PLTW courses, teachers must attend and successfully complete a course-specific training session sponsored by PLTW. Required skill sets are dispersed at that time.

Laboratory Knowledge and Skills

0780.1	Demonstrate competency in validating and using laboratory equipment.
0780.1.1	Understand the importance of validating laboratory equipment for accurate results and troubleshooting common issues.
0780.2	Demonstrate the concepts of recombinant technology.
0780.2.1	Explore the principles behind recombinant DNA technology and its applications in medicine, including genetic testing and therapeutic protein production.
0780.3	Perform Polymerase Chain Reaction (PCR).
0780.3.1	Learn the fundamental principles of PCR, including primer design, thermal cycling, and gel electrophoresis analysis.
0780.4	Demonstrate the concepts of microbial culture.
0780.4.1	Master techniques for microbial culture, including aseptic technique, media preparation, and isolation of bacterial colonies.
0780.5	Perform basic spectrophotometer assays.
0780.5.1	Understand the principles of spectrophotometry and its applications in quantifying DNA, proteins, and other biomolecules.

Ethics

0780.6	Demonstrate the knowledge of bioethics.
0780.6.1	Discuss the ethical implications of genetic testing, reproductive technology, and other medical interventions, considering factors such as privacy, consent, and access to care.
0780.7	Demonstrate the knowledge of professional ethics.
0780.7.1	Explore the ethical responsibilities of professionals working in biotechnology, including integrity, transparency, and adherence to regulatory guidelines.

Safety in the Biotechnology Laboratory

0780.8	Demonstrate general requirements for laboratory safety.
0780.8.1	Learn and follow general laboratory safety protocols, including proper handling of hazardous materials, use of personal protective equipment (PPE), and emergency procedures.
0780.9	Demonstrate ability to implement safety protocols.

0780.9.1	Understand and implement biosafety level protocols when working with infectious agents, including containment procedures and decontamination techniques.
0780.10	Follow SDS guidelines for handling, storage, and disposal of hazardous material.
0780.10.1	Follow safety data sheet (SDS) guidelines for the safe handling, storage, and disposal of hazardous chemicals and biological materials.

Working in a Highly Regulated Environment

0780.11	Perform documentation according to regulatory agency standards.
0780.11.1	Understand and adhere to regulatory requirements governing biotechnology research and development, including documentation, reporting, and quality assurance.
0780.12	Demonstrate an ability to maintain records in accordance with Intellectual Property Law.
0780.12.1	Learn about intellectual property laws and regulations governing the protection of inventions, patents, and proprietary information in biotechnology.
0780.13	Document lab activities and findings according to guidelines.
0780.13.1	Maintain accurate and detailed records of laboratory activities, experimental data, and research findings in compliance with regulatory standards.

Appropriate Use of Equipment and Instrumentation

0780.14	Use electrophoresis equipment.
0780.14.1	Demonstrate proficiency in using electrophoresis systems for separating DNA fragments.

Infectious Disease

0780.16	Investigate the variety of interventions involved in the prevention, diagnosis, and treatment of infectious disease.
0780.16.1	Define medical interventions and explain how these interventions help prevent, diagnose, and treat disease.
0780.16.2	Define bioinformatics and explore how it is used in the collection, classification, storage, and analysis of biochemical and biological information.
0780.16.3	Explain how bacteria can be identified using their DNA sequences.
0780.16.4	Investigate the significance of diagnostic tests for infectious diseases.
0780.16.5	Use contact tracing methods to identify connections between individuals to track the spread of infectious disease in a population.
0780.16.6	Determine the antigen concentration in simulated body fluids using antibody-based diagnostic tests, such as ELISA assay.

Antibiotics

0780.17	Explore the factors that contribute to the effectiveness of antibiotics against infectious diseases.
0780.17.1	Model the structure of a bacterial cell.
0780.17.2	Investigate how antibiotics disrupt some of the pathways that bacteria need to survive.
0780.17.3	Explain how bacteria use various pathways to gain resistance to antibiotics.
0780.17.4	Model one of the pathways through which bacterial cells transfer genes.
0780.17.5	Use a model to simulate the effects of antibiotics on the population of bacteria during an infection.

Hearing loss

0780.18	Investigate hearing loss as a detrimental effect of infectious disease.
0780.18.1	Distinguish the properties of sound waves; including frequency and amplitude.

0780.18.2	Apply knowledge of the structures of the ear to create a model of an ear.
0780.18.3	Identify and perform tests in which hearing loss can be evaluated.
0780.18.4	Research the variety of interventions and services available to aid those with hearing loss.
0780.18.5	Investigate and debate the bioethical concerns related to the use of cochlear implant technology.

Vaccination

0780.19	Explore vaccination as a mode of infectious disease prevention.
0780.19.1	Explain how vaccines act as medical interventions to defend the body against infectious invaders.
0780.19.2	Explore some of the various laboratory methods in which vaccines are produced.
0780.19.3	Define plasmids and explain their significance in genetic engineering.
0780.19.4	Investigate the importance of epidemiologists and the impact these medical professionals have on public health.
0780.19.5	Describe in general how vaccines interact with the human immune system.
0780.19.6	Interpret data from a disease outbreak to determine the course of the infection.
0780.19.7	Explore vaccination from the perspective of individuals from different generations.

Genetic Testing

0780.20	Investigate the available types of genetic testing/screening and their ethical implications.
0780.20.1	Describe genetic testing and how it is used to determine if someone has a genetic disorder.
0780.20.2	Explain how genetic counseling can positively affect persons who have had genetic testing for various situations.
0780.20.3	Amplify a segment of DNA in the laboratory using the Polymerase Chain Reaction (PCR) procedure.
0780.20.4	Use laboratory techniques such as DNA extraction, PCR, and restriction analysis to identify single base pair differences in DNA.
0780.20.5	Apply laboratory results to demonstrate the relationship between genotype and phenotype.
0780.20.6	Analyze prenatal genetic screening results.
0780.20.7	Describe the basics of proper prenatal care as well as specified medical interventions used to monitor a pregnancy.
0780.20.8	Use genetic testing techniques (such as PCR and gel electrophoresis) to confirm the relationship between genotype and phenotype.

Reproductive Technology

0780.21	Examine the current reproductive technology and discuss medical interventions of the future.
0780.21.1	Explore how gene therapy can be used to treat genetic disorders.
0780.21.2	Discuss and debate the safety and effectiveness of gene therapy.
0780.21.3	Explore the various medical interventions parents have available to genetically analyze embryos.
0780.21.4	Evaluate and debate the potential impact of reproductive technology from moral, ethical, and scientific perspectives.

Cancer

0780.22	Explore the diagnostic techniques and technology being used to better diagnose and understand cancer.
0780.22.1	Compare and contrast diagnostic imaging techniques.
0780.22.2	Describe some of the different uses of x-rays, CT scans, and MRI scans.

0780.22.3	Investigate what DNA microarrays measure and how this information is used to determine differences in gene expression between differing tissues samples.
0780.22.4	Using statistical analysis, determine the similarities between gene expression patterns of multiple clients/patients.
0780.22.5	Describe the potential risk factors for different types of cancer as well as the ways to reduce the risk.
0780.22.6	Explore some of the various cancer screening techniques that can be used to predict risk for developing cancer.
0780.22.7	Investigate viruses as a risk factor or cause for certain cancers.
0780.23	Investigate the treatments and therapies available to treat cancer.
0780.23.1	Compare and contrast cancer therapies.
0780.23.2	Explore biofeedback therapy and how it is utilized to treat cancer and its symptoms.
0780.23.3	Exhibit information on the advances and benefits of prosthetic technology for those who have lost their limbs.
0780.23.4	Explain how physical and occupational therapists help clients/patients with disabilities or recovering from surgery/injury.
0780.24	Explore the future of medical interventions for cancer.
0780.24.1	Discuss some of the many reasons why therapy drugs do not produce the same effect in all individuals.
0780.24.2	Explain how SNP profiles factor into the decision to prescribe a specific medication.
0780.24.3	Explore the field of pharmacogenetics and its contributions to the improvement of individualized client/patient treatment.
0780.24.4	Research and present how cases of human abuse have led to strict regulations of human participation in clinical trials.
0780.24.5	Describe the importance of nanomedicine, particularly for cancer research and the development of medical interventions.

Therapeutic Proteins

0780.25	Explore the medical implications of proteins produced and purified in a laboratory setting.
0780.25.1	Discuss how the diagnosis and treatment of various diseases have evolved from the 1800s through today.
0780.25.2	Explain the specific bacterial transformation process that they perform.
0780.25.3	Define chromatography and how it is used to separate items in a mixture.
0780.25.4	Interpret electrophoresis results to determine the molecular weight of specific proteins in a mixture.
0780.25.5	Explore and reflect on specific biomedical careers in the manufacturing of therapeutic proteins.

Kidney Failure

0780.26	Investigate the causes and treatments for kidney failure.
0780.26.1	Describe End Stage Renal Disease (ESRD) and how it is diagnosed.
0780.26.2	Describe the chain of events that result when kidneys do not function properly and how it affects the creation of red blood cells.
0780.26.3	Explore the medical options for treatment for persons with ESRD including hemodialysis, peritoneal dialysis, and kidney transplant.

Organ Transplants

0780.27	Explore the process, policies and procedures involved for organ transplantation.
0780.27.1	Consider the integral factors to consider when deciding who should receive an organ transplant.
0780.27.2	Describe the importance of blood and tissue typing for a successful organ transplant.
0780.27.3	Describe the general steps involved in a live donor laparoscopic nephrectomy.

0780.27.4	Compare the major similarities and differences between a heart and a kidney transplant.
0780.27.5	Explain the most common ways members of the surgical transplant team work together for a successful transplant.

Human Body Transplantation

0780.28	Investigate how advances in medical knowledge and technology can aid in building a better human body for the future.
0780.28.1	Explore how a variety of tissues and organs can be transplanted from one organism to another.
0780.28.2	Describe the general process of how xenotransplantation and tissue engineering works, as well as potential risks, benefits, challenges, and ethical/moral concerns.
0780.28.3	Reflect on how current methods of medical intervention can be improved.
0780.28.4	Describe how advancing medical knowledge and technology will enable scientists to enhance the human body.
0780.28.5	Design a potential “super” human using knowledge of the human body and available medical interventions.

This course is designed to allow the student to choose a career work-based experience from the following specializations: Health Occupations, Certified Nursing Assistant, Certified ECG Technician, Certified Health Unit Coordinator, Certified Patient Care Technician, Certified Phlebotomy Technician, Community Emergency Response Team, Dental Aide, Dietary Aide, Direct Care Worker, Electronic Health Record Specialist, Environmental Services, Orientation to Practical Nursing, Laundry Aide, Physical Therapy Aide, Pre-Pharmacy Technician, Imagery Aide, Veterinary Science Aide. Upon successful completion of the prerequisite courses in the Health Science Education Program of Study, students will be provided the opportunity in Clinical Specialty 1 to participate in a work-based clinical experience. Students choose a health career specialty for in-depth study and must complete a minimum of 25-55 hours in an applicable clinical rotation. Instruction is guided by career-specific content skill sets that must be mastered before students are eligible to attain established credentials and/or industry validation. Students within this course develop employability skills and explore career pathways while applying healthcare information technology and technical skills. Instruction will incorporate project and problem-based healthcare practices and procedures to demonstrate the criticality of these skills. Due to healthcare industry standards, exemplary attendance is mandatory.

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Respecting Client/Patient Staff and Diversity

0789.1	Using a problem-solving process applied to healthcare situations, describe how healthcare employees can respect client and staff diversity.
0789.1.1	Demonstrate respectful and empathetic treatment of all clients/patients/families: civility, customer service, patient satisfaction.

Client/Patient Interaction

0789.2	Perform appropriate client/patient interaction.
0789.2.1	Demonstrate knowledge of planned procedures and goals.
0789.2.2	Demonstrate technical skills required for all chosen career specialties and demonstrate skills and knowledge as appropriate.
0789.2.3	Demonstrate professional standards as they apply to hygiene, dress, language, confidentiality, and behavior.
0789.3	Respond to questions and concerns of the client/patient.
0789.3.1	Evaluate the client's/patient's ability to understand information.
0789.3.2	Demonstrate empathy for client/patient.
0789.3.3	Choose jargon-free language appropriate to the situation.
0789.3.4	Adjust communication to the needs of the client.

Intra Team Communication

0789.4	Participate in intra team communication.
0789.4.1	Effectively and appropriately communicate client/patient information within the team.
0789.4.2	Distinguish appropriate roles and responsibilities of each team member.
0789.4.3	Respect and value expertise and contributions of team members.
0789.4.4	Evaluate relevancy of information to be conveyed.
0789.4.5	Formulate and report information in a clear and concise manner.

Information Collection

0789.5	Properly collect information.
0789.5.1	Follow facility protocol and regulatory guidelines for collecting client/patient information.
0789.5.2	Understand key principles of health information systems.
0789.5.3	Maintain privacy and confidentiality of health information.
0789.5.4	Perform basic computer skills.
0789.5.5	Select appropriate tools for information to be collected.

Safety Practices

0789.6	Demonstrate knowledge of infection control.
0789.6.1	Apply skills to obtain training and/or certification in Bloodborne Pathogens ~~—ex. Preventing Disease Transmission (American Red Cross).~~
0789.7	Demonstrate knowledge of personal safety.
0789.7.1	Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.
0789.7.2	Apply principles of body mechanics.
0789.8	Demonstrate knowledge of environmental safety.
0789.8.1	Apply safety techniques in the work environment.
0789.8.2	Comply with safety signs, symbols, and labels.
0789.8.3	Recognize types of hazardous material.
0789.9	Demonstrate knowledge of emergency procedures and protocols.
0789.9.1	Practice fire safety in a healthcare setting.
0789.9.2	Apply principles of basic emergency response in natural disasters and other emergencies.

Client/Patient Monitoring and Evaluation

0789.10	Demonstrate knowledge monitoring of client/patient health status.
0789.10.1	Assess health status and report results to a treatment team.
0789.10.2	Evaluate client/patient response to treatment/procedures.
0789.10.3	Analyze and report client/patient response.
0789.10.4	Assess the need for follow-up and alternative care.
0789.11	Evaluate client/patient status.
0789.11.1	Identify client/patient needs, strengths, and problems.
0789.11.2	Analyze client/patient treatment goals and results.
0789.11.3	Choose appropriate evaluation tools to assess client/patient response to treatment plan.
0789.11.4	Analyze information gathered.
0789.11.5	Revise/create modifications to treatment plan.

Treatment Planning and Implementation

0789.12	Demonstrate understanding of the purpose and components of a patient treatment plan.
0789.12.1	Design the treatment plan incorporating client/patient input.
0789.12.2	Create a treatment plan using a problem-solving model.
0789.13	Plan procedures according to facility protocol and regulatory guidelines.
0789.13.1	Select appropriate resources to implement treatment plan.
0789.13.2	Document actions according to facility protocol and regulatory guidelines.

Clinical Specialty 1**Course #: 0789****Allowable Teacher Endorsement:** 7041, 7042, 7043, 7045, 7048, 7172, 7606

0789.13.3	Evaluate a treatment plan for intervention opportunities.
0789.14	Perform procedures to support the goals and objectives of the treatment plan.
0789.14.1	Use equipment and instruments according to manufacturer's guidelines and safety practices.
0789.14.2	Implement procedures within scope of practice.
0789.14.3	Evaluate priorities to organize work.

Technical Skills

0789.15	Demonstrate knowledge and technical skills required for all career specialties.
0789.15.1	Demonstrate knowledge of selected clinical specialty module requirements.
0789.15.2	Apply skills to obtain training and/or certification in selected clinical specialization.
0789.15.3	Participate in a work-based clinical experience of 25-55 hours in selected clinical specialization (length of work-based experience is determined by credentialing agency requirement).

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The Performance Skills for Emergency Services 1 meet the requirements for First Responder. The first responder is the first person to arrive at the scene who has emergency medical training and the first designated level of professional emergency medical care as outlined by the National EMS education and practice blueprint. Skills taught to a First Responder include: Assessment for life-threatening conditions in both medical and trauma client/patients, provision of initial airway care, assistance with breathing, provision of CPR, control of bleeding, and stabilization of spinal and extremity injuries. In addition, the West Virginia Office of Emergency Services requires successful completion of the hazardous materials awareness training meeting the Department of Labor, Occupational Safety and Health Administration (OSHA) 1910.120 requirements.

Emergency Services II applies fundamental knowledge of the EMS system, safety/well-being of the EMT, and medical/legal and ethical issues to the provision of emergency care. *The Performance Skills for Emergency Services I-EMR were adapted and condensed from the U S Department of Transportation, National Emergency Medical Services Education: Emergency Medical Technician Instructional Guidelines. Emergency Services II builds upon knowledge obtained in Emergency Services I.

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EMS Systems

0792.1	Develop a comprehensive understanding of emergency medical systems.
0792.1.1	Define the components of emergency medical (EMS) systems.
0792.1.2	Research the National Highway Traffic Safety Administration as related to emergency medical systems.
0792.1.3	Discuss how to access emergency medical services.
0792.1.4	Research EMS National Scope of Practice Model and National education standards.
0792.1.5	Define authorization to practice as related to the West Virginia Office of Emergency Services, medical oversight, local credentialing, employer policies and procedures.
0792.1.6	Describe the role of an Emergency Medical Responder as a member of the EMS Team.
0792.1.7	List and describe the responsibilities of the Emergency Medical Responder for the provision of pre-hospital emergency care within the local EMS system.
0792.1.8	Describe the principles of safely operating a ground ambulance.
0792.1.9	Understand the guidelines for operating safely in and around a landing zone during air medical operations and transport.

Workforce Safety and Wellness

0792.2	Ensure workforce safety and wellness.
0792.2.1	Have immunizations and health status reviewed.
0792.2.2	Discuss emotional reactions that may be experienced by First Responders, clients/patients, family members and bystanders when faced with trauma, illness, death and dying.
0792.2.3	Discuss the steps in your approach to the family confronted with death and dying and describe the possible reactions that the family may exhibit.
0792.2.4	Recognize the signs and symptoms of critical incident stress and state possible steps to reduce/alleviate stress.
0792.2.5	Demonstrate correct handwashing.

0792.2.6	Adhere to standard precautions and OSHA regulations.
0792.2.7	Adhere to the safe operation of EMS/client/patient care equipment.
0792.2.8	Identify and implement the appropriate personal protective equipment for client/patient care situations.
0792.2.9	Research exposure occurrence policies and procedures.
0792.2.10	Identify stressful situations and ways to deal with stress as it relates to EMS.
0792.2.11	Identify and prevent response-related injuries related to EMS.
0792.2.12	Demonstrate proper technique when lifting and moving clients/patients.
0792.2.13	Explain the procedures for cleaning, disinfecting and/or disposal of all items that are potentially contaminated with infectious materials.

EMS Roles, Responsibilities, and Professionalism

0792.3	Understand EMS provider roles, responsibilities, and adhere to professionalism.
0792.3.1	Discuss and research roles and responsibilities of EMS personnel as related to equipment, safety, scene evaluation, client/patient access, administering care, emotional support, continuity of care, community relations, medical and legal standards.
0792.3.2	Demonstrate characteristics of professional behavior.
0792.3.3	Research quality improvement as it relates to EMS.

Communication and Documentation

0792.4	Utilize appropriate communication and documentation in the EMS role.
0792.4.1	Demonstrate the proper procedure for the transfer of client/patient care to other EMS personnel.
0792.4.2	Describe/record information regarding a client/patient's condition and treatment that needs to be communicated.
0792.4.3	Communicate/document the Emergency Medical Responder's observations and actions to whomever client/patient care is transferred.
0792.4.4	Communicate with team members/document the call for resources.
0792.4.5	Describe and apply the principles of communicating with clients/patients in a manner that achieves a positive relationship.
0792.4.6	Recognize simple medical prefixes, suffixes and combining words.

Medical, Legal and Ethical Issues

0792.5	Understand medical, legal, and ethical issues.
0792.5.1	Describe and demonstrate an understanding of the medical legal aspects of an Emergency Medical Responder's provision of emergency medical care in the jurisdiction having authority, including, but not limited to, duty to act, standard of care, consent to care, forcible restraint, abandonment, documentation, and any applicable Good Samaritan Laws.
0792.5.2	Define the first responder standard of care.
0792.5.3	Discuss the importance of do-not-resuscitate, advance directives, and related state laws/rules.
0792.5.4	Define consent and discuss the methods of obtaining consent, differentiating between expressed and implied consent.
0792.5.5	Discuss the implications for EMR of client/patient refusal of transport.
0792.5.6	Define abandonment, negligence, and assault and battery, and their implications.
0792.5.7	Explain the importance and legality of client/patient confidentiality.
0792.5.8	State the conditions that require the EMR to notify local law enforcement and the action that should be taken when providing care at a crime scene.
0792.5.9	Discuss and demonstrate fundamental components of documentation.

0792.5.10	Discuss how consent would be obtained for a minor.

Vital Signs

0792.6	Accurately assess vital signs.
0792.6.1	Determine and record skin color, temperature, and moistness.
0792.6.2	Demonstrate the ability to accurately measure and record vital signs, including manual blood pressure.

Medical Identification Devices

0792.7	Recognize digital medical ID devices and apply their information to client/patient care.
0792.7.1	Identify the most used digital medical identification devices.
0792.7.2	Apply the information contained on or in the medical identification devices to client/patient assessment and client/patient care procedures.

Anatomy and Physiology

0792.8	Understand body systems, surface landmarks, and variations across different age groups.
0792.8.1	Understand and use basic anatomical and directional terms to identify body parts as they relate to each other.
0792.8.2	Describe the anatomy and function of the: respiratory system, circulatory system, musculoskeletal system, and nervous system.
0792.8.3	Relate a given surface landmark with the appropriate underlying anatomy.
0792.8.4	Identify the life support chain fundamental elements and issues impacting these elements, including age-related variations (pediatrics and geriatrics).

Shock and Respiratory Compromise

0792.9	Identify and manage life-threatening conditions and apply appropriate spinal precautions.
0792.9.1	Determine and record the level of consciousness of the injured person, including person, place, time, and events.
0792.9.2	Assess for an inadequate airway, inadequate respiration, inadequate circulation, and profuse bleeding.
0792.9.3	Recognize when immediate correction is necessary.
0792.9.4	Assess the client/patient and determine if the client/patient has a life-threatening condition.
0792.9.5	Use spinal precautions as appropriate.

Age-Specific Assessment and Care

0792.10	Tailor assessments and care strategies for infants, children, and the elderly, including recognizing signs of abuse.
0792.10.1	Differentiate between the anatomy and physiology of the infant, child, and adult client/patient (vital signs, weight, pulmonary system, nervous system, psychological).
0792.10.2	Describe how assessment of the infant or child may be different from that of an adult.
0792.10.3	Describe various causes of respiratory emergencies and summarize emergency care strategies for infants, children, and the elderly.
0792.10.4	List common causes and describe the management of seizures in the infant and child client/patient.
0792.10.5	Discuss the emergency medical care of the infant, child, and elderly trauma client/patient.
0792.10.6	Summarize the signs and symptoms of child and elder abuse and neglect.
0792.10.7	Describe the medical-legal responsibilities in suspected child and elder abuse.
0792.10.8	Demonstrate assessment of the infant and child client/patient.

Public Health

0792.11	Understand basic public health principles and their relevance to EMS.
0792.11.1	Research the basic principles behind public health.
0792.11.2	Discuss the EMS interface with public health.

Emergency Medications

0792.12	Know emergency medications and demonstrate their administration.
0792.12.1	Know the names, effects, indications, routes of administration and dosages for all emergency medications (chemical antidote auto injector devices).
0792.12.2	Demonstrate self-administration of intramuscular injection by auto injector (advantages, disadvantages, techniques).

Basic Life Support

0792.13	Perform CPR, use an AED, and provide basic lifesaving procedures effectively.
0792.13.1	Establish and maintain an open airway using both manual and mechanical airway techniques.
0792.13.2	Restore breathing and circulation by means of cardiopulmonary resuscitation (CPR).
0792.13.3	Demonstrate proficiency in the use of an automated external defibrillator (AED).
0792.13.4	Demonstrate proficiency in using basic lifesaving procedures.

Bleeding

0792.14	Control external bleeding, recognize internal bleeding, and apply trauma treatment standards.
0792.14.1	Identify items that can be used to control external bleeding and minimize the contamination of open wounds.
0792.14.2	Apply pressure dressings that will control bleeding and minimize the contamination of open wounds.
0792.14.3	Identify the likelihood of internal bleeding through observations of signs, symptoms, and mechanisms of injury.
0792.14.4	Care for a client/patient who exhibits the signs and symptoms of internal bleeding.
0792.14.5	Apply current trauma treatment standards when applying a tourniquet which may include Prehospital Trauma Life Support (PHTLS) standards.

Shock

0792.15	Recognize and address shock promptly as part of client/patient care.
0792.15.1	Recognize the likelihood that shock may occur or be present based on client/patient assessment and observation of a mechanism of injury.
0792.15.2	Provide anti-shock measures as a part of routine client/patient care.

Airway Management

0792.16	Maintain airway and ventilation using mechanical devices and oxygen therapy, considering age-related variations.
0792.16.1	Apply knowledge of Anatomy and Physiology to airway management procedures (e.g., patent airway, mechanical ventilation, respiration perfusion).
0792.16.2	Understand the pathophysiology of respiratory dysfunction.
0792.16.3	Use available mechanical devices to assure the maintenance of an open airway and assist ventilation
0792.16.4	Demonstrate proficiency in supplemental oxygen therapy, including portable oxygen cylinders and oxygen delivery devices.
0792.16.5	Describe and demonstrate airway management utilizing upper airway suctioning.

0792.16.6	Consider age-related variation in pediatric and geriatric clients/patients.

Assessment: Scene Size-up

0792.17	Identify hazards, ensure scene safety, and use personal protective equipment.
0792.17.1	Secure the safety of the scene by describing common scene hazards.
0792.17.2	Manage the scene by demonstrating knowledge of the impact of the environment on client/patient care, addressing hazards, assessing potential for violence and the need for additional or specialized resources.
0792.17.3	Implement/demonstrate use of standard precautions and personal protective equipment.

Client/Patient Evacuation and Transfer

0792.18	Safely evacuate and transfer clients/patients, considering appropriate methods and client/patient needs.
0792.18.1	Describe situations when a person should be evacuated or transferred.
0792.18.2	Use the most appropriate assistance, drag, or carry (alone or with a partner) to move a sick or injured person from a dangerous location to a safe place.
0792.18.3	Maintain safety precautions during evacuation and transfer.
0792.18.4	Demonstrate an understanding of the purpose and use of transfer methods for clients/patients, including stair chairs and stretchers.
0792.18.5	Provide emergency evaluation and transfer of a sick and/or injured person.

Primary Assessment

0792.19	Promptly identify and address life-threatening conditions, assess consciousness, airway, breathing, and circulation.
0792.19.1	Identify those conditions that represent an immediate threat to the client/patient's life.
0792.19.2	Demonstrate assessment of level of consciousness, airway status, breathing status, circulatory status.
0792.19.3	Identify life threats.
0792.19.4	Assess vital functions.
0792.19.5	Begin interventions needed to preserve life.

Secondary Assessment

0792.20	Conduct comprehensive physical examinations, assess pain, vital signs, and gather relevant information.
0792.20.1	Conduct a methodical head-to-toe physical examination to discover conditions not found during the primary assessment.
0792.20.2	Demonstrate a focused assessment of pain.
0792.20.3	Demonstrate assessment of vital signs.
0792.20.4	Consider special interventions for pediatric and geriatric clients/patients (normal vital signs by age etc.).
0792.20.5	Interview the sick or injured person to obtain facts relevant to the person's condition.
0792.20.6	Interview co-workers, witnesses, family members, or other individuals to obtain facts relevant to the person's condition.

Re-assessment

0792.21	Monitor and treat changes in client/patient condition, reassess regularly, and compare to baseline status.
0792.21.1	Identify and treat changes in the client/patient's condition in a timely manner.
0792.21.2	Reassess at regular intervals.

0792.21.3	Reassess, including primary assessment, vital signs, chief complaint, and interventions.
0792.21.4	Compare reassessment to baseline status.
0792.21.5	Assess pain.
0792.21.6	Reassess the effectiveness of each intervention, consider the need for a new intervention.
0792.21.7	Consider age-related assessment data.

Neurology

0792.22	Recognize altered mental status, seizures, and stroke symptoms, and manage accordingly.
0792.22.1	Define altered mental status and the causes of altered mental status.
0792.22.2	Research type of seizures, causes, assessment findings and management.
0792.22.3	Describe the causes, assessment findings and management of a client/patient with stroke symptoms.

Abdominal and Gastrointestinal Disorders

0792.23	Understand acute abdomen, assessment techniques, and management options, including age-related considerations.
0792.23.1	Define acute abdomen.
0792.23.2	Identify assessment techniques and symptoms related to abdominal and gastrointestinal disorders.
0792.23.3	Research general management for a client/patient with abdominal pain.
0792.23.4	Become familiar with specific acute abdominal conditions.
0792.23.5	Consider age-related variations for pediatric and geriatric assessment and management related abdominal and gastrointestinal disorders.

Musculoskeletal Injuries

0792.24	Identify and manage various musculoskeletal injuries, including immobilization techniques and the use of traction splints.
0792.24.1	Identify the various types of musculoskeletal injuries.
0792.24.2	Immobilize and otherwise care for suspected fractures, dislocations, sprains and strains with available supplies and equipment, including commercially available and improvised devices.
0792.24.3	Demonstrate an understanding of the function and need for traction splints.

Cervical/Spinal Injuries

0792.25	Recognize the need for spinal immobilization, maintain proper cervical alignment, and secure the client/patient safely.
0792.25.1	Identify the need for spinal immobilization.
0792.25.2	Maintain in-line immobilization of the cervical spine.
0792.25.3	Place a proper fitting rigid extrication-type cervical collar.
0792.25.4	Place client/patient in supine position on full-length spine board.
0792.25.5	Secure client/patient to the immobilization device.

Immobilization

0792.26	Determine the necessity for extremity immobilization, assess circulation, apply splints, and monitor circulation status.
0792.26.1	Identify the need for extremity immobilization.
0792.26.2	Assesses motor, sensory, and distal circulation in extremities.
0792.26.3	Place a proper fitting splint on the extremity.
0792.26.4	Reassesses motor, sensory, and distal circulation in extremities.

Caring for the Sick and/or Injured

0792.27	Provide comprehensive care for various medical emergencies, ensuring proper assessment and intervention.
0792.27.1	Identify and care for clients/patients with non-traumatic chest pain, utilizing client/patient assessment.
0792.27.2	Identify and care for clients/patients experiencing respiratory distress, utilizing client/patient assessment.
0792.27.3	Identify and care for clients/patients experiencing a diabetic emergency, utilizing client/patient assessment.
0792.27.4	Identify and care for a client/patient who is experiencing a seizure, utilizing client/patient assessment.
0792.27.5	Identify and care for a client/patient who has ingested, inhaled, absorbed, or been injected with a poisonous substance, utilizing client/patient assessment.
0792.27.6	Identify and care for a client/patient who is in an altered state of consciousness, utilizing client/patient assessment.
0792.27.7	Identify and care for a client/patient who is experiencing a stroke, utilizing client/patient assessment.
0792.27.8	Identify and care for a client/patient who has a foreign body in the eye, utilizing client/patient assessment.
0792.27.9	Identify and care for a client/patient with thermal, chemical, or electrical burns, determining the severity, including degree, body surface area, type, and location, utilizing client/patient assessment.
0792.27.10	Identify and care for a client/patient suffering from an environmental emergency, including heat cramps, heat exhaustion, heat stroke, and frostbite, utilizing client/patient assessment.

Client/Patient Care in Special Situations

0792.28	Tailor care to clients/patients with special needs, including children, the elderly, and individuals with physical or developmental disabilities.
0792.28.1	Identify clients/patients who have special needs.
0792.28.2	Care for injured/ill children.
0792.28.3	Care for the injured/ill elderly.
0792.28.4	Care for the injured/ill physically disabled.
0792.28.5	Care for the injured/ill developmentally disabled.

Multiple Casualty Incidents

0792.29	Perform triage, provide care in mass casualty incidents, and adhere to operational protocols in disaster situations.
0792.29.1	Categorize the victims of multiple casualty incidents according to the severity of injury or illness based on client/patient assessments.
0792.29.2	Use triage tags or other identification devices available locally to indicate priorities for pre-hospital emergency care and transportation to medical facilities.
0792.29.3	Work as a member of a team to perform triage at locations of multiple casualty incidents.
0792.29.4	Work as a member of a team to perform client/patient assessments at locations of multiple casualty incidents.
0792.29.5	Work as a member of a team to carry out client/patient care procedures at the locations of multiple casualty incidents.
0792.29.6	Demonstrate knowledge of the operating procedures during a terrorist event or during a natural or man-made disaster.

0792.29.7	Demonstrate a basic understanding of the Incident Command System (ICS) implemented by the Federal Emergency Management Agency (FEMA).
0792.29.8	Successfully complete Hazmat Awareness training meeting OSHA 1910.120.

Life-threatening Situations

0792.30	Minimize risks in critical situations through effective scene assessment and intervention.
0792.30.1	Take steps to minimize the chance of injury or death to all involved when confronted with a potentially life-threatening situation based on an assessment of the scene.

Entrapment

0792.31	Safely manage entrapment scenarios, identifying hazards and utilizing appropriate equipment.
0792.31.1	Identify accident-related hazards and undertake hazard control measures consistent with the capabilities of the Emergency Medical Responder and available equipment.
0792.31.2	Use available equipment safely to gain access to persons who are entrapped.
0792.31.3	Use available equipment safely to disentangle persons from mechanisms of entrapment.

Emergency Childbirth

0792.32	Evaluate and manage imminent deliveries, ensuring the safety of both mother and baby.
0792.32.1	Evaluate a mother to determine whether delivery is imminent.
0792.32.2	Assist with a normal delivery.
0792.32.3	Care for the mother and baby.
0792.32.4	Identify abnormal childbirth situations and care for the mother and baby within the Emergency Medical Responder's capabilities.

Non-medical Operational Skills

0792.33	Understand operational phases, incident command system components, and response protocols in various emergency scenarios.
0792.33.1	Differentiate the phases of a prehospital call.
0792.33.2	Identify the major components of an incident command system.
0792.33.3	Discuss your role as a first responder in extrication.
0792.33.4	List various methods of gaining access to the client/patient.
0792.33.5	Explain what to do if there is a hazard at the scene.
0792.33.6	State role you perform until appropriate trained personnel arrive.
0792.33.7	Describe criteria for a multiple casualty situation and discuss your role as a first responder.

Students build on the knowledge and skills gained from previous courses to design innovative solutions for the most pressing health challenges of the 21st century. Students address topics ranging from public health and biomedical engineering to clinical medicine and physiology. They have the opportunity to work on an independent design project with a mentor or advisor from a university, medical facility, or research institution.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Notes: teachers must attend and successfully complete a course-specific training session sponsored by PLTW. Required skill sets are dispersed at that time.

Work Habits

0795.1	Demonstrate professional work habits.
0795.1.1	Effectively design emergency care centers.
0795.1.2	Conduct reliable studies.
0795.1.3	Propose medical innovations.
0795.1.4	Explore biomedical problems.
0795.1.5	Present findings to a professional audience.
0795.2	Demonstrate the ability to organize, implement, and troubleshoot specific tasks.
0795.2.1	Organize, implement, and troubleshoot tasks related to biomedical research and innovation.
0795.2.2	Developing skills in project management, data analysis, and problem-solving.
0795.3	Demonstrate the ability to work in teams and as an individual.
0795.3.1	Work collaboratively in teams on group projects.
0795.3.2	Independently work on research projects and presentations.
0795.3.3	Develop both teamwork and individual initiatives.

Knowledge of Biotechnology

0795.4	Describe the life cycle of biotechnology product development.
0795.4.1	Outline the stages of biotechnology product development, including research, discovery, development, testing, regulatory approval, and commercialization.
0795.4.2	Describe the importance of interdisciplinary collaboration and iterative processes in biotechnology product development.
0795.4.3	Explain how regulatory requirements and market considerations influence the life cycle of biotechnology products.
0795.5	Identify the application of the biotechnology industry.
0795.5.1	Identify diverse applications of biotechnology in various sectors, including healthcare, agriculture, food production, environmental remediation, and industrial processes.
0795.5.2	Discuss specific examples of biotechnology products or technologies used in medical diagnostics, therapeutics, genetic engineering, and biomanufacturing.
0795.5.3	Analyze the impact of biotechnology on addressing global challenges such as disease outbreaks, food security, and environmental sustainability.

Laboratory Knowledge and Skills

0795.6	Demonstrate competency in validating and using laboratory equipment.
0795.6.1	Operate and validate various laboratory equipment used in biomedical research and innovation, such as spectrophotometers, centrifuges, PCR machines, electrophoresis systems, and microscopes.
0795.7	Demonstrate competency in using computer office applications.
0795.7.1	Utilize computer office applications to analyze data, create presentations, and write reports related to biomedical innovation projects. This includes proficiency in software like Microsoft Excel, PowerPoint, and Word.
0795.8	Perform basic laboratory math skills.
0795.8.1	Apply basic mathematical principles, including measurements, conversions, dilutions, and calculations of concentrations and volumes, essential for conducting experiments and analyzing experimental data accurately.
0795.9	Apply statistical analysis to interpret data.
0795.9.1	Learn statistical analysis techniques to interpret experimental data, including measures of central tendency, variability, hypothesis testing, and correlation analysis, to draw valid conclusions from experimental results.
0795.10	Demonstrate the ability to use the scientific method.
0795.10.1	Follow the scientific method to design and conduct experiments, formulate hypotheses, collect, and analyze data, and draw conclusions, ensuring rigor and reliability in their biomedical innovation projects.
0795.11	Properly prepare buffers and solutions.
0795.11.1	Prepare buffers and solutions accurately and precisely, following standard protocols and calculations to ensure the correct pH, concentration, and composition necessary for various laboratory procedures.
0795.12	Demonstrate the concepts of recombinant technology.
0795.12.1	Understand the principles of recombinant DNA technology, including gene cloning, gene expression, and genetic engineering techniques, and apply these concepts in designing and implementing biomedical innovation projects.
0795.13	Demonstrate the principles of DNA isolation.
0795.13.1	Learn techniques for isolating DNA from various biological samples, including cells, tissues, and bodily fluids, using methods such as DNA extraction kits, phenol-chloroform extraction, and column-based purification.
0795.14	Perform Polymerase Chain Reaction (PCR).
0795.14.1	Perform PCR experiments to amplify specific DNA sequences, utilizing thermocyclers and PCR reagents to replicate DNA segments for further analysis in biomedical innovation projects.
0795.15	Perform electrophoresis.
0795.15.1	Conduct electrophoresis experiments to separate nucleic acids or proteins based on size or charge, using agarose or polyacrylamide gels and gel electrophoresis apparatus to analyze DNA fragments or protein bands.
0795.16	Perform separation techniques.
0795.16.1	Set up and run chromatography procedures.
0795.16.2	Collect and analyze fractions for separated components.
0795.16.3	Troubleshoot chromatography procedures for optimal separation.
0795.17	Explain and perform aseptic technique.
0795.17.1	Understand the principles of aseptic technique and practice sterile procedures to prevent contamination in laboratory experiments, including proper handwashing, working in a laminar flow hood, and sterilizing equipment.
0795.18	Demonstrate the concept of mammalian cell culture.

0795.18.1	Prepare and maintain mammalian cell cultures.
0795.18.2	Perform cell-based assays or experiments.
0795.18.3	Troubleshoot cell culture issues.
0795.19	Demonstrate the concept of laboratory automation.
0795.19.1	Set up and operate automated laboratory equipment.
0795.19.2	Program automation protocols for specific tasks.
0795.19.3	Monitor and troubleshoot automated processes.
0795.20	Demonstrate the concepts of microbial culture.
0795.20.1	culture microbial organisms, such as bacteria, yeast, or fungi, under controlled laboratory conditions, including media preparation, inoculation, incubation, and microbial identification techniques, as part of biomedical innovation projects.

Safety in the Biotechnology Laboratory

0795.21	Demonstrate general requirements for laboratory safety.
0795.21.1	Understand and adhere to general laboratory safety rules and regulations to maintain a safe working environment.
0795.21.2	Identify potential hazards in the laboratory and take appropriate measures to mitigate risks.
0795.21.3	Demonstrate proficiency in handling equipment, chemicals, and biological materials safely.
0795.22	Identify and use personal protective equipment (PPE).
0795.22.1	Recognize different types of personal protective equipment (PPE) required for various laboratory tasks.
0795.22.2	Demonstrate the proper use of PPE, including lab coats, gloves, safety goggles, and respirators, to protect themselves from potential hazards.
0795.22.3	Understand the importance of wearing PPE consistently and correctly during laboratory activities.
0795.23	Follow SDS guidelines for handling, storage, and disposal of hazardous materials.
0795.23.1	Understand the purpose and content of Safety Data Sheets (SDS) and know how to access them for hazardous substances used in the laboratory.
0795.23.2	Follow SDS guidelines for the safe handling, storage, and disposal of chemicals and biological materials.
0795.23.3	Demonstrate knowledge of appropriate waste disposal methods and regulations to minimize environmental impact.
0795.24	Demonstrate knowledge of safety regulatory agencies, such as OSHA.
0795.24.1	Learn about relevant safety regulatory agencies, such as the Occupational Safety and Health Administration (OSHA), and their roles in establishing and enforcing workplace safety standards.
0795.24.2	Understand the legal requirements and responsibilities of employers and employees regarding workplace safety.
0795.24.3	Apply knowledge of safety regulations and standards set by regulatory agencies to ensure compliance in laboratory settings.

Working in a Highly Regulated Environment

0795.25	Perform documentation according to regulatory agency standards.
0795.25.1	Understand the documentation requirements set forth by regulatory agencies, such as the Food and Drug Administration (FDA) or the European Medicines Agency (EMA), pertaining to biotechnology and biomedical innovation.
0795.25.2	Document laboratory procedures, experimental data, and research outcomes in compliance with regulatory standards.
0795.25.3	Demonstrate proficiency in maintaining accurate and detailed records to support regulatory submissions and audits.

0795.26	Document lab activities and findings according to guidelines.
0795.26.1	Maintain comprehensive laboratory notebooks or electronic records that accurately record experimental procedures, observations, and results.
0795.26.2	Demonstrate proficiency in organizing and formatting lab documentation according to standard scientific practices and institutional guidelines.

Appropriate Use of Equipment and Instrumentation

0795.27	Use laboratory glassware.
0795.27.1	Select appropriate glassware for specific laboratory tasks.
0795.27.2	Handle laboratory glassware with care to prevent breakage and contamination.
0795.27.3	Clean laboratory glassware thoroughly before and after use.
0795.28	Use volumetric equipment.
0795.28.1	Accurately measure and dispense liquids using graduated cylinders, pipettes, and burettes.
0795.28.2	Ensure proper calibration and zeroing of volumetric equipment before use.
0795.28.3	Practice proper techniques to minimize parallax error when reading volumetric measurements.
0795.29	Use electrophoresis equipment.
0795.29.1	Set up electrophoresis gel according to protocol.
0795.29.2	Load samples onto the gel using micropipettes or loading buffers.
0795.29.3	Run electrophoresis under appropriate voltage and time conditions.
0795.29.4	Interpret electrophoresis results accurately to analyze DNA or protein fragments.
0795.30	Use a spectrophotometer.
0795.30.1	Prepare samples and cuvettes for spectrophotometric analysis.
0795.30.2	Set appropriate wavelength and blank the spectrophotometer.
0795.30.3	Measure absorbance or transmittance of samples and record data accurately.
0795.30.4	Calculate concentration or determine purity based on spectrophotometric readings.
0795.31	Use balances.
0795.31.1	Calibrate balances before use and verify accuracy using standard weights.
0795.31.2	Tare the balance to zero before weighing samples.
0795.31.3	Handle samples carefully and avoid overloading the balance.
0795.31.4	Record precise measurements and units for all weighed samples.
0795.32	Demonstrate knowledge of autoclaves.
0795.32.1	Understand the principles of autoclave operation and sterilization.
0795.32.2	Load autoclave trays or chambers correctly to ensure even sterilization.
0795.32.3	Set appropriate sterilization parameters (temperature, pressure, time) for different materials and applications.
0795.32.4	Monitor autoclave cycles and ensure proper ventilation and safety protocols.
0795.33	Use centrifuges.
0795.33.1	Load centrifuge tubes with balanced samples to prevent imbalance during operation.
0795.33.2	Set appropriate speed (rpm) and time settings for specific centrifugation protocols.
0795.33.3	Safely start and stop centrifuge operations according to manufacturer instructions.
0795.33.4	Handle centrifuge rotors and tubes carefully to prevent spills and accidents.
0795.34	Use pH meters.
0795.34.1	Calibrate pH meters using standard buffer solutions.
0795.34.2	Prepare samples and electrodes for pH measurements.
0795.34.3	Immerse electrodes into samples and wait for stable pH readings.
0795.34.4	Record pH measurements accurately and adjust as necessary for temperature variations.

0795.35	Demonstrate knowledge of thermocyclers.
0795.35.1	Understand the principles of PCR and DNA amplification.
0795.35.2	Set up thermocycler programs with appropriate cycling parameters (denaturation, annealing, extension).
0795.35.3	Load PCR reaction mixtures into thermal cycler wells or tubes.
0795.35.4	Monitor thermocycler runs and troubleshoot any technical issues that may arise.
0795.36	Use microscopes.
0795.36.1	Adjust microscope settings (magnification, focus, illumination) for optimal viewing.
0795.36.2	Prepare microscope slides and specimens for observation.
0795.36.3	Use proper microscopy techniques to focus and scan specimens.
0795.36.4	Identify and characterize microscopic structures based on morphology and staining.
0795.37	Demonstrate knowledge of laboratory hoods for worker protection.
0795.37.1	Understand the purpose and function of laboratory hoods in controlling exposure to hazardous fumes, vapors, or aerosols.
0795.37.2	Properly operate laboratory hoods to maintain adequate airflow and containment.
0795.37.3	Use appropriate personal protective equipment (PPE) when working with hazardous materials.
0795.37.4	Adhere to safety protocols and guidelines for working with chemicals and biological agents in laboratory hoods.
0795.38	Demonstrate knowledge of temperature regulating devices (e.g., water baths, incubators).
0795.38.1	Set temperature parameters on temperature-regulating devices according to experimental requirements.
0795.38.2	Monitor and maintain stable temperature conditions within water baths, incubators, or other temperature-controlled equipment.
0795.38.3	Use temperature probes or thermometers to verify and adjust temperature settings as needed.
0795.38.4	Follow safety protocols for handling hot or cold equipment and samples.
0795.39	Demonstrate knowledge of chromatographic equipment.
0795.39.1	Understand the principles of chromatography and separation techniques.
0795.39.2	Set up chromatographic columns or systems for sample separation.
0795.39.3	Prepare samples for chromatographic analysis and load onto the column or instrument.
0795.39.4	Interpret chromatograms to analyze sample components based on retention times and peak patterns.

Design of Clinical Care Center

0795.40	Investigate biomedical problems related to clinical care by designing an effective emergency care center.
0795.40.1	Evaluate the significant role that biomedical innovation plays in treating disease, reducing wait time, and promoting efficient care in emergency room and emergency care centers.
0795.40.2	Analyze website content and assess overall credibility of the information.
0795.40.3	Produce an effective presentation of scientific information by using oral communication skills and PowerPoint presentation.
0795.40.4	Using brainstorming and problem-solving skills propose solutions to healthcare delivery problems in the 21st century.
0795.40.5	Design an innovative emergency medicine delivery system.
0795.40.6	Demonstrate proficiency in using online search engines and journal databases to locate reliable scientific articles.

Designing Reliable and Valid Studies

0795.41	Explore the variety of research study designs available and investigate how to set up and conduct valid and reliable studies.

0795.41.1	Critique science data presented in popular media and compare this with data presented in scientific journals.
0795.41.2	Using knowledge of specified statistical analysis methods, analyze the results of experimental studies.
0795.41.3	Design, conduct and analyze an experimental study to answer a question regarding one or more body systems.
0795.41.4	Using at least three statistical fallacies, assume the role of an advertisement salesperson selling a fictitious product.
0795.41.5	Reflect on the various biomedical career fields related to clinical or research studies and describe two of these career fields.

Designing Medical Innovations

0795.42	Explore the process, knowledge and skills required to design a medical innovation.
0795.42.1	Investigate the evolution of biomedical products.
0795.42.2	Brainstorm ideas for a new biomedical product or methods to improve on an existing product.
0795.42.3	Discuss the concept of design process and how it is significant to medical innovation.
0795.42.4	Choose a problem to solve and then research the past and present solutions to this problem.
0795.42.5	Examine possible design solutions to the problem chosen, select the best approach and develop a design proposal.
0795.42.6	Design a marketing plan to pitch the chosen solution to potential investors.

Innovation for Water Contamination

0795.43	Explore biomedical innovation through investigating water contamination.
0795.43.1	List and describe multiple causes of water contamination.
0795.43.2	Explain why water quality is a global issue.
0795.43.3	Extrapolate on the cause of non-point source pollution and its implications.
0795.43.4	Using knowledge of specific assays, interpret the results of various chemical and culture assays and identify specific contaminants found.
0795.43.5	Research and propose solutions to prevent or treat water contamination.
0795.43.6	Determine local potential hazards or sources of contamination of local water samples and research local and Internet resources to investigate the condition of the local water delivery system.

Public Health

0795.44	Evaluate a public health issue and combat the problem using knowledge of epidemiology, disease diagnosis and public health resources.
0795.44.1	Discuss the significant role that epidemiologists and public health investigators play in a public health crisis or disease outbreak.
0795.44.2	Describe how to set up case control and cohort studies.
0795.44.3	Discuss how measures of association are used to illustrate the correlation between specific risk factors and the development of disease.
0795.44.4	Calculate the measures of association used to assess risk in case control and cohort studies.
0795.44.5	List and discuss the various components that may be involved in a public health intervention plan.
0795.44.6	Determine the source of a mystery illness by examining evidence documents and data including laboratory results, imaging results, disease maps and molecular data.
0795.44.7	Research local, national, and global health issues and analyze how culture, geographic location and access to health care affect health and wellness.
0795.44.8	Write a grant proposal outlining an intervention plan for a particular public health issue.

0795.44.9	Present and defend the proposed intervention plan to a professional audience.

Medical Research

0795.45	Understand medical research and the process of writing a scientific grant.
0795.45.1	Define and elaborate on what medical research is used for and how funding for it is obtained.
0795.45.2	Explain the role of a grant in relation to medical research.
0795.45.3	Understand the difference between what constitutes a credible source opposed to a non-credible source when conducting a literature search.
0795.45.4	Distinguish between primary and secondary sources.
0795.45.5	Discuss potential bias based on constructing and funding sources of research.
0795.45.6	Discuss the role of an IRB in ensuring safety of a research project prior to data initiation.
0795.45.7	Understand and identify the process by which a grant is created and the principal components that are present in scientific grant proposals (i.e., abstract, specific aims, background and significance, preliminary data/progress, project description, resources, supplemental materials).
0795.45.8	Prepare, write, and present a detailed grant proposal for a research project that will impact a specific aspect of a disease or medical condition.

Molecular Biology Techniques

0795.46	(Optional) Use modern molecular biology techniques to clone and transfer DNA.
0795.46.1	Explain the structure and function of plasmids, and how they are used in genetic engineering.
0795.46.2	Describe the role restriction enzymes and how they interact with plasmids.
0795.46.3	Interpret plasmid maps to determine the results of specific digestions with restriction enzymes.
0795.46.4	Explain how to assemble recombinant DNA and clone a gene of interest using bacterial cells.
0795.46.5	Interpret gel electrophoresis results to determine the success of a cloning experiment.
0795.46.6	Using the process of bacterial transformation, insert a new plasmid into bacterial cells.
0795.46.7	Draw and label possible ligation products and describe digestion results for each product.

Forensic Techniques

0795.47	(Optional) Assuming the role of a medical expert, investigate a mysterious death using forensics autopsy techniques.
0795.47.1	Describe observations of the internal and external anatomy of a fetal pig.
0795.47.2	Evaluate a fetal pig for any abnormalities that may have led to the pig's death.
0795.47.3	Complete an autopsy report for the fetal pig.
0795.47.4	Solve the cause of death for a fetal pig by assuming the role of a forensic pathologist.
0795.47.5	Design a fictitious death scenario using knowledge of the human body.
0795.47.6	Create fictitious documents including an autopsy report and medical history to illustrate clues left behind in a dead body.
0795.47.7	Research and reflect on the various biomedical careers involved in forensic pathology and describe two of these careers in detail.

Independent Study Project

0795.48	(Optional) Students work independently in an area of interest in the biomedical sciences and outline milestones in a long-term open ended problem using skills learned throughout the program to complete the project.
0795.48.1	Choose a topic and describe work previously completed pertaining to that topic.

0795.48.2	Interpret charts, graphs, data sets and any other information related to the project.
0795.48.3	Utilize time and project management skills to complete the approved project in the time allotted.
0795.48.4	Apply skills and knowledge of researching a topic, evaluating information and decision making to complete the project.
0795.48.5	Write a well-constructed final report describing the purpose, procedures and results of the project and present this information orally.
0795.48.6	Create a final product related to the project.
0795.48.7	Write a self-analysis of what was learned during the project with a focus on whether things should have been done differently or not.
0795.48.8	Prepare a portfolio of all artifacts related to the project to demonstrate the work progression.

Instructional content will focus on basic operation of a 12-lead electrocardiograph machine, explanation of the Einthoven triangle related to the cardiac system. Students will identify the anatomic position of each of the chest leads, prepare a patient for a 12-Lead EKG, maintain the EKG machine, and maintain EKG tracings in the patient's chart. The student will interpret and evaluate electrocardiogram tracing. Students participate in clinical practicum for the EKG Technician. Clinical experiences may occur in a variety of settings that utilize EKG monitors.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Academic Foundations

0810.1	Comprehend cardiovascular system structures, functions, diseases, and disorders.
0810.1.1	Locate the heart and surrounding structures.
0810.1.2	Diagram and label the parts of the heart and list the functions of each labeled part.
0810.1.3	Trace the flow of blood through the cardiopulmonary system.
0810.1.4	Identify and describe the electrical conduction system.
0810.1.5	Identify common diseases and disorders of the cardiovascular system.
0810.2	Describe cardiovascular drug mechanisms.
0810.2.1	Describe mechanisms by which cardiovascular drugs work.
0810.2.2	Identify response to cardiac emergency.
0810.2.3	List common cardiovascular drugs.
0810.2.4	State actions and adverse effects of commonly used cardiovascular drugs.
0810.2.5	Differentiate between normal and abnormal ECG changes due to drugs.
0810.3	Apply healthcare math computations and analyze data including ECG tracings for interpretation.
0810.3.1	Apply mathematical computations related to healthcare procedures (metric and household, conversions, and measurements).
0810.3.2	Analyze diagrams, charts, graphs, and tables to interpret healthcare results.
0810.3.3	Analyze ECG tracing to interpret client/patient results.

Communications

0810.4	Showcase proficiency in effective communication, medical terminology, and electrocardiograph technician skills within a healthcare context.
0810.4.1	Report subjective and objective information.
0810.4.2	Use roots, prefixes, and suffixes to communicate information.
0810.4.3	Use medical abbreviations to communicate information.
0810.4.4	List, classify and discuss various departments and services within the health care setting in which the ECG technician must interact to obtain laboratory specimens from clients/patients.
0810.4.5	Identify the major departments/sections within the acute care setting and the major types of procedures run in each department/section.

Legal Responsibilities and Ethics

0810.5	Understand legal responsibilities of an ECG Technician.

0810.5.1	Recognize and practice legal and ethical responsibilities as they relate to an ECG technician.
0810.5.2	Maintain a safe and efficient work environment.
0810.5.3	Maintain ECG equipment so that it will be safe and accurate.
0810.5.4	Implement appropriate JCAHO client/patient safety goals.
0810.5.5	Apply procedures for accurate documentation and record keeping.
0810.5.6	Apply for Health Insurance Portability and Accountability Act (HIPAA).
0810.5.7	Summarize the Patient Bill of Rights.
0810.5.8	Describe and demonstrate an understanding of informed consent.
0810.6	Comprehend ethical boundaries, practice, and social diversity in ethics.
0810.6.1	Differentiate between ethical and legal issues impacting healthcare.
0810.6.2	Recognize ethical issues and their implications related to healthcare.
0810.6.3	Apply procedures for reporting activities and behaviors that affect the health, safety, and welfare of others.
0810.6.4	Understand religious and cultural values as they impact healthcare.
0810.6.5	Demonstrate respectful and empathetic treatment of ALL clients/patients (customer service).

Safety Practices

0810.7	Demonstrate knowledge of infection control, personal safety, environmental safety, common hazards, and emergency protocols.
0810.7.1	Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.
0810.7.2	Apply skills to obtain training or certification in Bloodborne Pathogens
0810.7.3	Apply principles of body mechanics.
0810.7.4	Apply safety techniques in the work environment.
0810.7.5	Comply with safety signs, symbols, and labels.
0810.7.6	Identify hazardous materials.
0810.7.7	Practice fire safety in a healthcare setting.
0810.7.8	Practice quality assurance and safety as it relates to electrocardiography.

Teamwork

0810.8	Demonstrate knowledge of health care teams and team member participation.
0810.8.1	Demonstrate understanding of roles and responsibilities of team members.
0810.8.2	Apply effective techniques for managing team conflict.

Technical Skills

0810.9	Demonstrate skills and knowledge necessary to perform electrocardiography.
0810.9.1	Calibrate the cardiograph instrument.
0810.9.2	Identify three types of lead systems.
0810.9.3	State Einthoven's triangle.
0810.9.4	Demonstrate proper lead placement including lead placement for clients/patients with special needs.
0810.9.5	Identify artifacts and mechanical problems.
0810.9.6	Perform a 12 lead ECG.
0810.9.7	Recognize normal sinus rhythm.
0810.9.8	Report any rhythm that is not normal sinus rhythm.
0810.9.9	Describe the physical and mental preparation of the client/patient for ECG testing.
0810.9.10	Identify client/patient and verify the requisition order.

0810.9.11	Prepare client/patient for ECG testing.
0810.9.12	Measure and record patient's/client's vital signs and recognize and report abnormalities.
0810.9.13	Perform client/patient care techniques in the health care facility.
0810.9.14	State precautions required when performing an ECG.
0810.9.15	Describe the Holter monitoring and scanning exercise treatment.
0810.9.16	Describe other modalities of cardiovascular diagnosis and interpretation.

Information Technology Applications

0810.10	Demonstrate knowledge of computer usage as it relates to electrocardiograph technicians.
0810.10.1	Utilize current computer hardware and software.
0810.10.2	Identify records, files, and technology applications common to healthcare.
0810.10.3	Maintain security and confidentiality of electronic client/patient information adhering to workplace policies.
0810.11	Interpret normal and abnormal monitoring and testing results
0810.11.1	Measure waves, segments, complexes, rates, and intervals.
0810.11.2	Identify electrical axis.
0810.11.3	List purposes for pacemakers and indications for insertion.
0810.11.4	Recognize normal and deviations from normal sinus rhythms.
0810.11.5	Recognize normal and deviations from normal atrial rhythms.
0810.11.6	Recognize normal and deviations from normal atrio-ventricular rhythms.
0810.11.7	Recognize normal and deviations from normal ventricular rhythms.
0810.11.8	Recognize normal and deviations from normal types of heart blocks.
0810.11.9	Recognize normal and deviations from normal pacemaker rhythms.
0810.11.10	Recognize normal and deviations from normal types of myocardial ischemia and infarction.
0810.11.11	Recognize normal and deviations from normal atrial and ventricular hypertrophies.
0810.11.12	Recognize normal and deviations from normal extrasystole and other rare phenomena.
0810.11.13	Recognize normal and deviations from normal 12 lead ECG results.

Clinical Application

0810.12	Demonstrate knowledge of electrocardiograph technician certification requirements.
0810.12.1	Perform skills listed and obtained through mastery of theory content.
0810.12.2	Prior to clinical assignment, demonstrate minimum competence in performing electrocardiography procedures in a laboratory setting.
0810.12.3	Perfect individual competency in performing ECG tracings.
0810.12.4	Assist in a department that performs ECG tracings.
0810.12.5	Perform electrocardiograph technician skills in a healthcare facility.

Phlebotomy Skills

Course #: 0825

Allowable Teacher Endorsement: 7041, 7042, 7043, 7045, 7048, 7171, 7172, 7606, 7050

Instructional content will focus on performing laboratory duties requiring accuracy, timeliness, and documentation. The student will be able to function in the laboratory setting utilizing these skills. This course will enhance the students' knowledge of safety procedures as they relate to phlebotomy. They will be provided with the knowledge and skills necessary to maintain the standard procedures required for a laboratory. Legal and ethical issues to consider in the profession are an integral part of this course. The phlebotomist must be able to recognize appropriate methods for analyzing specimens. In this course, the student will learn these methods for collecting and processing the specimen to be analyzed. This externship is designed to provide students with hands-on experience in a clinical, physician's office or laboratory setting. They are required to complete certification requirements, which could require not less than 50 hours and up to 120 hours in the externship to receive credit for the course.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Academic Foundation

0825.1	Comprehend circulatory system structures, functions, diseases, and disorders.
0825.1.1	Describe and define major body systems with emphasis on the circulatory system.
0825.1.2	List and describe the main superficial veins used in performing venipuncture.
0825.1.3	Identify appropriate sites for capillary/venipuncture and name and locate the most desirable one(s).
0825.1.4	Describe the function of the following blood components: erythrocytes, thrombocytes, leukocytes, plasma, and serum.
0825.2	Apply healthcare math computations and analyze data.
0825.2.1	Apply mathematical computations related to healthcare procedures (metric and household, conversions, and measurements).
0825.2.2	Analyze diagrams, charts, graphs, and tables to interpret healthcare results.
0825.2.3	Record time using the 24-hour clock.

Communications

0825.3	Showcase proficiency in effective communication, medical terminology, and electrocardiograph technician skills within a healthcare context.
0825.3.1	Report subjective and objective information.
0825.3.2	Use roots, prefixes, and suffixes to communicate information.
0825.3.3	Use medical abbreviations to communicate information.
0825.3.4	List, classify and discuss various departments and services within which the phlebotomist must interact to obtain specimens from clients/patients.
0825.3.5	Identify the major departments/sections with the clinical laboratory, the major types of procedures run in each department/section, and their specimen requirements.

Legal Responsibilities and Ethics

0825.4	Understand the legal responsibilities of a Phlebotomy Technician.
0825.4.1	Apply procedures for accurate documentation and record keeping.
0825.4.2	Apply for the Health Insurance Portability and Accountability Act (HIPAA).
0825.4.3	Summarize the Patient's Bill of Rights.

0825.4.4	Describe and demonstrate an understanding of informed consent.
0825.5	Comprehend ethical boundaries, practice, and social diversity in ethics.
0825.5.1	Differentiate between ethical and legal issues impacting healthcare.
0825.5.2	Recognize ethical issues and their implications related to healthcare.
0825.5.3	Apply procedures for reporting activities and behaviors that affect the health, safety, and welfare of others.
0825.5.4	Understand religious and cultural values as they impact healthcare.
0825.5.5	Demonstrate respectful and empathetic treatment of ALL clients/patients (customer service).

Safety Practices

0825.6	Demonstrate knowledge of infection control, personal safety, environmental safety, common hazards, and emergency protocols.
0825.6.1	Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.
0825.6.2	Apply skills to obtain training or certification in Bloodborne Pathogens
0825.6.3	Apply principles of body mechanics.
0825.6.4	Apply safety techniques in the work environment.
0825.6.5	Comply with safety signs, symbols, and labels.
0825.6.6	Identify hazardous materials.
0825.6.7	Practice fire safety in a healthcare setting.
0825.6.8	Practice quality assurance and safety as it relates to phlebotomy

Teamwork

0825.7	Demonstrate knowledge of health care teams and team member participation.
0825.7.1	Demonstrate understanding of the roles and responsibilities of team members.
0825.7.2	Apply effective techniques for managing team conflict.

Technical Skills

0825.8	Demonstrate skills and knowledge necessary to perform phlebotomy.
0825.8.1	Describe the types of client/patient specimens that are analyzed in the clinical laboratory, and the phlebotomist's role in collecting and/or transporting these specimens to the laboratory.
0825.8.2	Demonstrate knowledge of established protocol for client/patient and specimen identification.
0825.8.3	Recognize a properly completed requisition and apply established protocol for client/patient and specimen identification.
0825.8.4	Discuss/perform appropriate methods for preparing a site for capillary or venipuncture.
0825.8.5	List appropriate antiseptic agents useful in preparing sites for capillary/venipuncture.
0825.8.6	Identify and discuss the proper use of appropriate types of equipment needed to collect various clinical laboratory blood specimens by venipuncture.
0825.8.7	Describe the correct order of draw during capillary and venipuncture.
0825.8.8	Identify and discuss the proper use of the various types of anticoagulants, preservatives and gels used in blood collection and the vacuum tube color-codes for these additives.
0825.8.9	Discuss/perform methods for facilitating capillary/venipuncture collection.
0825.8.10	Perform venipuncture by evacuated tube and syringe systems, demonstrating appropriate use of supplies, proper handling of equipment/specimens and appropriate client/patient care.
0825.8.11	Perform a capillary puncture using appropriate supplies and techniques for adults, children, and neonates.

Phlebotomy Skills**Course #: 0825****Allowable Teacher Endorsement:** 7041, 7042, 7043, 7045, 7048, 7171, 7172, 7606, 7050

0825.8.12	Describe the most common complications associated with capillary and venipuncture, their causes, prevention, and treatment.
0825.8.13	Describe/perform capillary/venipuncture procedures for disposing of used or contaminated supplies.
0825.8.14	Describe/perform appropriate techniques for making a peripheral blood smear for hematologic evaluation.
0825.8.15	Describe routine procedures for transporting and processing specimens.
0825.8.16	Describe the significance of time constraints for specimen collection and delivery.
0825.8.17	Demonstrate knowledge of accessioning procedures.
0825.8.18	Aliquot samples for testing.
0825.8.19	Describe the protocol for accepting verbal test orders.
0825.8.20	Explain the special precautions and types of equipment needed to collect blood from a neonate.
0825.8.21	Identify and discuss the proper use of supplies used in collecting micro specimens.
0825.8.22	Describe substances potentially encountered during phlebotomy that can interfere in the analysis of blood constituents.
0825.8.23	Define and utilize correct medical terminology and metric measurements needed for specimen collection.

This course is designed to provide the student with knowledge on health care laws and ethics, medical terminology, basic anatomy, injury recognition, and infection control related to Sports Medicine. It is also designed to allow instructional content to focus on Sports medicine-related professions and teamwork.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Documentation, Legal, and Ethical Issues

0840.1	Maintain the confidentiality of records/information as required by HIPAA.
0840.1.1	Understand the importance of client/patient confidentiality in sports medicine.
0840.1.2	Learn about HIPAA regulations and how they apply to handling client/patient records and information.
0840.1.3	Practice keeping client/patient information secure and private.
0840.1.4	Demonstrate proper procedures for maintaining confidentiality in various situations.
0840.2	Define informed consent and identify appropriate documentation.
0840.2.1	Define informed consent and its role in client/patient care.
0840.2.2	Identify the components of informed consent and how to communicate them effectively to clients/patients.
0840.2.3	Learn the importance of documenting informed consent properly.
0840.2.4	Practice obtaining informed consent and documenting it accurately in simulated scenarios.
0840.3	Analyze legal considerations and ethical actions.
0840.3.1	Explore legal and ethical considerations relevant to sports medicine practice.
0840.3.2	Analyze case studies to understand how to navigate legal and ethical dilemmas.
0840.3.3	Discuss the rights of athletes and clients/patients in various situations.
0840.3.4	Learn strategies for making ethical decisions and maintaining professionalism in sports medicine settings.

Emergency Care and Infection Control

0840.4	Identify the components of an Emergency Action Plan (EAP).
0840.4.1	Collaborate with healthcare professionals to understand the key components of an Emergency Action Plan (EAP) in sports medicine settings.
0840.4.2	Analyze case studies and real-life scenarios to identify potential emergencies and appropriate responses.
0840.4.3	Develop, review, and revise EAPs for different sports venues and events, considering factors such as location, audience, and available resources.
0840.4.4	Conduct regular drills and simulations to ensure proficiency in implementing EAPs during emergencies.
0840.5	Perform proper handwashing technique.
0840.5.1	Understand the importance of hand hygiene in preventing the spread of infections in sports medicine settings.
0840.5.2	Demonstrate and practice proper handwashing technique according to CDC guidelines, emphasizing thoroughness and duration.
0840.5.3	Apply handwashing techniques in simulated clinical settings and real-world scenarios.
0840.6	Identify various bloodborne pathogens and comply with OSHA standards.
0840.6.1	Learn common bloodborne pathogens relevant to sports medicine, such as HIV, HBV, and HCV.

0840.6.2	Discuss OSHA standards and regulations related to bloodborne pathogens, recognizing the importance of compliance in healthcare settings.
0840.6.3	Demonstrate proper handling and disposal of sharps, contaminated materials, and biohazardous waste.
0840.6.4	Utilize resources to protect from exposure to bloodborne pathogens, including the use of engineering controls and safe work practices.
0840.7	Utilize Personal Protective Equipment (PPE).
0840.7.1	Learn different types of Personal Protective Equipment (PPE) used in sports medicine, such as gloves, masks, goggles, and gowns.
0840.7.2	Demonstrate proper techniques for donning, doffing, and disposing of PPE to minimize the risk of exposure to infectious agents.
0840.7.3	Participate in hands-on practice sessions with various PPE and learn when and how to use them effectively.
0840.7.4	Understand the importance of selecting the appropriate PPE based on the specific task, level of risk, and type of exposure anticipated in sports medicine practice.

Anatomy, Physiology, Pathophysiology, and Medical Terminology

0840.8	Use medical terminology and abbreviations/acronyms.
0840.8.1	Demonstrate fluency in utilizing medical terminology and abbreviations/acronyms in written and verbal communication related to sports medicine.
0840.8.2	Apply appropriate medical terminology and abbreviations/acronyms accurately in documentation, reports, and discussions within the context of sports medicine.
0840.9	Identify anatomical position, body planes, directions, and cavities.
0840.9.1	Describe and demonstrate the anatomical position and its significance in sports medicine.
0840.9.2	Differentiate between various body planes and accurately identify anatomical structures in each plane.
0840.9.3	Explain directional terms and apply them to describe movements and positions in sports medicine contexts.
0840.9.4	Identify and describe major body cavities and their relevance in sports medicine assessments and interventions.
0840.10	Identify organs, functions, and disease processes of the integumentary system.
0840.10.1	List and describe the organs comprising the integumentary system.
0840.10.2	Explain the functions of the integumentary system in relation to sports medicine practices.
0840.10.3	Identify common disease processes affecting the integumentary system and their implications for athletes.
0840.11	Identify organs, functions, and disease processes of the skeletal system.
0840.11.1	Identify the major bones and joints of the skeletal system.
0840.11.2	Describe the functions of the skeletal system in supporting movement and protecting vital organs, particularly relevant to sports medicine.
0840.11.3	Recognize common skeletal system disorders and injuries encountered in sports medicine and their management.
0840.12	Identify organs, functions, and disease processes of the muscular system.
0840.12.1	Identify the major muscles and muscle groups in the human body.
0840.12.2	Explain the functions of the muscular system in movement and stability, emphasizing their significance in sports medicine.
0840.12.3	Identify common muscular system injuries, conditions, and diseases relevant to athletes.
0840.13	Identify organs, functions, and disease processes of the nervous system.

0840.13.1	Identify the key components of the nervous system including the brain, spinal cord, and peripheral nerves.
0840.13.2	Describe the functions of the nervous system and its relevance to sports medicine, including coordination, sensation, and response to stimuli.
0840.13.3	Recognize common neurological disorders and injuries encountered in sports medicine and their implications for athlete assessment and care.
0840.14	Identify organs, functions, and disease processes of the cardiovascular system.
0840.14.1	Describe the organs and structures comprising the cardiovascular system.
0840.14.2	Explain the functions of the cardiovascular system, particularly in relation to oxygen transport, circulation, and performance in sports.
0840.14.3	Identify common cardiovascular disorders and conditions affecting athletes, including recognition of signs and symptoms requiring immediate attention.
0840.15	Identify organs, functions, and disease processes of the respiratory system.
0840.15.1	Identify the organs and structures of the respiratory system.
0840.15.2	Explain the functions of the respiratory system, particularly in relation to oxygen exchange and athletic performance.
0840.15.3	Recognize common respiratory disorders and conditions affecting athletes, including their impact on exercise tolerance and performance.

Sports Medicine Laws and Ethics

0840.16	Develop a comprehensive understanding of sports medicine law.
0840.16.1	Investigate and evaluate the legal considerations in the management of sport injuries.
0840.16.2	Define the terms tort and negligence and describe commission and omission negligence.
0840.16.3	Describe the criteria used to evaluate and establish proof of negligence.
0840.16.4	Discuss the Good Samaritan law, including its legal implications for school personnel such as coaches or athletic trainers.
0840.16.5	Describe appropriate procedures to limit liability in the instance of a sports injury.
0840.16.6	Explain Health Insurance Portability and Accountability Act (HIPAA) and describe its application when managing a sports injury incident.
0840.16.7	Research and discuss local district policy and procedures related to civil litigation.
0840.17	Discuss the ethics of sports-injury care for athletes.
0840.17.1	Analyze case studies to understand ethical considerations in sports injury care.
0840.17.2	Engage in debates to explore ethical dilemmas.
0840.17.3	Research professional ethical guidelines in sports medicine.
0840.17.4	Participate in role-playing for ethical decision-making practice.
0840.17.5	Collaborate on strategies for promoting ethical behavior in sports medicine.
0840.17.6	Reflect on personal values on ethical decisions.
0840.17.7	Apply learned principles to develop action plans for ethical challenges in practice.

Body Systems

0840.18	Analyze joint types.
0840.18.1	Differentiate between various types of joints, including synarthroses, amphiarthroses, and diarthroses.
0840.18.2	Identify specific examples of each joint type found in the human body.
0840.18.3	Compare and contrast the structural and functional characteristics of different joint types.
0840.19	Analyze joint characteristics.

0840.19.1	Examine the structural components of synovial joints, including articular cartilage, synovial membrane, synovial fluid, and joint capsule.
0840.19.2	Analyze the roles of ligaments, tendons, and muscles in supporting and stabilizing different types of joints.
0840.19.3	Evaluate the range of motion and mobility associated with different joint characteristics.
0840.20	Analyze articulating structures.
0840.20.1	Identify the articulating surfaces and structures involved in various types of joints.
0840.20.2	Describe the role of articulating structures in facilitating smooth joint movement and function.
0840.20.3	Analyze the adaptations of articulating structures in response to different types of physical activity and sports-related movements.
0840.21	Apply knowledge to sports medicine contexts.
0840.21.1	Relate the understanding of joint types, characteristics, and articulating structures to sports-related injuries and conditions.
0840.21.2	Analyze the biomechanical implications of joint characteristics in sports performance and injury prevention.
0840.21.3	Develop strategies for assessing and managing joint-related issues encountered in sports medicine practice.

Injury Recognition

0840.22	Differentiate injury types, understand inflammatory and healing processes, and demonstrate injury evaluation skills.
0840.22.1	Differentiate between acute and chronic injury.
0840.22.2	Describe acute traumatic injuries (i.e., fractures, dislocations and subluxations, contusions, ligament sprains, muscle strains, muscle soreness, and nerve injuries).
0840.22.3	Identify chronic overuse injuries and their causes in sports (i.e., shin splints, plantar fasciitis, and stress fractures).
0840.22.4	Describe the phases of the inflammatory process due to injury.
0840.22.5	Identify the various phases of the healing process.
0840.22.6	Demonstrate the steps in evaluation of injury.
0840.22.7	Differentiate between acute and chronic injury.

Safety

0840.23	Develop and implement protocols for maintaining a safe treatment area.
0840.23.1	Describe guidelines and procedures for maintaining and cleaning a safe and sanitary treatment area, including the use of disinfectants, antiseptics, and sanitization techniques.
0840.23.2	Recognize, properly report, and apply strategies of risk management according to OSHA compliance, SDS chemical management, and injury and illness compliance solutions.

Employability in Sports Medicine

0840.24	Explore the sports medicine education requirements and profession.
0840.24.1	Recognize potential sports medicine career pathways (Athletic Training, Physical Therapist at PT Assistant, Occupational Therapist and OT Assistant, Physician Assistant, Physicians, exercise science and rehabilitation-related fields).
0840.24.2	Understand the sports medicine educational process, level of education requirements, credentialing requirements, employment and career growth opportunities, workplace environments, and professional development.

0840.24.3	Compare and contrast sports medicine-related professional and student organizations
0840.24.4	Demonstrate professional standards in sports medicine as they apply to behavior, language, hygiene, and appropriate dress.
0840.24.5	Identify sports medicine job posting components: application procedures, resume, job description, qualifications, salary, and benefits.
0840.24.6	Analyze the different job settings available to sports medicine-related professionals.

Teamwork

0840.25	Understand the structure and dynamics of the sports medicine team.
0840.25.1	Identify the sports medicine team members.
0840.25.2	Define sports medicine and identify the roles of the sports medicine team.
0840.25.3	Understand the actions and chain of command of the sports medicine team.
0840.25.4	Explain how sports medicine team members work together.

This course is designed to provide the student with knowledge of sports trauma and injuries. The instructional content will focus on the psychological effects of sports injury, emergency planning and injury evaluation, and technical skills.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Human Development and Mental Health

0841.1	Identify the stages of human growth and development.
0841.1.1	Examine and categorize the various stages of human growth and development from infancy to adulthood.
0841.1.2	Analyze the physiological, psychological, and social changes occurring during each stage of human development.
0841.1.3	Differentiate between the key milestones and characteristics associated with each stage of human growth and development.
0841.2	Identify and discuss types of mental health disorders.
0841.2.1	Classify and describe common mental health disorders.
0841.2.2	Evaluate the symptoms, causes, and potential impact of mental health disorders on individuals and communities.
0841.2.3	Compare and contrast various treatment options and support systems available for individuals with mental health disorders.
0841.3	Identify and discuss types of disordered eating.
0841.3.1	Define and classify different types of disordered eating behaviors such as anorexia nervosa, bulimia nervosa, and binge eating disorder.
0841.3.2	Examine the physiological, psychological, and sociocultural factors contributing to the development of disordered eating.
0841.3.3	Analyze the potential consequences and health risks associated with disordered eating behaviors.
0841.3.4	Explore strategies for prevention, intervention, and treatment of disordered eating within athletic and non-athletic populations.

Emergency Care and Infection Control

0841.4	Perform CPR, AED, and Basic First Aid skills.
0841.4.1	Demonstrate proficiency in cardiopulmonary resuscitation (CPR) techniques.
0841.4.2	Exhibit competency in operating automated external defibrillators (AED) and administering defibrillation in simulated emergency scenarios.
0841.4.3	Execute basic first aid procedures, including wound management, splinting, and immobilization techniques.
0841.4.4	Practice effective communication and coordination skills when providing emergency care in sports-related incidents.
0841.5	Identify signs and symptoms, and prevention and treatment of head injuries and/Traumatic Brain Injuries.
0841.5.1	Recognize common signs and symptoms associated with head injuries and traumatic brain injuries (TBIs) such as headache, dizziness, nausea, and loss of consciousness.

0841.5.2	Differentiate between mild, moderate, and severe head injuries based on clinical presentation and neurological assessment.
0841.5.3	Interpret clinical assessment tools and diagnostic tests used to evaluate head injuries and TBIs.
0841.5.4	Utilize critical thinking skills to assess the severity and potential complications of head injuries in athletic settings.
0841.5.5	Implement strategies for preventing head injuries and TBIs in sports activities, including proper equipment fitting, safe playing techniques, and environmental modifications.
0841.5.6	Develop comprehensive concussion management protocols for early detection, evaluation, and appropriate referral of suspected head injuries.
0841.5.7	Collaborate with healthcare professionals, coaches, and athletes to facilitate timely and effective treatment interventions for head injuries and TBIs.
0841.5.8	Educate athletes, coaches, and stakeholders about the importance of concussion awareness, return-to-play guidelines, and long-term implications of repetitive head trauma.

Injury Prevention and Rehabilitation

0841.6	Select the appropriate taping, bracing, and wrapping techniques.
0841.6.1	Demonstrate proficiency in selecting and applying various taping, bracing, and wrapping techniques based on injury type, location, and individual athlete needs.
0841.6.2	Evaluate the effectiveness of different taping and bracing materials in providing support, stability, and protection to injured anatomical structures.
0841.6.3	Adapt taping and bracing techniques to accommodate specific sport-related movements and functional requirements of athletes.
0841.6.4	Incorporate principles of biomechanics and kinesiology into the application of taping, bracing, and wrapping techniques to optimize athletic performance and injury prevention.
0841.7	Utilize client/patient safety measures.
0841.7.1	Implement standardized safety protocols and procedures to ensure the physical and emotional well-being of clients/patients and clients in clinical settings.
0841.7.2	Adhere to infection control guidelines and principles of aseptic technique when providing direct client/patient care and performing invasive procedures.
0841.7.3	Employ ergonomic principles and proper body mechanics to minimize the risk of musculoskeletal injuries during client/patient transfers and therapeutic interventions.
0841.7.4	Demonstrate effective communication and interpersonal skills to establish rapport and trust with clients/patients, fostering a safe and therapeutic environment for healthcare delivery.
0841.8	Compose History, Observation, Palpation, Special Tests (HOPS) and Subjective, Objective, Assessment, Plan (SOAP) notes.
0841.8.1	Conduct comprehensive client/patient assessments using the HOPS (History, Observation, Palpation, Special Tests) framework to gather relevant clinical information and identify musculoskeletal injuries.
0841.8.2	Document subjective information provided by clients/patients regarding symptoms, medical history, and functional limitations using SOAP (Subjective, Objective, Assessment, Plan) note format.
0841.8.3	Perform objective assessments, including physical examinations, range of motion assessments, and functional tests, to evaluate musculoskeletal conditions and determine treatment interventions.
0841.8.4	Formulate accurate clinical impressions and treatment plans based on the integration of subjective and objective data, utilizing critical thinking and clinical reasoning skills.
0841.9	Measure and record vital signs.
0841.9.1	Utilize appropriate instruments and techniques to measure and record vital signs, including blood pressure, heart rate, respiratory rate, and temperature accurately.

0841.9.2	Communicate measurement findings effectively in written documentation and verbal reports, facilitating interdisciplinary collaboration and continuity of care.
0841.10	Measure and record height, weight, and visual acuity.
0841.10.1	Document anthropometric measurements such as height, weight, body mass index (BMI), and visual acuity using standardized protocols and equipment.
0841.10.2	Interpret measurement data within the context of individual client/patient characteristics and healthcare goals, identifying deviations from normal ranges and trends.
0841.10.3	Communicate measurement findings effectively in written documentation and verbal reports, facilitating interdisciplinary collaboration and continuity of care.

Sports Trauma and Injuries

0841.11	Demonstrate a comprehensive understanding of injury recognition, treatment, and prevention.
0841.11.1	Understand the etiology, signs, and symptoms, and treatments related to injuries to the head, neck, and face.
0841.11.2	Identify potential risks of returning an athlete too soon after a concussion/TBI.
0841.11.3	Understand common injuries and their mechanisms, signs, symptoms, and treatments for injuries to the axial regions.
0841.11.4	Understand common injuries and their mechanisms, signs, symptoms, and treatments for injuries to the upper body extremities.
0841.11.5	Understand common injuries and their mechanisms, signs, symptoms, and treatments for injuries to the lower body extremities.
0841.11.6	Identify and describe common special tests used to evaluate joints (e.g., ligament, valgus and various, anterior, and posterior drawer, and apprehension).
0841.11.7	Identify phases of soft tissue vs. bony tissue healing.
0841.11.8	Describe and assess the severity or damage of tissue injury – displaced fracture vs. nondisplaced fracture, first degree vs. third degree, etc.
0841.11.9	Investigate the cause of primary and secondary injuries (i.e., gait, compensatory posture, etc.).
0841.11.10	Understand biomechanical changes and secondary injuries that can occur during the healing process and rehabilitation.

Psychological Effects of Sports Injury

0841.12	Understand emotional responses to injury.
0841.12.1	Describe emotional/psychological responses to injury and rehabilitation (i.e., depression, anxiety, fear, etc.).
0841.12.2	Analyze the five stages of grief and understand behaviors found in each stage.
0841.12.3	Understand risk factors and behaviors that are associated with an increased level of stress and methods to reduce stress.
0841.12.4	Explain motivation techniques for conditioning and rehabilitation and how extrinsic and intrinsic motivation and apply the various situations.
0841.12.5	Identify risk factors, signs, and symptoms that would lead to a psychological referral (i.e., eating disorders, depression, head injury, substance abuse, etc.).
0841.12.6	Explain how variables of personality (i.e., openness, extraversion, agreeableness, or neuroticism) relate to injury rehabilitation.
0841.12.7	Understand the relationship between an athlete's self-concept and the risk of sports injury.
0841.12.8	Investigate the psychological impact of a sports injury on an athlete in terms of stress.

Emergency Plan and Initial Injury Evaluation

0841.13	Develop a comprehensive emergency plan.
0841.13.1	Describe the components of an effective emergency plan.
0841.13.2	Analyze the aspects to be addressed when coaches oversee the provision of emergency care for athletic injuries.
0841.13.3	In the assessment of an injured athlete, describe the initial check and physical exam (survey).
0841.13.4	Describe the recommended procedure for opening an airway when a neck injury is suspected.
0841.13.5	Identify early symptoms of internal bleeding.
0841.13.6	Define and explain shock and the conditions that may lead to shock.
0841.13.7	Define the functions of the emergency team (e.g., immediate care, emergency equipment retrieval, activation of EMS, and directing EMS to the athlete.
0841.13.8	Identify and summarize the medical training all organized sports personnel should receive.
0841.13.9	Analyze the issues pertaining to the return-to-play decision made by a medical professional.

Technical Skills

0841.14	Demonstrate bandaging and taping skills.
0841.14.1	Identify and demonstrate various bandaging and taping skills.
0841.14.2	Explain the need for and demonstrate the application of various roller, triangular, and cravat bandages.
0841.14.3	Identify the different taping materials available.
0841.14.4	Explain the purpose of each strip in the application of tape to an arch, ankle, shin, hand, wrist, and thumb.
0841.14.5	Perform proper removal of tape and bandages from an extremity.

The instructional content of this course will focus on sports injury prevention and rehabilitation. This course is designed to allow students to focus on nutrition for athletes, therapeutic modalities, therapeutic exercise and intervention, reconditioning, and pain management. Students will participate in a work-based clinical internship in the sports medicine industry. Due to the health care industry standards, exemplary attendance is mandatory.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Organizational and Professional Health and Wellbeing

0842.1	Use medical/fitness equipment.
0842.1.1	Demonstrate proficiency in operating medical and fitness equipment according to manufacturer guidelines.
0842.1.2	Utilize appropriate safety precautions and protocols when using medical/fitness equipment.
0842.1.3	Regularly inspect and maintain equipment to ensure functionality and safety.
0842.1.4	Train others on the proper use of medical/fitness equipment as needed.
0842.2	Use proper body mechanics for personal and client/patient safety.
0842.2.1	Demonstrate correct posture and body mechanics during tasks to prevent injury and promote personal safety.
0842.2.2	Educate clients/patients on proper body mechanics to prevent injuries during activities of daily living or exercise.
0842.2.3	Assess and adjust positioning and technique to ensure client/patient comfort and safety during procedures or exercises.
0842.2.4	Model and reinforce proper body mechanics within the healthcare or fitness setting to promote a culture of safety.

Emergency Care and Infection Control

0842.3	Identify signs and symptoms, and prevention and treatment of weather-related illnesses.
0842.3.1	Recognize signs and symptoms of weather-related illnesses such as heat exhaustion, heat stroke, hypothermia, and frostbite.
0842.3.2	Implement preventive measures such as hydration, appropriate clothing, and shelter to mitigate the risk of weather-related illnesses.
0842.3.3	Administer appropriate first aid and medical interventions for weather-related illnesses, including cooling or warming techniques as needed.
0842.3.4	Educate individuals on recognizing early warning signs and seeking prompt medical attention for weather-related illnesses.
0842.4	Apply protect, rest, ice, compress, and elevate (PRICE) principle.
0842.4.1	Assess injuries to determine applicability of the PRICE principle for immediate management.
0842.4.2	Protect injured area from further harm by immobilization or appropriate bracing.
0842.4.3	Advise rest to promote tissue healing and reduce inflammation.
0842.4.4	Apply ice therapy to reduce pain and swelling, following recommended protocols for duration and frequency.
0842.4.5	Utilize compression bandages or wraps to support injured tissues and reduce swelling.

0842.4.6	Elevate injured extremities above heart level to enhance fluid drainage and reduce swelling.
0842.4.7	Monitor and adjust PRICE application based on individual response and injury progression.

Injury Prevention and Rehabilitation

0842.5	Utilize client/patient safety measures.
0842.5.1	Implement appropriate safety protocols to ensure the physical and emotional well-being of clients/patients during interactions and procedures.
0842.5.2	Maintain a safe environment by removing hazards, securing equipment, and providing adequate supervision.
0842.5.3	Educate clients/patients on safety practices and assistive devices to prevent accidents and injuries.
0842.5.4	Regularly assess and address any potential risks or concerns to optimize client/patient safety.
0842.6	Measure and perform Range of Motion (ROM).
0842.6.1	Accurately measure joint range of motion using standardized techniques and equipment.
0842.6.2	Document ROM measurements in client/patient records for tracking progress and treatment planning.
0842.6.3	Perform passive, active, and resistive ROM exercises to assess joint flexibility and function.
0842.6.4	Modify ROM exercises based on individual needs, limitations, and goals to optimize outcomes.
0842.7	Perform Manual Muscle Test (MMT).
0842.7.1	Administer manual muscle testing using established grading scales and techniques to assess muscle strength and function.
0842.7.2	Document MMT findings to monitor changes over time and guide treatment interventions.
0842.7.3	Ensure proper positioning and stabilization during MMT to isolate specific muscle groups and minimize compensatory movements.
0842.7.4	Interpret MMT results in conjunction with other assessment findings to develop tailored treatment plans.
0842.8	Identify signs and symptoms, and prevention and treatment of neuromusculoskeletal injuries.
0842.8.1	Recognize signs and symptoms of neuromusculoskeletal injuries, including strains, sprains, fractures, and nerve injuries.
0842.8.2	Implement preventive measures such as proper warm-up, stretching, and protective equipment to reduce the risk of injuries.
0842.8.3	Administer appropriate first aid and medical interventions for neuromusculoskeletal injuries, following established protocols.
0842.8.4	Educate clients/patients on injury prevention strategies, rehabilitation exercises, and self-care techniques to promote recovery and minimize recurrence.

Nutrition and Hydration

0842.9	Explain daily nutritional requirements and caloric intake needs.
0842.9.1	Educate individuals on the daily recommended intake of essential nutrients such as carbohydrates, proteins, fats, vitamins, and minerals.
0842.9.2	Assess individual dietary needs based on factors such as age, gender, activity level, and health status.
0842.9.3	Provide guidance on achieving a balanced diet that meets daily caloric requirements and supports overall health and wellness goals.
0842.9.4	Educate individuals on the daily recommended intake of essential nutrients such as carbohydrates, proteins, fats, vitamins, and minerals.
0842.10	Evaluate food labels.
0842.10.1	Interpret food labels to determine nutritional content, portion sizes, and ingredient lists.
0842.10.2	Analyze food labels for key nutrients, including macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals).

0842.10.3	Identify and compare nutritional information between different food products to make informed dietary choices.
0842.11	Evaluate basic and sports nutrition needs, including hydration.
0842.11.1	Assess nutritional needs specific to daily activities and sports participation, considering factors such as energy expenditure, muscle recovery, and hydration requirements.
0842.11.2	Educate individuals on the importance of proper hydration before, during, and after physical activity to maintain optimal performance and prevent dehydration.
0842.11.3	Provide guidance on pre- and post-workout nutrition strategies to support energy levels, muscle repair, and recovery.
0842.12	Identify signs and symptoms of dehydration.
0842.12.1	Recognize common signs of dehydration such as increased thirst, dry mouth, dark urine, fatigue, and dizziness.
0842.12.2	Assess hydration status through physical indicators such as skin turgor, urine color, and overall hydration level.
0842.12.3	Educate individuals on the importance of early recognition and prompt rehydration to prevent dehydration-related complications and optimize health and performance.

Exercise Science and Prescription

0842.13	Simulate pre-exercise screening in determining physical activity participation.
0842.13.1	Utilize standardized pre-exercise screening tools to assess individuals' readiness for physical activity participation.
0842.13.2	Gather relevant information on medical history, current health status, and exercise goals to inform decision-making regarding exercise participation.
0842.13.3	Provide recommendations and modifications based on screening results to ensure safe and effective engagement in physical activity.
0842.14	Conduct baseline testing for body composition, cardiorespiratory fitness, muscular strength, endurance, and flexibility.
0842.14.1	Administer assessments such as body composition analysis, cardiorespiratory fitness tests, strength evaluations, endurance tests, and flexibility assessments.
0842.14.2	Document baseline measurements to establish starting points for individualized exercise programs.
0842.14.3	Interpret test results to identify strengths, weaknesses, and areas for improvement in physical fitness components.
0842.15	Implement the components of exercise prescription and modification.
0842.15.1	Design exercise programs tailored to individuals' fitness levels, goals, and preferences, incorporating principles of frequency, intensity, time, and type (FITT).
0842.15.2	Modify exercise prescriptions based on changes in individuals' fitness levels, health status, or goals.
0842.15.3	Provide guidance on adjusting exercise variables such as intensity, duration, and progression to optimize training adaptations and minimize injury risk.
0842.16	Select and demonstrate exercises to improve body function.
0842.16.1	Identify appropriate exercises targeting specific fitness components, including aerobic activities, resistance training exercises, and flexibility exercises.
0842.16.2	Demonstrate proper exercise technique and form to ensure safety and effectiveness.
0842.16.3	Provide variations and progressions for exercises to accommodate individuals' fitness levels and goals.
0842.17	Select and demonstrate exercises to improve agility, power, speed, balance, and proprioception.
0842.17.1	Choose exercises targeting agility, power, speed, balance, and proprioception to enhance functional fitness and athletic performance.

0842.17.2	Demonstrate dynamic and multi-directional movements, plyometric exercises, speed drills, balance exercises, and proprioceptive drills.
0842.17.3	Incorporate equipment such as agility ladders, cones, medicine balls, and balance pads to challenge and improve specific physical abilities.
0842.18	Create short-term and long-term goals utilizing the Specific, Measurable, Attainable, Realistic, and Time-bound (SMART) principle.
0842.18.1	Establish goals that are specific, measurable, attainable, realistic, and time-bound to provide clear direction and motivation.
0842.18.2	Collaborate with individuals to set short-term goals for immediate progress and long-term goals for sustained improvement.
0842.18.3	Monitor goal achievement and adjust as necessary to maintain motivation and adherence to exercise programs.
0842.19	Execute spotting techniques for resistance training exercise.
0842.19.1	Demonstrate proper spotting techniques for resistance training exercises to ensure safety and provide assistance as needed.
0842.19.2	Position oneself appropriately to provide support and minimize injury risk during resistance training exercises.
0842.19.3	Communicate effectively with individuals performing resistance exercises to anticipate their needs and provide assistance in a timely manner.

Injury Process

0842.20	Analyze injury effects.
0842.20.1	Analyze the effects of the injury process on body tissues.
0842.20.2	Describe various mechanical forces that can cause injury.
0842.20.3	Analyze the physiological effects and the time frame of the healing process for various injuries.
0842.20.4	Evaluate how the injury process affects soft tissue and bone.
0842.20.5	Describe the assessment of pain and pain control.
0842.20.6	Differentiate between cryotherapy and thermotherapy.
0842.20.7	Describe the importance of exercise in the healing process.

Injury Prevention

0842.21	Analyze sports injury prevention.
0842.21.1	Differentiate and analyze the elements of preventing sports injuries.
0842.21.2	Explain the differences between intrinsic and extrinsic causative factors leading to a sports injury.
0842.21.3	Describe the components of fitness that can aid in sports injury preventions (i.e., speed, strength, agility, and coordination).
0842.21.4	Describe the relationships between volume, intensity, and frequency of training as they relate to periodization.
0842.21.5	Explain the advantages and disadvantages of stretching exercises.
0842.21.6	Explain the influence that dietary habits have on over performance and recovery from injury.
0842.21.7	Identify the role of protective equipment and proper fitting of equipment in the prevention of injuries.
0842.21.8	Differentiate and analyze the elements of preventing sports injuries.

Injury Rehabilitation

0842.22	Demonstrate injury rehabilitation.
0842.22.1	Demonstrate isometric and isotonic exercise.

0842.22.2	Demonstrate proper instruction of rehab exercise.
0842.22.3	Perform a specified rehab exercise for each upper and lower extremity.
0842.22.4	Demonstrate proper functional progression exercises.
0842.22.5	Demonstrate proper use of rehab equipment (i.e., bike, weights, and theraband).
0842.22.6	Identify the criteria for return to play.
0842.22.7	Explain documentation for proper record keeping of a rehab session.

Nutritional Practice for Athletic Performance

0842.23	Describe nutritional concepts.
0842.23.1	Describe and explain nutritional concepts and physical composition of food (e.g., 6 basic nutrients, protein, carbohydrates, fats, vitamins, minerals, and water).
0842.23.2	Explain the role in the body of the six major types of nutrients.
0842.23.3	Explain the best sources and quantities needed of the six types of nutrients.
0842.23.4	Calculate and analyze caloric intake in relation to dietary guidelines to maintain, lose, or gain weight (e.g., RDA for protein, carbohydrates, and fat).
0842.23.5	Describe general concepts of athletic hydration (i.e., method to monitor hydration levels, proper hydration processes, signs, and symptoms of dehydration).
0842.23.6	Explain the relationship of nutrition to injury recovery.

Therapeutic Modalities

0842.24	Describe and demonstrate therapeutic modalities.
0842.24.1	Describe the effects of cold versus heat modalities on the body.
0842.24.2	Identify and explain the various heat and cold modalities available.
0842.24.3	Describe the effect of electrical stimulation and ultrasound on the healing process of athletic injuries.
0842.24.4	Demonstrate the proper set-up of specified modalities.
0842.24.5	Perform the proper application of specified modalities.

Therapeutic Exercise, Training and Reconditioning

0842.25	Describe and demonstrate therapeutic exercise, training, and reconditioning.
0842.25.1	Differentiate various exercises (i.e., isometric, isotonic, manual resistance, isokinetic, circuit training, etc.).
0842.25.2	Explain early and advance strengthening, endurance, and proprioceptive exercises.
0842.25.3	Describe classifications of exercises (i.e., open/close chain, isotonic vs. isokinetic, etc.).
0842.25.4	Develop and understanding of indications, contraindication, safety precautions, and applications for various types of exercises.
0842.25.5	Explain strength, mobility, and balance as related to performance and injury prevention.
0842.25.6	Explain indications, contraindications, precautions, and proper fitting of devices for mobility, transfers, and ambulation (e.g., weight-bearing assistive devices, prosthetics, orthotic devices, and protective equipment).
0842.25.7	Describe musculoskeletal injury rehabilitation progression (e.g., return-to-play, work, daily activity criteria and full strength, free from pain skill performance test, and emotional readiness).

Therapeutic Interventions and Pain Management

0842.26	Describe therapeutic interventions and pain management techniques.
0842.26.1	Describe treatment expectations, physiological changes, and special instructions for specific interventions (i.e., thermotherapy, cryotherapy, electric stimulation, ultrasound, hydrotherapy, compression etc.).

0842.26.2	Explain indications, contraindications, safety precautions, and applications of various modalities.
0842.26.3	Recognize traditional and nontraditional approaches to pain management (i.e., pharmaceutical medications and alternative pain control approaches – acupuncture, massage, meditation, etc.
0842.26.4	Identify the pharmacologic agents commonly used in the healing process.

Treatment Planning and Implementation

0842.27	Design and apply client/patient-centered treatment.
0842.27.1	Design a treatment plan incorporating client/patient input.
0842.27.2	Create a treatment plan using a problem-solving model.
0842.27.3	Evaluate a treatment plan for intervention opportunities.
0842.27.4	Select appropriate resources to implement treatment plan.
0842.27.5	Evaluate priorities to organize work.

The instructional content of this course will focus on management of sports injuries. This course is designed to allow students to apply sports medicine skills and knowledge to analyze injuries, develop injury rehabilitation plans, perform specialized taping skills, and demonstrate leadership in the clinical setting. Students will participate in a work-based clinical internship in the sports medicine industry. Due to health care industry standards, exemplary attendance is mandatory.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Organizational and Professional Health and Wellbeing

0843.1	Utilize safety and emergency procedures and report emergencies immediately.
0843.1.1	Demonstrate proficiency in implementing safety protocols and emergency procedures to mitigate risks and ensure the well-being of clients/patients, clients, and colleagues.
0843.1.2	Respond promptly and effectively to emergencies by assessing the situation, initiating appropriate interventions, and seeking assistance as needed.
0843.1.3	Communicate emergency situations promptly and accurately to designated authorities or emergency response teams to facilitate timely intervention and resolution.
0843.1.4	Participate in regular training and drills to maintain competency in safety and emergency procedures and enhance readiness to respond to critical incidents.
0843.2	Adhere to the professional standards for healthcare providers.
0843.2.1	Uphold ethical principles, integrity, and professionalism in all interactions and practices as outlined by relevant governing bodies and professional organizations.
0843.2.2	Comply with legal and regulatory requirements governing healthcare delivery, including privacy laws, informed consent procedures, and scope of practice guidelines.
0843.2.3	Maintain confidentiality and respect client/patient privacy rights by safeguarding protected health information and adhering to HIPAA regulations.
0843.2.4	Understand the importance of professional development activities, such as continuing education, certification maintenance, and participation in peer review processes, to enhance clinical competence and stay abreast of best practices in healthcare delivery.

Emergency Care and Infection Control

0843.3	Identify signs and symptoms, and prevention and treatment of acute traumatic spine injuries.
0843.3.1	Recognize signs and symptoms of acute traumatic spine injuries, including spinal cord compression, vertebral fractures, and disc herniation.
0843.3.2	Implement preventive measures such as proper body mechanics, safe lifting techniques, and use of protective equipment to reduce the risk of spinal injuries.
0843.3.3	Administer immediate first aid and emergency interventions, including spinal immobilization and stabilization, to prevent further injury and preserve neurological function.
0843.3.4	Coordinate with healthcare providers and emergency response teams to facilitate timely diagnosis, treatment, and rehabilitation of acute traumatic spine injuries.
0843.4	Identify common causes of cardiorespiratory complications.
0843.4.1	Identify common risk factors and precipitating factors associated with cardiorespiratory complications, such as heart failure, pulmonary embolism, and respiratory distress syndrome.

0843.4.2	Recognize signs and symptoms indicative of cardiorespiratory compromise, including chest pain, shortness of breath, cyanosis, and altered mental status.
0843.4.3	Assess clients'/patients' medical history, clinical presentation, and vital signs to identify potential underlying causes of cardiorespiratory complications and guide appropriate interventions.
0843.4.4	Collaborate with healthcare team members to implement preventive strategies, monitor client/patient status, and provide timely interventions to minimize the risk of cardiorespiratory complications.
0843.5	Identify emergency management techniques for neuromusculoskeletal conditions.
0843.5.1	Identify common neuromusculoskeletal conditions requiring emergency management, such as acute fractures, dislocations, compartment syndrome, and nerve injuries.
0843.5.2	Implement appropriate first aid measures, including immobilization, splinting, and traction, to stabilize injured extremities and prevent further damage.
0843.5.3	Recognize signs and symptoms of neurovascular compromise, such as decreased sensation, pallor, weak pulses, and delayed capillary refill, indicating the need for urgent intervention.
0843.5.4	Coordinate with healthcare providers and emergency response teams to ensure prompt diagnosis, treatment, and referral for clients/patients with acute neuromusculoskeletal conditions, optimizing outcomes and minimizing complications.

Management of Head, Neck, and Spine Injuries

0843.6	Summarize understanding and treatment of head, brain, dental, eye, ear, nasal injuries, facial wounds, and spinal range of motion.
0843.6.1	Differentiate between cranial and intracranial brain injury.
0843.6.2	Describe the initial treatment guidelines for a suspected head injury.
0843.6.3	Identify the signs and symptoms of a concussion.
0843.6.4	Identify the causes, symptoms, and treatment of dental injuries.
0843.6.5	Describe the symptoms and treatment of eye, ear, and nasal injuries.
0843.6.6	Summarize the care of facial wounds.
0843.6.7	Describe and identify the anatomy of the cervical and thoracic spine.
0843.6.8	Describe the physiology of and demonstrate spinal active ranges of motion including flexion, extension, lateral flexion, and rotation.

Management of Shoulder Injuries

0843.7	Understand shoulder anatomy, potential injuries, and treatment.
0843.7.1	Understand the anatomy, mechanisms of injury, symptoms, emergency procedures, and treatment of injuries to the shoulder region.
0843.7.2	Identify bones, articulations, stabilizing ligaments, and musculature of the shoulder complex.
0843.7.3	Summarize the specific skeletal injuries that occur to the shoulder joint.
0843.7.4	Describe the etiology, signs, symptoms, and first-aid care for skeletal injuries and soft-tissues injuries to the shoulder region.

Management of Upper and Lower Extremity Injuries

0843.8	Understand anatomy and potential injuries of upper extremities and demonstrate taping techniques.
0843.8.1	Identify the bones, articulations, stabilizing ligaments, and musculature of the elbow, forearm, wrist, and hand.
0843.8.2	Describe soft-tissue injuries and classification of fractures to the upper arm, and their signs, symptoms, and first-aid care.

0843.8.3	Describe the signs, symptoms, and first-aid care for sprains, dislocations, fractures, contusions, epicondylitis, and osteochondritis dissecans of the elbow.
0843.8.4	Describe the etiology, signs, symptoms, and first-aid care for fractures, nerve injuries, and tendon injuries of the wrist, hand, and fingers.
0843.8.5	Demonstrated a selected elbow, wrist, and hand taping/wrapping technique.
0843.9	Understand anatomy and potential injuries of lower extremities and demonstrate taping techniques.
0843.9.1	Understand the anatomy of the thigh, hip, knee, and pelvis and identify skeletal and soft-tissue injuries and their etiology, signs, symptoms, and first-aid care.
0843.9.2	Identify anatomical surface landmarks, including femur, ilium, ischium, sacrum, quadriceps, hamstrings, groin muscles, abductor muscles, and sartorius muscle.
0843.9.3	Demonstrate selected thigh, hip, knee, and pelvis taping/wrapping techniques (i.e., Quadriceps support wrap, hamstring support wrap, groin spica support wrap, hip flexor support wrap, knee compression wrap, knee ligament taping, and patellofemoral taping).
0843.9.4	Describe the anatomy of the lower leg, ankle, and foot.
0843.9.5	Identify specific skeletal and soft-tissue injuries that occur to the lower leg, ankle, and foot.
0843.9.6	Describe the physiology of and demonstrate foot active ranges of motion, including dorsiflexion, plantar flexion, circumduction, eversion, and inversion.
0843.9.7	Demonstrate selected foot taping/wrapping techniques such as blister bandaging, toe sprains, and arch sprain taping.
0843.9.8	Summarize the steps in preventative ankle taping.

Management of Injuries to the Abdomen and Torso

0843.10	Understand anatomy and how to manage injuries and conditions of the thorax, abdomen, and related organs.
0843.10.1	Describe the anatomy of the thorax and abdomen with the mechanisms of injury, symptoms, emergency procedures, and treatment of injuries.
0843.10.2	Describe the injuries and related conditions to the lungs, liver, kidneys, spleen, and bladder.
0843.10.3	Describe the various injuries and health conditions that cause abdominal pain.

Applications of Sports Medicine

0843.11	Develop a rehabilitation program for lower body extremities.
0843.11.1	Design a comprehensive rehabilitation plan tailored to address specific lower extremity injuries, incorporating therapeutic exercises, manual therapy techniques, and progression criteria.
0843.11.2	Establish measurable goals and objectives for rehabilitation, considering individual client/patient needs, functional limitations, and desired outcomes.
0843.11.4	Implement evidence-based practices and best practices in rehabilitation to optimize client/patient outcomes and facilitate return to function.
0843.12	Develop a rehabilitation program for upper body extremities.
0843.12.1	Create a customized rehabilitation program targeting upper extremity injuries, including exercises, stretches, and therapeutic modalities to improve strength, mobility, and function.
0843.12.2	Modify rehabilitation protocols based on individual client/patient characteristics, injury severity, and rehabilitation goals.
0843.12.3	Monitor progress and adjust treatment interventions as needed to facilitate recovery and prevent complications.
0843.13	Analyze data to conduct research on lower extremity injuries.

0843.13.1	Collect and analyze relevant data on lower extremity injuries, including incidence rates, risk factors, mechanisms of injury, and treatment outcomes.
0843.13.2	Interpret research findings to identify trends, patterns, and areas for further investigation in lower extremity injury prevention and management.
0843.13.3	Communicate research findings effectively through written reports, presentations, or other mediums to contribute to the body of knowledge in sports medicine.
0843.14	Analyze data to conduct research on upper extremity injuries.
0843.14.1	Gather and analyze data pertaining to upper extremity injuries, including epidemiological data, biomechanical factors, and treatment efficacy.
0843.14.2	Synthesize research findings to generate hypotheses, identify gaps in knowledge, and propose future research directions in upper extremity injury research.
0843.14.3	Present research findings in a clear and concise manner, utilizing appropriate scientific methods and statistical analyses.
0843.15	Demonstrate the ability to tape special lower extremity injuries.
0843.15.1	Apply taping techniques effectively to address specific lower extremity injuries, such as ankle sprains, shin splints, or knee instability.
0843.15.2	Utilize appropriate taping materials and methods to provide support, stability, and pain relief for injured lower extremity structures.
0843.15.3	Evaluate taping outcomes and adjust techniques as needed to optimize client/patient comfort and functional performance.
0843.16	Demonstrate the ability to tape special upper extremity injuries.
0843.16.1	Employ taping skills to manage upper extremity injuries, including wrist sprains, elbow instability, or shoulder impingement.
0843.16.2	Adapt taping techniques to accommodate individual client/patient needs, injury characteristics, and functional requirements.
0843.16.3	Ensure proper application and fit of taping materials to promote healing and prevent further injury.
0843.17	Demonstrate leadership skills in the clinical setting.
0843.17.1	Take initiative to organize and coordinate client/patient care activities, including scheduling appointments, managing treatment plans, and communicating with healthcare team members.
0843.17.2	Provide guidance and support to colleagues and peers, fostering a collaborative and positive work environment.
0843.17.3	Demonstrate professionalism, integrity, and accountability in all clinical interactions, serving as a role model for ethical and compassionate client/patient care.
0843.18	Participate in a minimum of 30 hours of a job shadowing and/or internship with instructor supervision.
0843.18.1	Engage actively in observational learning experiences within clinical settings under the guidance of experienced healthcare professionals.
0843.18.2	Apply theoretical knowledge and practical skills gained in the classroom to real-world healthcare scenarios, gaining hands-on experience and exposure to diverse client/patient populations.
0843.18.3	Seek feedback from instructors and preceptors to enhance learning and professional development, reflecting on experiences to identify areas for improvement and growth.

This course is designed to allow instructional content to focus on medical math concepts and is designed for mathematics in a medical setting. Students will obtain knowledge in the following topics: basic math, fractions, decimals, ratios and percentages, measurement systems, prescriptions, and dosages, IV therapy, documentation, and calculations.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Basics of Medical Math

0850.1	Demonstrate proficiency in healthcare mathematics.
0850.1.1	Identify why math is important in healthcare.
0850.1.2	Understand basic math skills used in every health career.
0850.1.3	Identify what math skills are important to healthcare providers.
0850.1.4	Know when a calculator should be used.
0850.1.5	Convert Roman numerals to Arabic numerals and vice versa.
0850.1.6	Demonstrate knowledge of addition, subtraction, multiplication, division.
0850.1.7	Solve for X equations.
0850.1.8	Understand solving equations as a process of reasoning and explain the reasoning.
0850.1.9	Solve systems of equations.

Fractions

0850.2	Demonstrate proficiency in using fractions in healthcare mathematics.
0850.2.1	Discuss the meaning of fractions.
0850.2.2	Explain the advantages of using fractions in healthcare.
0850.2.3	Demonstrate knowledge of how to find the numerator and denominator.
0850.2.4	Understand the use of fractions in a division problem.
0850.2.5	Demonstrate knowledge of common fractions.
0850.2.6	Reduce fractions using common denominators.
0850.2.7	Discuss mixed numbers.
0850.2.8	Add and subtract fractions.
0850.2.9	Multiply and divide fractions.
0850.2.10	Divide fractions and express answers to the nearest tenth and hundredth using a calculator.
0850.2.11	Solve equations containing whole numbers, decimal numbers, multiple numbers.

Decimals

0850.3	Demonstrate proficiency in using decimals in healthcare mathematics.
0850.3.1	Identify the relative value of decimals.
0850.3.2	Explain place value of decimals and their importance in health care.
0850.3.3	Explain the advantages of using decimals in health care.
0850.3.4	Convert from decimal to fractions and vice versa.
0850.3.5	Add and subtract decimals.
0850.3.6	Multiply and divide decimals.
0850.3.7	Round decimals.

0850.3.8	Recognize the abbreviations: mg for milligram, and g for gram as drug measures.

Ratio, Proportion, and Percent

0850.4	Demonstrate proficiency in applying healthcare mathematical concepts.
0850.4.1	Express a comparison of two quantities in a ratio form.
0850.4.2	Define ratios.
0850.4.3	Define proportions.
0850.4.4	Define percentages.
0850.4.5	Determine if proportions are equal.
0850.4.6	Solve dosage problems using ratio and proportion.
0850.4.7	Apply the concepts of ratio and proportion to the solution of rate problems.
0850.4.8	Change any number from a percent form to fraction or mixed number form or vice versa.
0850.4.9	Change any number from a percent form to a decimal.
0850.4.10	Find a percent of a given quantity.
0850.4.11	Solve to find a percent using multiplication and division.
0850.4.12	Solve to find a percent using proportions.

Measurement Systems

0850.5	Demonstrate a comprehensive understanding of measurement systems in healthcare.
0850.5.1	List the commonly used units of measure in the metric system.
0850.5.2	Distinguish between the official abbreviations and variations in common use.
0850.5.3	Convert international system to metric.
0850.5.4	Convert household system to metric.
0850.5.5	Convert apothecaries' system to metric.
0850.5.6	Convert 12-hour clock to 24 hours.
0850.5.7	Discuss using an analog clock vs. digital.
0850.5.8	Demonstrate understanding of the international system.
0850.5.9	Demonstrate understanding of the apothecary system.
0850.5.10	List the key components of the household system.
0850.5.11	Express metric weights and volumes using correct notation rules.
0850.5.12	Demonstrate knowledge of conversion of US system length to metric (meter).
0850.5.13	Demonstrate knowledge of conversion of US weight to metric (kilograms).
0850.5.14	Demonstrate knowledge of conversion of US system volume to metric (liters).
0850.5.15	Describe how to read a thermometer.
0850.5.16	Demonstrate knowledge of conversion of temperature from Fahrenheit to Celsius.
0850.5.17	Explain the concept of measuring intake and output.
0850.5.18	Discuss how to determine body surface area.
0850.5.19	Know how to read manual scales.
0850.5.20	Demonstrate how to take length measurements.
0850.5.21	Determine total input and output.
0850.5.22	Estimate liquid and food intake.

Medication Prescriptions, Dosage and Administration

0850.6	Demonstrate a thorough understanding and practical proficiency in medication management.
0850.6.1	Demonstrate knowledge of the components of a medication label.
0850.6.2	Understand medical symbols for dosage instructions.

0850.6.3	Know the routes of medication administration and why each route is used.
0850.6.4	Understand the methods of medication administration.
0850.6.5	Discuss the “rights” of medication administration.
0850.6.6	Discuss the safety limits for medication dosages.
0850.6.7	Demonstrate how to properly read a prescription.
0850.6.8	Locate dosage strengths and calculate simple dosages.
0850.6.9	Differentiate tablets, capsules, and liquid oral medication forms and dosages.
0850.6.10	Identify scored tablets, unscored tablets, and capsules.
0850.6.11	Describe how to properly read a syringe.
0850.6.12	Measure parenteral solutions using: • Standard 3 mL/cc syringe • Tuberculin syringe • Insulin syringe • 5,6,10, and 12 mL/cc syringes • 20 cc syringe
0850.6.13	Read drug labels to identify trade and generic names.
0850.6.14	Determine the correct syringe and needle sized needed for different types of medication administration.
0850.6.15	Describe how to properly read medication in an IV bag.
0850.6.16	Discuss concentrations of solutions.
0850.6.17	Recognize dosages: • Measured in units • Measured in percentages • Using ratio strengths • In milliequivalents • In apothecary measures • In household measures
0850.6.18	Measure oral solutions using a medicine cup.
0850.6.19	Describe how medications dosages are used at home.
0850.6.20	Discuss medication errors and how to ensure medication administration safety.
0850.6.21	Prepare powdered drugs using directions printed on vial labels.
0850.6.22	Prepare powdered solutions from powdered drugs using drug literature or inserts.
0850.6.23	Determine expiration dates and times for reconstituted drugs.
0850.6.24	Distinguish between insulin of animal and human origin.
0850.6.25	Discuss the difference between rapid, intermediate, and long-acting insulins.
0850.6.26	Read insulin labels to identify origin and type.
0850.6.27	Read calibrations on U-100 insulin syringes.
0850.6.28	Read dosage in pre-loaded insulin pens.
0850.6.29	Measure single insulin dosages.
0850.6.30	Measure combined insulin dosages.
0850.6.31	Use the formula method to solve simple dosage problems containing metric, U, and mEq dosages.
0850.6.32	Convert body weight from lb. to kg; and from kg to lb.
0850.6.33	Calculate dosages using mg/kg, mcg/kg, mg/lb.
0850.6.34	Demonstrate proper technique for IM injections.
0850.6.35	Demonstrate proper technique for SQ injections.

Intravenous Therapy

0850.7	Demonstrate a thorough understanding of intravenous therapy.
0850.7.1	Differentiate between primary and secondary administration sets, and peripheral and central IV lines.
0850.7.2	Explain the function of drip chambers, roller and slide clamps, and on-line and indwelling injection ports.
0850.7.3	Differentiate between volumetric pumps, syringe pumps, PCA's and IV push.
0850.7.4	Identify abbreviations for common types of intravenous solution.
0850.7.5	Identify the calibrations in gtt/mL on IV administration sets.
0850.7.6	Read the markings for calibration on an IV bag or bottle.
0850.7.7	Differentiate between a macro drip and a micro drip IV administration set.
0850.7.8	Determine which drip set should be used for different medications.
0850.7.9	Calculate the IV flow rate and drip rate using the rate formula method.
0850.7.10	Calculate flow rates by the division factor method.
0850.7.11	Calculate the dosage of selected IV medications.
0850.7.12	Calculate the flow rate and drip rate needed to deliver the prescribed dosage of IV medication.
0850.7.13	Calculate IV infusion times using: • Volume and hourly rate of infusion • Volume, gtt/min rate of infusion and set calibration • Start time and infusion time to determine completion times
0850.7.14	Calculate • Flow rates to infuse ordered dosages • Dosages and flow rates based on kg body weight • Dosage infusing from flow rate and solution strength • Dosage and flow rate ranges for titrated medications
0850.7.15	Characterize various solutions used in pharmacy to include: • irrigation • IV Piggyback • Total Parenteral Nutrition (TPN)
0850.7.16	Check drug dosages to avoid errors in medication administration.
0850.7.17	Explain why a flush is included in IV medication administration.

Documentation

0850.8	Demonstrate proficiency in documentation of client/patient information.
0850.8.1	Demonstrate knowledge of medication administration record documentation.
0850.8.2	Demonstrate knowledge of computer documentation.
0850.8.3	State why accurate documentation is important.
0850.8.4	Record drug, dosage, route, frequency, and times of administration on a medication administration record.
0850.8.5	Record a client's fluid intake and output.
0850.8.6	Graph vital signs on a graphic chart.
0850.8.7	Identify the advantages of using flow sheets for documentation.
0850.8.8	Identify the advantage of using computers for clinical documentation of drug therapy.

Special Populations

0850.9	Demonstrate a comprehensive understanding of pharmacotherapy for special client/patient populations.
0850.9.1	Understand how medication used during pregnancy will affect the mother and fetus.
0850.9.2	Explain special conditions during pregnancy that will require medication therapy.
0850.9.3	Understand medication changes in child and infant medication dosages.
0850.9.4	Calculate oral doses for pediatric clients/patients.
0850.9.5	Apply general rules for calculating an infant's or child's dose of medication when given the age or weight of the client/patient and the normal adult dose.
0850.9.6	Explain the potential problems with fluid administration to pediatric clients/patients.
0850.9.7	Explain how suspensions are measured and administered to pediatric clients/patients.
0850.9.8	List the precautions of IM and SC injection in infants and children.
0850.9.9	Explain the changes that occur in geriatric client/patient that can affect medication absorption and reaction.
0850.9.10	Explain how dialysis and liver disease effects medication.
0850.9.11	Demonstrate understanding of possible medication interactions.
0850.9.12	Calculate pediatric IM and SC dosages.
0850.9.13	Determine criteria for critical care.
0850.9.14	Explain different scenarios that could be encountered in the critical care setting.
0850.9.15	Demonstrate understanding of common medications used in the treatment of critical care clients/patients.
0850.9.16	Describe emergency care situations.
0850.9.17	Explain different scenarios that could be encountered in the emergency situations.
0850.9.18	Demonstrate understanding of common medications used in emergency care.
0850.9.19	Demonstrate understanding of IV medications used during cardiac arrest.

Dosage Calculations

0850.10	Demonstrate proficiency in drug dosage calculations.
0850.10.1	Know differences in drug dosage calculations for both adults and children.
0850.10.2	Know how to follow the proper steps in the calculation of drug doses.
0850.10.3	Interpret medication labels.
0850.10.4	Compare medication label information to medication order.
0850.10.5	Convert to the same units of measure.
0850.10.6	Articulate the proportion method and the formula method for calculating drug doses.
0850.10.7	Compute drug doses using the proportion method and the formula method.
0850.10.8	Utilize the methods for calculating pediatric drug doses.

This course is designed to help students evaluate readiness for parenting while examining appropriate practices. Students will develop an awareness of societal issues affecting families and explore support systems. Students will use reasoning processes, individually and collaboratively, to take responsible action in families, workplaces, and communities and to manage the challenges of living and working in a diverse global society.

Notes: This is the only course that complies with the requirements of WVDE Policy 2530.02.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Family and Community Services Technical Skills

0903.1	Demonstrate an understanding of lifespan development.
0903.1.1	Compare and contrast the developmental stages from infancy to adulthood.
0903.1.2	Analyze the biological processes related to the stages of development.
0903.1.3	Evaluate the effects of heredity, gender, and culture on individual development.
0903.1.4	Outline key milestones in physical, cognitive, and social-emotional development.
0903.1.5	Discuss paradigms of human development (i.e., nature vs. nurture, continuity vs. discontinuity, universal vs. context specific).
0903.1.6	Discuss major historical and contemporary theories on lifespan development (i.e., Locke, Rousseau, Gesell, Freud, Piaget, Erikson, Vygotsky).
0903.2	Identify and access appropriate community services and resources.
0903.2.1	Research community services and resources available in your area.
0903.2.2	List the local resources, their purpose, and how to access them.
0903.3	Promote family and community health awareness.
0903.3.1	Discuss nutrition, mental health, and preventive care for families.
0903.3.2	Discuss pertinent health topics within the community.
0903.4	Evaluate family needs and available community services.
0903.4.1	Assess the local needs in your area.
0903.4.2	Develop assessment tools to identify gaps in existing community services.
0903.4.3	Analyze data to determine trends and patterns in family needs and service utilization.

Quality Parenting Environments

0903.5	Implement positive parenting practices.
0903.5.1	Examine roles and responsibilities relating to positive parenting practices.
0903.5.2	Explain family structures and boundaries.
0903.5.3	Develop and implement long and short-term goals for fulfilling the roles of parenting.
0903.5.4	Identify critical thinking, practical reasoning, and problem-solving skills useful to parents and families in resolving practical problems.
0903.5.5	Compare the differences between guidance, discipline, and punishment.
0903.5.6	Evaluate the types, causes and effects of child abuse and neglect.
0903.5.7	Assess the importance of setting developmentally appropriate expectations.
0903.5.8	Analyze outcomes of parenting practices for children, families, and society.

Parenting and Strong Families**Course #: 0903****Allowable Teacher Endorsement:** 1601, 1700, 1705, 1706, 2200, 2205, 2210, 2215, 2250, 7185, 7316, 7317, 7626, 7627, 7714

0903.5.9	Explain methods to manage anger, frustration, separation, and loss.
0903.5.10	Discuss conflict resolution techniques.
0903.5.11	Examine the impact of personal financial issues on children and parents.
0903.5.12	Analyze the effects of social policies and issues on children and parents.
0903.5.13	Discuss the influences of culture on parenting philosophies and practices.

Relationship Readiness and Enrichment

0903.6	Demonstrate an understanding of parenting dynamics.
0903.6.1	Summarize biological processes.
0903.6.2	Estimate the costs of rearing a child.
0903.6.3	Examine the interrelationships of parenting, career, and other life goals.

Emotional and Physical Effects of Parenthood

0903.7	Examine parental roles and influencing factors.
0903.7.1	Explain factors contributing to emotional and physical health of mother, father and baby during pre-natal period including the effects of exposure to various hazards on fetal development.
0903.7.2	Discuss factors contributing to emotional and physical health of mother, father, and baby during post-natal period.
0903.7.3	Describe parents' roles during pregnancy and the emotional changes that occur.
0903.7.4	Explain the impact of bonding on parent-child relationships.
0903.7.5	Discuss family adjustments and coping strategies after pregnancy.

Developmental Milestone Preparedness

0903.8	Assess effective parenting strategies that support the holistic development of children.
0903.8.1	Examine the essential elements representing the development of children.
0903.8.2	Assess parenting practices that meet developmental needs.
0903.8.3	Demonstrate practices that nurture the development of children.
0903.8.4	Plan strategies for meeting individual developmental challenges and special needs.
0903.8.5	Explain strategies for integrating a new child into the family.
0903.8.6	Plan and implement strategies to enhance development of children through play and activities.
0903.8.7	Demonstrate the use of appropriate communication skills with children in various stages of development.
0903.8.8	Examine strategies for meeting nutritional needs.

Family Resource Identification and Assessment

0903.9	Identify and assess effective parenting support systems.
0903.9.1	Outline components of effective parenting support systems.
0903.9.2	Develop criteria for evaluating quality childcare programs.
0903.9.3	Assess resources available to ensure the well-being of child and parent.
0903.9.4	Explain methods for fostering student success.

This course offers students a comprehensive exploration of human and social advocacy. Participants will explore various aspects of social and emotional development, covering topics such as mental health awareness, behavioral disorders, trauma, abuse, and neglect, as well as addiction and prevention.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Problem Solving, Critical Thinking, and Decision Making

0909.1	Use problem solving and critical thinking skills to locate credible sources of information about problems and determine appropriate methods for investigating causes.
0909.1.1	Identify and define problems within the context of human services and social work using various scenarios.
0909.1.2	Identify research methods used in social service professions.
0909.1.3	Demonstrate problem-solving and critical thinking skills to address complex issues.
0909.2	Use problem solving and critical thinking skills to determine root causes of problems and to suggest and evaluate solutions.
0909.2.1	Demonstrate critical thinking skills to determine the underlying and systemic root causes of problems.
0909.2.2	Discuss innovative and practical solutions to address identified issues.
0909.3	Demonstrate skills involving crisis intervention and management.
0909.3.1	Demonstrate the ability to manage crises by employing effective problem-solving and decision-making strategies.
0909.3.2	Demonstrate sensitivity and responsiveness to diverse populations experiencing crises.

Leadership and Teamwork

0909.4	Apply leadership qualities.
0909.4.1	Discuss key leadership theories and principles (e.g., Maslow, Herzberg, McClelland, McGregor's Theory X – Theory Y, Likert's System 1 – System 4),
0909.4.2	Demonstrate communication skills for effective leadership in diverse and multicultural settings.
0909.4.3	Foster self-awareness to identify personal leadership styles and strengths.
0909.5	Work effectively in a team environment.
0909.5.1	Analyze the impact of leadership styles on team dynamics.
0909.5.2	Explain the importance of cultural awareness in teams.
0909.5.3	List common challenges in teamwork, communication, and delegation.
0909.5.4	Discuss conflict resolution techniques.
0909.6	Implement strategies to promote advocacy.
0909.6.1	Demonstrate an understanding of the role and significance of advocacy vs lobbying in the field of social and other human service professions.
0909.6.2	Analyze systemic issues that impact individuals and communities.
0909.6.3	Develop an advocacy plan for a specific human services issue.

Wellness

0909.7	Examine the six dimensions of wellness.
0909.7.1	Demonstrate an understanding of the key components and factors associated with the six dimensions of wellness: Physical, Emotional, Social, Intellectual, Occupational, and Spiritual.
0909.7.2	Summarize the significance and relevance of each dimension in contributing to overall well-being.
0909.7.3	Evaluate the impact of lifestyle choices on each dimension.
0909.7.4	Develop a personalized wellness plan that addresses strengths and areas for improvement across the dimensions.
0909.7.5	Discuss financial and environmental wellness contributions to a person's overall quality of life.

Mental Health

0909.8	Demonstrate an understanding of social and emotional development.
0909.8.1	Examine the factors influencing social and emotional growth in individuals across the lifespan.
0909.8.2	Explore the role of genetics, environment, culture, and relationships in shaping individual development.
0909.8.3	Discuss the impact of cultural diversity on social and emotional development.
0909.9	Explore mental health awareness.
0909.9.1	Describe the difference between mental health and behavioral health.
0909.9.2	Explain the importance of mental health awareness.
0909.9.3	Explore causes, risk factors, and treatment options for various mental health conditions such as anxiety, depression, attention-deficit/hyperactivity disorder (ADHD), eating disorders, and post-traumatic stress disorder (PTSD).
0909.9.4	Explore strategies to reduce stigma and promote open dialogue about mental health.
0909.9.5	Explore intersectionality of mental health with other social factors (e.g., race, gender, socioeconomic status).
0909.10	Identify behavioral and emotional disorders.
0909.10.1	Differentiate between behavioral and emotional disorders.
0909.10.2	Discuss intervention strategies for addressing behavioral issues in individuals.
0909.10.3	Evaluate the impact of behavioral and emotional disorders on individuals and families.
0909.11	Research types, causes, and signs of trauma.
0909.11.1	Identify and classify different types of trauma, understanding their unique characteristics and implications.
0909.11.2	Discuss trauma-informed care principles and develop coping strategies for individuals affected by trauma.
0909.11.3	Discuss various defense mechanisms such as denial, displacement, projection, and repression.
0909.11.4	Evaluate the impact of trauma on different populations.

Abuse and Neglect

0909.12	Identify types of abuse and neglect.
0909.12.1	Define and recognize physical, emotional, psychological, sexual abuse, and neglect.
0909.12.2	Examine the short-term and long-term effects of abuse on victims and their support systems.
0909.12.3	Discuss the intergenerational impact of abuse and neglect on families and communities.
0909.12.4	Describe intervention techniques for supporting individuals affected by abuse and neglect.
0909.12.5	Analyze community-based prevention programs and initiatives.
0909.12.6	Explain the importance of education and advocacy in preventing future cases.

Addiction and Prevention

0909.13	Explore the fundamental concepts of addiction.
0909.13.1	Define addiction and articulate its impact on individuals, families, and communities.
0909.13.2	Identify various substances and behaviors that can lead to addiction.
0909.13.3	Explain the meaning of substance abuse, relapse, and detoxification.
0909.13.4	Examine the psychological and social factors contributing to addiction, including stress, trauma, and environmental influences.
0909.13.5	Analyze statistical data related to addiction rates and demographics.
0909.13.6	Evaluate the effectiveness of different prevention models.
0909.13.7	Develop an organized approach to addressing addiction issues within the community.

Social Advocacy

0909.14	Demonstrate an understanding of social issues.
0909.14.1	Identify key social issues, including poverty, homelessness, discrimination, and barriers to healthcare and education.
0909.14.2	Examine various forms of discrimination and develop strategies to address and combat discrimination in different social contexts.
0909.14.3	Explore challenges related to access to healthcare and education.
0909.14.4	Examine the unique needs and challenges of different populations.
0909.14.5	Develop strategies for addressing specific social problems within the community.
0909.14.6	Demonstrate techniques for advocating on behalf of clients.

In this course, students will get hands-on experience in the world of social services. The course explores how laws, rules, and ethical guidelines apply in real workplaces. Students will learn how to complete a case plan for different social service situations. The course covers assessment techniques, intervention strategies, and the application of social work theories to address diverse client needs.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Ethics and Responsibilities

0910.1	Apply appropriate laws, regulations, and industry standards in human service situations.
0910.1.1	Demonstrate an understanding of relevant laws, regulations, and industry standards in the field of human services [e.g., Health Insurance Portability and Accountability Act (HIPAA), Affordable Care Act (ACA), The Child Abuse Prevention and Treatment Act (CAPTA), Family and Medical Leave Act (FMLA), Americans with Disabilities Act (ADA)].
0910.1.2	Discuss West Virginia State Codes related to human service professions (e.g., §30-21 Psychologists, §30-30 Social Worker, §30-31 Counselors).
0910.1.3	Review West Virginia professional licensing policies and ethical standards for the following boards: WV Board of Examiners and Counseling, WV Board of Social Work, and WV Board of Examiners of Psychologists.
0910.1.4	Discuss West Virginia State Codes relating to human services and child welfare (e.g., Chapter 9 Human Services, Chapter 49 Child Welfare).
0910.1.5	Identify persons designated as mandated reporters under W. Va. Code §49-2-803 and §9-6-9.
0910.1.6	Demonstrate an understanding of the methods by which mandated reporters document and communicate information for state agencies (e.g., child abuse and neglect, elder abuse, animal abuse, disabled persons).
0910.2	Identify ethical issues and established ethical behavior in human service situations.
0910.2.1	Demonstrate an understanding of key ethical principles relevant to human service professions (e.g., autonomy, beneficence, non-maleficence, justice).
0910.2.2	Demonstrate the ability to recognize and identify potential ethical issues in diverse human service scenarios.
0910.2.3	Analyze human service cases using ethical frameworks, considering relevant laws, regulations, and professional codes of ethics.
0910.2.4	Demonstrate the ability to weigh the potential risks and benefits of different ethical choices.
0910.2.5	Discuss Use of Self: self-awareness and self-care for human service professionals including secondary trauma, transference, boundaries, and burnout.
0910.2.6	Develop strategies for establishing and maintaining ethical behavior in professional practice, considering self-care and ethical boundaries.

Information Management, Planning and Evaluation

0910.3	Perform a complete case plan in a social service scenario.
0910.3.1	Analyze a case study evaluation.
0910.3.2	Conduct needs assessment.
0910.3.3	Create a case plan following policies and standard operating procedures.

0910.3.4	Create long and short-term goals.
0910.3.5	Identify resources including counseling and assistance programs.
0910.3.6	Maintain relevant data to assist with planning, management, assessments, and interventions.
0910.3.7	Collect, analyze, and interpret data to monitor and evaluate improvement.

Employability and Career Development

0910.4	Demonstrate appropriate workplace behavior.
0910.4.1	Demonstrate effective verbal and written communication skills.
0910.4.2	Practice active listening techniques to enhance communication.
0910.4.3	Discuss the dynamics of teamwork and its significance in achieving positive outcomes for clients.
0910.4.4	Demonstrate high quality workplace standards including honesty, integrity, being respectful, positive attitude, showing good judgement, and ethical standards.
0910.4.5	Establish an understanding of professional boundaries in the workplace.
0910.5	Pursue career development skills to advance in careers.
0910.5.1	Differentiate among the different levels of education, qualifications, licensures, certifications, salary scales, and job outlook for social services careers.
0910.5.2	Identify state and national professional organizations and membership benefits available to social workers, counselors, and psychologists.
0910.5.3	Develop effective networking skills to build professional relationships.
0910.5.4	Identify personal strengths, weaknesses, and career goals from a self-assessment.
0910.5.5	Develop a career plan that aligns with individual interests, values, and long-term aspirations.
0910.5.6	Demonstrate effective job search skills, including application techniques, interview preparation, and negotiation strategies.

Field Experience

0910.6	Participate in a social services field experience.
0910.6.1	Discuss the importance of field experience.
0910.6.2	Identify key learning outcomes associated with engaging in a field experience.
0910.6.3	Participate for a minimum of 30 field experience hours in a social service setting.
0910.6.4	Demonstrate the ability to apply various human service theories in real-world scenarios.
0910.7	Apply ethical considerations in field experience.
0910.7.1	Examine ethical considerations and dilemmas that may arise in the context of field practicum.
0910.7.2	Develop strategies for addressing ethical challenges in social work practice.
0910.8	Engage in the evaluation of field experiences.
0910.8.1	Evaluate the impact of field practicum on personal and professional development.
0910.8.2	Assess the challenges and opportunities encountered during field placement.
0910.8.3	Explain the importance of self-reflection and professional development.

This course covers the foundational principles and history of human service professions including values, ethics, and the various roles professionals play in addressing social and personal issues. It investigates the impact of factors like culture, environment, and societal structures on both individual and group behavior. Students will integrate essential knowledge, skills, attitudes, and practices necessary for pursuing careers dedicated to addressing the social issues and concerns of individuals, families, and communities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Introduction to Social Service Careers

0928.1	Define the scope and purpose of social service.
0928.1.1	Define the scope of social service and its purpose in addressing challenges.
0928.1.2	Define history and evolution of the professions (e.g., social work, psychology, sociology, counseling).
0928.1.3	Discuss ethical codes and their application in social service careers (e.g., NASW, APA, ACA).
0928.2	Explain social theories and approaches.
0928.2.1	Explain the core principles and concepts of social service, psychology, and counseling theories (e.g., systems theory, ecological perspective, cognitive, behavioral).
0928.2.2	Summarize the major theoretical frameworks guiding social service practices.
0928.2.3	Evaluate the appropriateness of selecting specific theories in different scenarios.
0928.3	Identify and describe various social service careers.
0928.3.1	Explore various roles within social service (e.g., clinical, school, medical).
0928.3.2	Describe the key responsibilities associated with case management, advocacy, lobbying, counseling, and therapy in social services.
0928.3.3	Explain the role of counseling and therapy.
0928.3.4	Analyze how different roles in social services contribute to the overall well-being of individuals and communities.
0928.3.5	Evaluate the challenges and benefits of case management in social service.

General Human Services Technical Skills

0928.4	Apply professional standards when interacting with clients, coworkers, and public.
0928.4.1	Explain the importance of adhering to professional standards in client interactions.
0928.4.2	Demonstrate active listening skills during client interactions, ensuring understanding and empathy.
0928.4.3	Articulate ideas clearly and professionally in verbal communication with clients, coworkers, and the public.
0928.5	Display familiarity with human services terminology.
0928.5.1	Expand vocabulary and language skills relevant to human services.
0928.5.2	Communicate complex concepts clearly and concisely using appropriate terminology.
0928.6	Employ organizational and planning skills to meet the needs of service recipients.
0928.6.1	Explain how organizational and planning skills contribute to meeting the needs of service recipients.
0928.6.2	Analyze problems related to meeting the needs of service recipients through efficient planning.
0928.6.3	Evaluate the efficiency of an existing organizational plan and propose improvements.

Academic Foundations

0928.7	Apply literacy skills in a human services career environment.
0928.7.1	Effectively interpret and analyze complex written materials relevant to human services.
0928.7.2	Demonstrate advanced reading comprehension in understanding professional documents, policies, and client information.
0928.7.3	Communicate clearly and concisely through written reports, emails, and documentation in a human services context.
0928.8	Apply mathematical skills in a human services career environment.
0928.8.1	Utilize mathematical concepts and calculations to analyze statistical data related to human services trends and outcomes.
0928.8.2	Apply quantitative skills to budgeting, resource allocation, and financial management within a human service setting.
0928.8.3	Interpret and utilize numerical data to make informed decisions in areas such as program evaluation and client needs assessment.
0928.9	Apply science skills in a human services career environment.
0928.9.1	Apply scientific principles to understand and address health-related issues in a human services career.
0928.9.2	Utilize research methods and scientific inquiry to assess the effectiveness of interventions and programs in the field of human services.

Systems

0928.10	Describe relationships, roles, and responsibilities among human service professionals.
0928.10.1	Identify and describe key components of effective communication within professional relationships.
0928.10.2	Summarize factors that contribute to collaborative relationships between family members and human services professionals.
0928.10.3	Develop strategies for resolving conflicts and promoting positive interactions.
0928.10.4	Demonstrate empathetic communication to better connect with clients and colleagues.
0928.11	Analyze impact on human services of technology, economy, and environment.
0928.11.1	Outline services for individuals and families with a variety of disadvantaged conditions.
0928.11.2	Evaluate the influence of technology on human services.
0928.11.3	Analyze economic trends and their implications for human services.
0928.11.4	Evaluate the environmental factors affecting human services delivery.
0928.11.5	Demonstrate awareness of ecological and environmental issues and their potential impact on clients.

Communications

0928.12	Communicate using appropriate language and level, including using appropriate techniques for communicating with special needs individuals.
0928.12.1	Explain the importance of using appropriate language and techniques for communicating with special needs individuals.
0928.12.2	Differentiate between communication strategies based on specific needs.
0928.12.3	Develop innovative and inclusive communication techniques for diverse special needs individuals.
0928.12.4	Utilize various techniques like visual aids or modified language to communicate effectively.
0928.13	Apply listening skills and interpret verbal and nonverbal behaviors to enhance communication with coworkers and the public.
0928.13.1	Explain the significance of active listening in building rapport and understanding within social work teams and when interacting with the public.
0928.13.2	Explain the significance of interpreting both verbal and nonverbal cues.

0928.13.3	Interpret and analyze verbal and nonverbal behaviors to better understand the needs and concerns of clients and colleagues.
0928.14	Interpret and use tables, charts, and figures to support written and oral communication.
0928.14.1	Explain the role of visual aids in conveying complex information in social work documentation and communication.
0928.14.2	Develop visually compelling tables, charts, and figures to enhance communication in a social service setting.

Information Technology Applications

0928.15	Use word Processing, presentation software, and email applications.
0928.15.1	Demonstrate an understanding of formatting options in word processing for creating professional reports and case notes in social work.
0928.15.2	Utilize word processing for creating and editing client reports, case notes, and intervention plans in a manner that respects confidentiality and ethical standards.
0928.15.3	Create engaging presentations about community awareness programs in your area.
0928.15.4	Interpret and organize information effectively in presentation software to communicate program outcomes and intervention strategies.
0928.15.5	Analyze and compare the advantages and disadvantages of various email communication strategies in the context of maintaining client relationships.
0928.16	Use spreadsheet and database application.
0928.16.1	Demonstrate an understanding of data organization in spreadsheets and databases for tracking client progress and program outcomes.
0928.16.2	Explain the importance of data security and privacy considerations in managing client information in databases.

Safety, Health and Environmental

0928.17	Identify and practice appropriate safety and health procedures.
0928.17.1	Explain the principles and importance of safety and health in human services.
0928.17.2	Demonstrate the ability to follow and implement appropriate emergency and first aid procedures.
0928.18	Demonstrate appropriate emergency and first aid knowledge and procedures.
0928.18.1	Explain the significance of timely and appropriate emergency response in human services situations.
0928.18.2	Summarize the principles of providing effective first aid while considering the unique challenges in social work environments.
0928.18.3	Demonstrate the correct application of first aid techniques in simulated emergency scenarios.
0928.18.4	Analyze different emergency scenarios to identify appropriate first aid responses, considering ethical and cultural factors.
0928.19	Identify and practice appropriate environmental procedures.
0928.19.1	Identify environmental factors that may influence the well-being of clients and practitioners, including potential risks and areas for improvement.
0928.19.2	Identify warning signs of potential safety concerns and threats to social service workers and clients.
0928.19.3	Research and summarize current environmental regulations applicable to human services and social work, ensuring compliance in practice.

Learning for Independence, Family and Employment

Course #: 0929

Allowable Teacher Endorsement: 1700, 1705, 1706, 1601, 7185, 7316, 7317, 7626, 7627, 7714, 3600, 3601, 3602, 3603, 3606

The LIFE (Learning for Independence, Family, and Employment) students will develop skills to function successfully within family, community, and peer groups. By utilizing basic skills and higher order thinking skills, the student will learn problem solving and management techniques, resource management, consumer education, and relationships skills. Students will use reasoning processes, individually and collaboratively, to take responsible action in families, workplaces, and communities and to manage the challenges of living and working in a diverse global society. The Skill Sets in this course focus on the basic and intermediate levels of knowledge necessary for the development of responsible and disciplined behaviors leading to self-sufficiency in adulthood. Life Connections is an elective designed for the initial high school course in life management skills and may be an adjunct to any CTE Program of Study. Life Connections may be an initial course or built on BASE skills from middle school.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Career Awareness

0929.1	Demonstrate awareness of career pathways and workplace expectations.
0929.1.1	Relate skills and abilities to possible career pathways.
0929.1.2	Explain methods of goal development and time management.
0929.1.3	Demonstrate professionalism through punctuality, task completion, and appropriate personal grooming and dress.
0929.1.4	Evaluate factors affecting a positive personal and professional image.
0929.1.5	Investigate methods of supervision such as giving and receiving feedback and instruction.
0929.1.6	Develop and present a personal work ethic statement.
0929.1.7	Create a professional employment portfolio including application, cover letter, resume, and thank-you letter.

Communication

0929.2	Apply clear and respectful communication skills in personal and workplace settings.
0929.2.1	Interpret verbal and nonverbal communication.
0929.2.2	Apply speaking and active listening skills including reflection, restatement, and clarification techniques.
0929.2.3	Recognize barriers to effective communication.
0929.2.4	Identify elements of written and electronic communication, including grammar, spelling, and formatting.
0929.2.5	Discuss how to adapt communication skills to varied audiences, including various ages, cultural backgrounds, economic statuses, ethnicities, and religions.
0929.2.6	Distinguish between subjective and objective information.
0929.2.7	Report relevant information in chronological order.
0929.2.8	Select and employ appropriate communication strategies for workplace communication.
0929.2.9	Design and deliver presentations using appropriate media.
0929.2.10	Develop and interpret tables and charts to support communication.

Consumer Awareness/Personal and Family Finance

0929.3	Plan personal and family finances through informed spending, saving, and consumer decisions.

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0929.3.1	Take responsibility for personal and family financial decisions based on needs, wants, and values.
0929.3.2	Examine how advertising, media, and peer influence affect consumer decisions.
0929.3.3	Examine factors that influence price, quality, and consumer services.
0929.3.4	Develop strategies for managing income, including goal setting and budgeting.
0929.3.5	Analyze how education and skills influence employment opportunities.
0929.3.6	Describe factors affecting take-home pay.
0929.3.7	Create and maintain financial records and documents.
0929.3.8	Apply consumer skills to make informed purchases.
0929.3.9	Identify responsibilities related to credit and debt management.
0929.3.10	Compare loans and credit options for major expenses such as vehicles, housing, and education.
0929.3.11	Explain credit reports, borrower rights, and consumer laws.
0929.3.12	Explain the importance of property and liability insurance.
0929.3.13	Explain the purpose of health, disability, and life insurance.
0929.3.14	Analyze how regulatory agencies protect consumers.

Nutrition, Food, and Wellness

0929.4	Promote healthy living through informed food choices, wellness habits, and safe food handling.
0929.4.1	Identify behaviors that promote health and wellness.
0929.4.2	Explain basic concepts of positive self-image, wellness, and stress.
0929.4.3	Differentiate among the five schedules of controlled substances.
0929.4.4	Discuss the adverse effects of the use of alcohol, tobacco and both legal and illegal drugs on the human body.
0929.4.5	Identify essential nutrients and food groups using tools such as the USDA's MyPlate guide.
0929.4.6	Identify the functions and requirements of vitamins, minerals, proteins, fats, and carbohydrates.
0929.4.7	Describe strategies for disease prevention, including health screenings and exams.
0929.4.8	Analyze economic and environmental influences on food choices and nutritional practices.
0929.4.9	Evaluate nutrition labels and food content.
0929.4.10	Explain the causes and foods at risk for food borne illnesses.
0929.4.11	Demonstrate food safety, handling, and sanitation practices.
0929.4.12	Analyze the role of food science and technology in nutrition and safety.

Life Choices and Relationships

0929.5	Explore how personal traits, roles, and values influence relationships and life decisions.
0929.5.1	Examine how self-concept and personal traits influence life choices.
0929.5.2	Demonstrate etiquette in social and professional settings.
0929.5.3	Analyze roles and responsibilities in relationships and families.
0929.5.4	Determine strategies for coping with various adolescent problems.
0929.5.5	Identify values, goals, and priorities in decision-making.
0929.5.6	Demonstrate effective conflict management techniques.

Leadership Development and Community Involvement

0929.6	Develop leadership and teamwork skills to build citizenship and career readiness.
0929.6.1	Identify successful leadership and teamwork skills.
0929.6.2	Apply leadership, citizenship, and teamwork skills as an integral part of classroom activities.
0929.6.3	Develop and deliver speeches.

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0929.6.4	Participate in meetings using parliamentary procedure.
0929.6.5	Explore Career Technical Student Organizations (CTSO).

Safety, Health, and Environmental

0929.7	Practice safety, health, and emergency skills to promote personal and environmental well-being.
0929.7.1	Identify safety and environmental health practices.
0929.7.2	Discuss safe use of technology and social media.
0929.7.3	Develop a home fire escape plan.
0929.7.4	Demonstrate proficiency in first aid techniques.

This course is designed to examine food preparation and management using the decision-making process; meeting basic needs by applying nutrition and wellness concepts; meeting health and safety needs in planning, preparing, and serving food; maximizing resources when planning, preparing, and serving food; promoting hospitality in food practices; and analyzing individual and family nutritional needs in relation to change. Students will use reasoning processes, individually and collaboratively, to take responsible action in families, workplaces, and communities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Nutrition and Food Practices in a Multicultural Society

0950.1	Nutrition and Food Practices in a Multicultural Society
0950.1.1	Compare factors affecting national and international food supply and distribution.
0950.1.2	Evaluate food habits and meal patterns in terms of cultural influences.
0950.1.3	Exhibit an awareness of the variety of food choices available in our multicultural society.

Nutritional Needs of Individuals and Families

0950.2	Nutritional Needs of Individuals and Families
0950.2.1	Demonstrate how to conserve nutrients during food preparation.
0950.2.2	Research diet disorders (i.e., bulimia, anorexia).
0950.2.3	Demonstrate the use of dietary guidelines in making wise food choices.
0950.2.4	Analyze nutritional adequacy of selected diets using available technology.
0950.2.5	Analyze the reliability of nutrition information.
0950.2.6	Evaluate claims made for dietary supplements, diet aids, and diet fads.
0950.2.7	Analyze special needs diets (i.e., diabetic, vegetarian, low cholesterol, etc.).

Risk Management Procedures

0950.3	Risk Management Procedures
0950.3.1	Analyze factors that contribute to food borne illness.
0950.3.2	Analyze food service management safety and sanitation programs.
0950.3.3	Implement industry standards for documenting, investigating, and reporting foodborne illnesses.
0950.3.4	Use the hazard analysis critical control point (HACCP) during all food handling processes to minimize the risks of food borne illness.
0950.3.5	Demonstrate practices and procedures that assure personal and workplace health and hygiene.
0950.3.6	Demonstrate standard procedures for receiving and storage of raw and prepared foods.
0950.3.7	Classify current types of cleaning materials and sanitizers and their proper use.
0950.3.8	Use occupational safety and health administration's (OSHA) right to know law and material safety data sheets (MSDS) and explain their requirements in handling hazardous materials.
0950.3.9	Demonstrate waste disposal and recycling methods.

Nutritional Therapy

0950.4	Nutritional Therapy
0950.4.1	Analyze nutritional needs of individuals.

0950.4.2	Use nutritional information to support care planning.
0950.4.3	Utilize a selective menu.
0950.4.4	Construct a modified diet based on nutritional needs and health conditions.
0950.4.5	Design instruction on nutrition for health maintenance and disease prevention.

This course will provide students with the skills and practices that are required for Foundational Food Preparation skills for healthy eating. Emphasis is placed on the relationship of diet to health, healthful food preparation, and sound nutrition. Sustainability for a global society, kitchen and meal management, traditions and trends in food consumption and resource management are addressed.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety and Sanitation Procedures

0954.1	Safety and Sanitation Procedures
0954.1.1	Practice good personal hygiene/health procedures.
0954.1.2	Demonstrate safe food handling and preparation techniques.
0954.1.3	Demonstrate safe and environmentally responsible waste disposal and recycling methods.

Selection and Use of Kitchen Equipment

0954.2	Selection and Use of Kitchen Equipment
0954.2.1	Maintain tools and equipment following safety procedures.
0954.2.2	Demonstrate procedures for safe and secure storage of equipment and tools.
0954.2.3	Design plans for food, equipment, and supplies to meet food preparation requirements.
0954.2.4	Utilize weights and measurement tools to demonstrate knowledge of portion control and measurement techniques.
0954.2.5	Utilize kitchen equipment appropriately.

Food Preparation

0954.3	Food Preparation
0954.3.1	Demonstrate measurement procedures, equivalents, and conversion.
0954.3.2	Interpret recipe terminology and directions.
0954.3.3	Demonstrate ability to select, store and prepare nutritious and pleasing foods.
0954.3.4	Determine the effects of workspace, tools, equipment, and technology on food preparation.

Plan and Serve Food for Healthful Eating

0954.4	Plan and Serve Food for Healthful Eating
0954.4.1	Analyze characteristics of appealing menus.
0954.4.2	Develop appropriate menus, grocery orders, and timelines for cooking and/or baking labs.
0954.4.3	Examine functions of ingredients, nutritive value, and methods of preparation.
0954.4.4	Develop a variety of nutritionally sound and healthy menus for individuals and groups.
0954.4.5	Examine the applicability of convenience food items.
0954.4.6	Demonstrate cooking methods that increase nutritional value, lower calorie, and fat content, and utilize herbs and spices to enhance flavor.
0954.4.7	Manage money allocated for food.
0954.4.8	Examine methods of meal service.

Food Traditions and Trends

0954.5	Food Traditions and Trends
0954.5.1	Illustrate how technological developments affect food choices.
0954.5.2	Summarize factors that influence food choices.
0954.5.3	Practice a positive dining atmosphere.
0954.5.4	Demonstrate table appointments.
0954.5.5	Practice food presentation and table service appropriate for specific situations.
0954.5.6	Exhibit appropriate etiquette.

Nutrition and Health

0954.6	Nutrition and Health
0954.6.1	Summarize the effect of nutrients on health, appearance, and peak performance.
0954.6.2	Outline the relationship of nutrition and wellness to individual and family health throughout the life span.
0954.6.3	Estimate the effects of food and diet fads, food addictions, and eating disorders on wellness.

Leadership, Citizenship, and Teamwork Skills

0954.7	Leadership, Citizenship, and Teamwork Skills
0954.7.1	Assess factors involved in successful leadership skills, citizenship traits, and teamwork traits.
0954.7.2	Apply leadership, citizenship, and teamwork skills as an integral part of classroom activities.

Future Careers is an exploratory course that introduces students to a wide range of career options across all clusters. Through hands-on activities, career research, and self-assessments, students will explore emerging industries, labor market trends, and entrepreneurship. The course emphasizes career readiness and helps students connect their interests and strengths to future opportunities. Students will build a career portfolio and gain foundational skills for success in high school and beyond.

Career Exploration

0970.1	Differentiate between jobs and careers
0970.1.1	Differentiate between jobs and careers.
0970.1.2	Identify differences in education, training, and career pathways.
0970.1.3	Compare CTE programs, certifications, apprenticeships, and college options.
0970.2	Examine career evolution and future trends
0970.2.1	Explore historical shifts in work and technology.
0970.2.2	Research careers projected to grow in the next 5–10 years.
0970.2.3	Analyze the impact of automation and AI on future careers.

Self-Assessment & Reflection

0970.3	Assess personal interests, strengths, and values
0970.3.1	Complete career interest inventories and personality assessments.
0970.3.2	Analyze how traits align with career fields.
0970.4	Reflect on experiences to connect learning with career pathways
0970.4.1	Maintain a career journal or portfolio.
0970.4.2	Evaluate the impact of classroom activities, field trips, and guest speakers.

Labor Market Analysis

0970.5	Interpret labor projections
0970.5.1	Analyze growth sectors and employment trends.
0970.5.2	Compare national vs. global labor market data.
0970.6	Apply occupational research tools
0970.6.1	Use the Occupational Outlook Handbook and other databases.
0970.6.2	Conduct independent research on emerging careers.
0970.7	Investigate workforce trends
0970.7.1	Evaluate entrepreneurship, gig economy, and remote work.
0970.7.2	Discuss demographic shifts and their impact on employment.

Employability & Entrepreneurship

0970.8	Demonstrate workplace readiness
0970.8.1	Practice communication, teamwork, and problem-solving.
0970.8.2	Engage in mock interviews, resume writing, and workplace simulations.
0970.9	Explore entrepreneurship
0970.9.1	Develop a basic business plan.
0970.9.2	Identify local opportunities and innovation trends.

Future Career Planning

0970.10	Develop a Career Plan
0970.10.1	Research a variety of career options using reliable sources.

Future Careers**Course #: 0970****Allowable Teacher Endorsement:** Certified Teacher

0970.10.2	Analyze results from self-assessments to identify strengths, interests, and values.
0970.10.3	Interpret labor market data to evaluate future career opportunities.
0970.10.4	Create a professional resume tailored to a selected career path.
0970.10.5	Demonstrate interview skills.
0970.10.6	Present an entrepreneurship pitch or career-focused presentation to an audience.

Regional Careers is a hands-on, community-focused course that introduces students to career opportunities within their local area and across West Virginia. Students will explore regional industries, engage with local professionals, and develop technical and employability skills through project-based learning. The course emphasizes career readiness, community engagement, and real-world applications, helping students connect classroom learning to meaningful career pathways in their own communities.

Regional Career Awareness

0971.1	Identify career clusters relevant to West Virginia
0971.1.1	Explore industries such as healthcare, energy, manufacturing, and tourism.
0971.2	Understand local education and training pathways
0971.2.1	Identify regional programs, certifications, and apprenticeships.
0971.2.2	Map local career pathways using community resources.

Community Engagement

0971.3	Connect with local professionals and employers
0971.3.1	Participate in guest speaker events, field trips, and interviews.
0971.4	Investigate regional labor market needs
0971.4.1	Analyze job availability and workforce gaps in the community.
0971.4.2	Conduct surveys or interviews with local businesses.

Technical & Hands-On Skills

0971.5	Demonstrate basic skills aligned with regional careers
0971.5.1	Safely use tools and equipment in simulated environments.
0971.6	Apply learning in project-based experiences
0971.6.1	Complete tasks related to local career fields (e.g., healthcare, trades).
0971.6.2	Collaborate on community service or school-based enterprise projects.

Career Readiness

0971.7	Exhibit professionalism and work ethic
0971.7.1	Practice punctuality, responsibility, and collaboration.
0971.8	Prepare for entry-level opportunities
0971.8.1	Create resumes, practice interviews, and explore job applications.
0971.8.2	Identify local opportunities and innovation trends.
0971.8.3	Learn workplace safety and basic employment laws.

Regional Career Opportunities

0971.9	Investigate and engage with career opportunities within the local community and the state of West Virginia
0971.9.1	Research local and state career fields using labor market data and community resources.
0971.9.2	Conduct interviews with local professionals to gain insight into regional career pathways.
0971.9.3	Create a hands-on project or presentation that showcases a regional career of interest.
0971.9.4	Create a professional resume and/or job application tailored to a selected regional career opportunity.

Discover Your Future is a middle school career exploration course that introduces students to the career clusters through hands-on lessons which include guest speakers and industry field trips. It offers students a one of a kind CTE experience to support them in making more informed decisions about their future. The course is designed to introduce students in 6th – 8th grades to career opportunities across career clusters so they become more aware of what CTE secondary programs are available to them when they get to high school. More guidance on the career clusters and additional resources can be found at [Career Tech WV Middle School - West Virginia Department of Education \(wvde.us\)](https://www.wvde.us/CareerTech/WVMiddleSchool/)

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction by utilizing grade-level appropriate principles of Simulated Workplace. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect - Instructor's Guide.pdf](#) for more information.

Career Exploration

0972.1	Career Cluster Exploration.
0972.1.1	Identify and individually describe each of the career clusters.
0972.1.2	Identify a diverse range of career options available within each of the career clusters.
0972.1.3	Explore various pathways within each of the career clusters.
0972.2	Research.
0972.2.1	Gather information about specific careers of interest.
0972.2.2	Analyze and evaluate information related to each of the career clusters.
0972.2.3	Compare and contrast different careers within the same cluster.
0972.2.4	Research the skill requirements, educational requirements, certifications, career pathways, and potential career progression of each of the career clusters.
0972.3	Self-Assessment.
0972.3.1	Engage in self-assessment activities.
0972.3.2	Identify personal interests, strengths, and values.
0972.3.3	Understand how personal attributes align with different career clusters.
0972.3.4	Explore and evaluate careers using information from self-assessments.
0972.4	Real-World Connections.
0972.4.1	Make connections between classroom learning and careers.
0972.4.2	Engage in classroom activities that simulate behaviors and skills necessary for employment.
0972.4.3	Explore the relationship between education, career choices, and financial stability.
0972.4.4	Analyze the connection between career choice and personal goals.

Employability Skills

0972.5	Communication & Collaboration.
0972.5.1	Discuss and present information about career clusters.
0972.5.2	Create presentations, posters, or digital media projects to showcase information about specific career clusters to peers.
0972.5.3	Collaborate with peers to explore career clusters and share findings.
0972.5.4	Participate in group projects or discussions to research and present information about specific career clusters.

0972.5.5	Utilize digital communication tools and platforms for collaboration and presentation.
0972.6	Technical Skills.
0972.6.1	Develop basic technical skills relevant to specific career pathways (e.g., computer applications, basic coding, graphic design, healthcare technology, engineering software, culinary arts technology, environmental science technology, automotive technology, financial technology, etc.).
0972.6.2	Understand and apply principles of safety in the workplace.
0972.7	Goal Setting.
0972.7.1	Set short-term goals related to their career interests within each of the career clusters.
0972.7.2	Set long-term goals related to their career interests within each of the career clusters.
0972.7.3	Develop action plans outlining steps they can take in middle school, high school, and beyond to pursue careers of interest.
0972.7.4	Make connections between career goals and the Personalized Educational Plan (PEP).

This course is designed to focus on the various social, personal, practical, and financial knowledge and skills essential for self-reliance in modern society. Students will learn the importance of personal wellness and proper hygiene and how they promote a positive self-image and shape public perceptions. They will learn how to perform general life tasks and manage their personal financial responsibilities. Teachers will provide each student with essential knowledge and skills that will facilitate personal and professional achievement.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Hygiene and Personal Wellness

0973.1	Hygiene and Personal Wellness
0973.1.1	Discuss the importance of maintaining good health and hygiene. (Hygiene for Teens: Why Good Habits are Important)
0973.1.2	Discuss the proper way to wash dishes and utensils. (How to Wash Dishes the Right Way thespruce.com)
0973.1.3	Discuss how to properly launder and remove stains from clothing items and fabrics. (How to get stains out of almost anything nbcnews.com)
0973.1.4	Identify ways to remove wrinkles from clothing without an iron. (How to Remove Wrinkles from Clothes Without an Iron: 9 Ways wikihow.com)
0973.1.5	Identify ways to plan and prepare for an emergency. (Disaster Preparedness Plan: Make a Plan Red Cross)
0973.1.6	Discuss the importance of knowing how to administer basic First Aid. (First Aid Steps: Perform First Aid Red Cross)
0973.1.7	Identify ways to treat a bleeding nose or wound. (9 First Aid Tips You'll Actually Use verywellhealth.com)

Etiquette and Life Skills

0973.2	Etiquette and Life Skills
0973.2.1	Discuss how to read a recipe and prepare a basic meal. (Baking 101: How To Read A Recipe - Joy the Baker)
0973.2.2	Discuss ways to search for a job and prepare for a job interview. (How To Prepare for a Job Interview thebalancemoney.com)
0973.2.3	Demonstrate the proper way to tie a tie. (4 Ways to Tie a Tie wikiHow)
0973.2.4	Identify ways to plan and book a trip. (Booking.com Official Site)
0973.2.5	Identify and display good etiquette for dining out. (Dining Etiquette Around the World: A Guide to Manners & Tipping in 47 Countries theculinarytravelguide.com)
0973.2.6	Identify how to use a calendar or schedule to remember important events. (How To Use a Calendar for Time Management in 4 Steps Indeed.com)
0973.2.7	Discuss common Internet safety and security practices. (How to Stay Safe Online: A Guide for Everyone Who Uses the Internet snbsd.com)
0973.2.8	Recognize what to wear for any occasion or event. (The Guide To Dress Codes: What To Wear On Every Occasion lifehack.org)

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

Home Maintenance and Repair

0973.3	Home Maintenance and Repair
0973.3.1	Develop a day-to-day home maintenance schedule. (Printable Cleaning Checklists: Daily, Weekly & Monthly Tasks! mom4real.com)
0973.3.2	Identify ways to clean a house properly. (The Ultimate Checklist for Cleaning Your Entire House thespruce.com)
0973.3.3	Explain how to change a vacuum cleaner bag or empty the dirt collection canister. (7 Tips for Maintaining Your Vacuum Cleaner: Allergy & Air allergyandair.com)
0973.3.4	Identify how and when to clean or change the filter on a residential HVAC unit. (How to Change a Home Air Filter The Home Depot)
0973.3.5	Explain how to check and change the battery on a smoke detector. (How to Change the Battery in Your Smoke Detector Vector Security)
0973.3.6	Discuss how to safely detect and reset a blown electrical fuse or circuit breaker. (How to Reset a Circuit Breaker angi.com)
0973.3.7	Discuss common plumbing problems and solutions. (How to Unclog a Drain Without Harsh Chemicals Family Handyman)
0973.3.8	Identify ways to complete basic home repairs. (100 Home Repairs You Can Do Yourself The Family Handyman)
0973.3.9	Identify and demonstrate how to safely use kitchen appliances.

Automobile Care and Maintenance

0973.4	Automobile Care and Maintenance
0973.4.1	Explain the process for registering, insuring, and licensing a vehicle. (WV Vehicle Registration - How to Register a Car DMV.ORG , WV Division of Motor Vehicles: Insurance DMV.ORG , and WV Division of Motor Vehicles: Registration DMV.ORG)
0973.4.2	Identify the routine service needs of a car or small truck. (The Ultimate Car Maintenance Checklist Nationwide)
0973.4.3	Explain when and how to change your vehicle's oil and oil filter. (How to Check the 6 Essential Fluids in Your Car popularmechanics.com)
0973.4.4	Explain how to check and add air pressure to your vehicle's tires. (How to Inflate Tires to an Ideal Tire Pressure)
0973.4.5	Develop a list of things to check before taking a vehicle on a long trip.
0973.4.6	Explain how to change a flat tire on your vehicle safely. (How to Change a Flat Tire: A Step-by-Step Guide SafeWise)
0973.4.7	Discuss what to do in the event of a vehicle breakdown. (What To Do When Your Vehicle Breaks Down)
0973.4.8	Discuss what to do if you receive a speeding ticket or citation. (What to Do When You Get a Speeding Ticket NerdWallet)
0973.4.9	Compile a list of vehicle problems that demand immediate attention. (Top Warning Signs Your Car Needs Immediate Servicing)

Finance and Legal Management

0973.5	Finance and Legal Management
0973.5.1	Discuss how to prepare a monthly spending budget. (How to Make a Budget: Your Step-by-Step Guide ramseysolutions.com and Your Guide to How to Budget Money NerdWallet)
0973.5.2	Explain the procedure for opening a checking or savings account. (How to Open a Checking Account wallethub.com)

0973.5.3	Demonstrate the proper way to write a personal check. (How To Write a Check: A Step-by-Step Guide thebalancemoney.com)
0973.5.4	Explain how to track spending and balance a checking account. (How to Balance a Checking Account: A Step-by-Step Guide thebalancemoney.com)
0973.5.5	Explain how to invest money in a CD or brokerage account. (How To Invest In CDs Forbes Advisor and Brokerage Account: What It Is and How to Open One NerdWallet)
0973.5.6	Discuss when and how to file a tax return. (Tax Filing Guide: How to File Taxes NerdWallet)
0973.5.7	Identify basic practices for keeping and storing financial records. (Financial Documents: What To Save And What You Can Throw Away Forbes Advisor and How to organize your financial records Financial Education (prudential.com))
0973.5.8	Identify the process for making a major purchase, such as a vehicle or home. (How to plan for a major purchase Ameriprise Financial)
0973.5.9	Identify the taxes that you are responsible for paying in your state. (West Virginia Tax Division (wv.gov))
0973.5.10	Explain how to get a certified copy of your birth certificate. (Vital Registration wv.gov)
0973.5.11	Explain how to get a replacement Social Security card. (Replace Social Security card SSA)
0973.5.12	Discuss the process for obtaining a Passport. (U.S. passports USAGov)
0973.5.13	Identify ways to prevent identity theft. (Identity theft USAGov)
0973.5.14	Identify ways to shop for the best insurance rates. (How to Compare Car Insurance Quotes businessinsider.com)
0973.5.15	Identify which types of insurance are necessary and which types are unnecessary. (8 types of insurance you need and why usatoday.com)
0973.5.16	Identify ways to maintain a good credit score. (How do I get and keep a good credit score? consumerfinance.gov)
0973.5.17	Identify ways to budget money and avoid unnecessary debt. (19 Ways To Tackle Your Budget and Manage Your Debt GOBankingRates and 5 Steps To Take Now To Save More And Reduce Debt Forbes Advisor)
0973.5.18	Identify ways to use a credit card properly and responsibly. (9 Tips for Responsible Credit Card Management Capital One)
0973.5.19	Identify the importance of setting personal goals. (20 Achievable Goals To Set for Your Personal Development Indeed.com and How to Set and Achieve Life Goals The Right Way positivepsychology.com)
0973.5.20	Identify ways to save money when purchasing groceries and other common necessities. (22 Ways To Save Money on Groceries clark.com and 16 Brilliant Ways To Get the Best Deals at the Grocery Store Every Time Sunmark Credit Union)

This course is designed to focus on the various social, personal, practical, and financial knowledge and skills essential for self-reliance in modern society. Students will learn the importance of personal wellness and proper hygiene and how they promote a positive self-image and shape public perceptions. They will learn how to perform general life tasks and manage their personal financial responsibilities. Teachers will provide each student with essential knowledge and skills that will facilitate personal and professional achievement.

Please see the Resource Document for additional information:

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Hygiene and Personal Wellness

0973.1	Hygiene and Personal Wellness
0973.1.1	Discuss the importance of maintaining good health and hygiene.
0973.1.2	Discuss the proper way to wash dishes and utensils.
0973.1.3	Discuss how to properly launder and remove stains from clothing items and fabrics.
0973.1.4	Identify ways to remove wrinkles from clothing without an iron.
0973.1.5	Identify ways to plan and prepare for an emergency.
0973.1.6	Discuss the importance of knowing how to administer basic First Aid.
0973.1.7	Identify ways to treat a bleeding nose or wound.

Etiquette and Life Skills

0973.2	Etiquette and Life Skills
0973.2.1	Discuss how to read a recipe and prepare a basic meal.
0973.2.2	Discuss ways to search for a job and prepare for a job interview.
0973.2.3	Demonstrate the proper way to tie a tie.
0973.2.4	Identify ways to plan and book a trip.
0973.2.5	Identify and display good etiquette for dining out.
0973.2.6	Identify how to use a calendar or schedule to remember important events.
0973.2.7	Discuss common Internet safety and security practices.
0973.2.8	Recognize what to wear for any occasion or event.

Home Maintenance and Repair

0973.3	Home Maintenance and Repair
0973.3.1	Develop a day-to-day home maintenance schedule.
0973.3.2	Identify ways to clean a house properly.
0973.3.3	Explain how to change a vacuum cleaner bag or empty the dirt collection canister.
0973.3.4	Identify how and when to clean or change the filter on a residential HVAC unit.
0973.3.5	Explain how to check and change the battery on a smoke detector.
0973.3.6	Discuss how to safely detect and reset a blown electrical fuse or circuit breaker.
0973.3.7	Discuss common plumbing problems and solutions.
0973.3.8	Identify ways to complete basic home repairs.

0973.3.9	Identify and demonstrate how to safely use kitchen appliances.

Automobile Care and Maintenance

0973.4	Automobile Care and Maintenance
0973.4.1	Explain the process for registering, insuring, and licensing a vehicle.
0973.4.2	Identify the routine service needs of a car or small truck.
0973.4.3	Explain when and how to change your vehicle's oil and oil filter.
0973.4.4	Explain how to check and add air pressure to your vehicle's tires.
0973.4.5	Develop a list of things to check before taking a vehicle on a long trip.
0973.4.6	Explain how to change a flat tire on your vehicle safely.
0973.4.7	Discuss what to do in the event of a vehicle breakdown.
0973.4.8	Discuss what to do if you receive a speeding ticket or citation.
0973.4.9	Compile a list of vehicle problems that demand immediate attention.

Finance and Legal Management

0973.5	Finance and Legal Management
0973.5.1	Discuss how to prepare a monthly spending budget.
0973.5.2	Explain the procedure for opening a checking or savings account.
0973.5.3	Demonstrate the proper way to write a personal check.
0973.5.4	Explain how to track spending and balance a checking account.
0973.5.5	Explain how to invest money in a CD or brokerage account.
0973.5.6	Discuss when and how to file a tax return.
0973.5.7	Identify basic practices for keeping and storing financial records.
0973.5.8	Identify the process for making a major purchase, such as a vehicle or home.
0973.5.9	Identify the taxes that you are responsible for paying in your state.
0973.5.10	Explain how to get a certified copy of your birth certificate.
0973.5.11	Explain how to get a replacement Social Security card.
0973.5.12	Discuss the process for obtaining a Passport.
0973.5.13	Identify ways to prevent identity theft.
0973.5.14	Identify ways to shop for the best insurance rates.
0973.5.15	Identify which types of insurance are necessary and which types are unnecessary.
0973.5.16	Identify ways to maintain a good credit score.
0973.5.17	Identify ways to budget money and avoid unnecessary debt.
0973.5.18	Identify ways to use a credit card properly and responsibly. (
0973.5.19	Identify the importance of setting personal goals.
0973.5.20	Identify ways to save money when purchasing groceries and other common necessities.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement

This course is designed to provide practical skills, explore basic financial literacy, examine job markets and workplace safety, discover careers and employment opportunities in West Virginia and refine communication skills. Students will explore all sixteen career clusters. This exploration will help students to select a future career and plan the necessary educational requirements to maintain that career.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Practical Know How

0974.1	Explore hygiene and personal wellness.
0974.1.1	Discuss the importance of maintaining good health and hygiene.
0974.1.2	Identify ways to plan and prepare for an emergency.
0974.1.3	Discuss the importance of knowing how to administer basic first aid.
0974.2	Practice etiquette and life skills.
0974.2.1	Discuss how to read a recipe and prepare a basic meal.
0974.2.2	Discuss ways to search for a job and prepare for a job interview.
0974.2.3	Identify and display good etiquette for dining out.
0974.2.4	Discuss common Internet safety and security practices.
0974.2.5	Recognize what to wear for any occasion or event.
0974.3	Understand necessary home maintenance and repair.
0974.3.1	Identify how and when to clean or change the filter on a residential HVAC unit.
0974.3.2	Explain how to check and change the battery on a smoke detector.
0974.3.3	Discuss how to safely detect and reset a blown electrical fuser or circuit breaker.
0974.3.4	Identify ways to complete basic home repairs.
0974.4	Recognize routine automobile care and maintenance.
0974.4.1	Explain the process for registering, insuring, and licensing a vehicle.
0974.4.2	Identify the routine service needs of a car or small truck.
0974.4.3	Explain when and how to change your vehicle’s oil and oil filter.
0974.4.4	Explain how to check and add air pressure to your vehicle’s tires.
0974.4.5	Explain how to change a flat tire on your vehicle safely.
0974.4.6	Discuss what to do in the event of a vehicle breakdown.

Basic Financial Literacy

0974.5	Review finance and legal management.
0974.5.1	Discuss how to prepare a monthly spending budget.
0974.5.2	Explain the procedure for opening a checking or savings account.
0974.5.3	Demonstrate the proper way to write a personal check.
0974.5.4	Explain how to track spending and balance a checking account.
0974.5.5	Explain how to invest money in a certificate of deposit (CD) or brokerage account.
0974.5.6	Discuss when and how to file a tax return.
0974.5.7	Identify basic practices for keeping and storing financial records.
0974.5.8	Identify the process for making a major purchase, such as a vehicle or home.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement

0974.5.9	Identify the taxes that you are responsible for paying in your state.
0974.5.10	Explain how to get a certified copy of your birth certificate.
0974.5.11	Explain how to get a replacement Social Security card.
0974.5.12	Discuss the process for obtaining a passport.
0974.5.13	Identify ways to prevent identity theft.
0974.5.14	Identify ways to shop for the best insurance rates.
0974.5.15	Identify which types of insurance are necessary and which types are unnecessary.
0974.5.16	Identify ways to maintain a good credit score.
0974.5.17	Identify ways to use a credit card properly and responsibly.
0974.5.18	Identify the importance of setting personal goals.

Job Markets and Workplace Safety

0974.6	Explore the United States (U.S.) Department of Labor projects.
0974.6.1	Examine the U.S. Bureau of Labor projections for the U.S. economy between 2021 and 2031.
0974.6.2	Discuss the occupations projected to be the fastest growing in the next ten years.
0974.6.3	Explore why the healthcare and social assistance sector is projected to create the most job growth by the year 2031.
0974.6.4	Explain why the leisure and hospitality sector is projected to see the fastest employment growth of all sectors.
0974.6.5	Discuss total employment and future projections in comparison to the previous decade.
0974.7	Discuss populations and the labor force.
0974.7.1	Discuss the labor force participation rate and why it is expected to decline over the coming decade.
0974.7.2	Explore which occupations will experience a shortage of qualified applications to fill future vacancies.
0974.7.3	Discuss which sectors are projected to lose the most jobs and why.
0974.7.4	Discuss how automation of tasks will negatively affect the job market in many sectors.
0974.7.5	Explore why labor force participation rates of older adults are expected to increase in the next ten years.
0974.7.6	Identify the impact of small business/entrepreneurship on market economics.
0974.7.7	Assess local trends and opportunities for business ventures.
0974.8	Examine ethical and safety guidelines.
0974.8.1	Discuss safety in the workplace.
0974.8.2	Discuss confidentiality in the workplace.
0974.8.3	Explore the Occupational Safety and Health Administration (OSHA) and its standards.
0974.8.4	Describe the rights of employees and employers regarding OSHA standards.
0974.8.5	Recognize what kind of personal protective equipment (PPE) is necessary and how to use it properly.
0974.8.6	Describe managing diversity in the workplace.
0974.8.7	Discuss the Family and Medical Leave Act (FMLA), Americans with Disabilities Act (ADA), Age Discrimination Acts, and Title VII of the Civil Rights Act.

West Virginia Careers and Employment Opportunities

0974.9	Explore careers and employment opportunities in West Virginia.
0974.9.1	Discuss which industries have historically been most important to the economy in West Virginia.
0974.9.2	Provide an overview of the industries that are still relevant to our economy today.
0974.9.3	Explain how one industry can create a need for additional industries to sustain it.
0974.9.4	Discuss the reasons for population growth and decline in our state.
0974.9.5	Determine which regions are predicted to see the greatest population growth in the future.
0974.9.6	Explain how tourism can create an increase/decrease in job opportunities.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement

0974.9.7	Examine which occupational groups will see the largest increase in new jobs and why.
0974.9.8	Explain how natural resources have created job opportunities in West Virginia (coal, timber, limestone, oil, and natural gas).
0974.9.9	Identify West Virginia's geographic regions and how job markets differ in each region.
0974.9.10	Explore the cost of living and availability of community services in each region.

Communication

0974.10	Discover the essentials of communication.
0974.10.	Describe verbal, nonverbal, and written communication.
0974.10.	Interpret nonverbal communication.
0974.10.	Practice verbal and written communication skills.
0974.10.	Interpret information and ideas.
0974.10.5	Apply basic speaking and active listening skills, including reflection, restatement, and clarification techniques.
0974.10.	Recognize communication barriers.
0974.10.7	Recognize elements of written and electronic communication such as spelling, grammar, and formatting.
0974.10.8	Recognize the importance of courtesy and respect for customers and colleagues to maintain good interpersonal relationships.
0974.10.9	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.

Career Technical Education (CTE) Cluster Exploration

0974.11	Explore CTE clusters.
0974.11.1	Define and use proper terminology associated with each career cluster.
0974.11.2	Describe some available careers in each career cluster.
0974.11.3	Identify skills to be successful in each career cluster.
0974.11.4	Describe technologies associated with each career cluster.
0974.11.5	Describe how careers relate to the needs and functions of the economy, society, and personal fulfillment.
0974.11.6	Describe how societal, economic, and technological changes influence employment trends and future training.
0974.11.7	Describe the importance of career planning, changing careers, and the concept of lifelong learning, and how they relate to personal fulfillment.
0974.11.8	Show the ability to locate, understand, and use career/cluster information and resources for future planning.
0974.11.9	Explain the relationship between educational achievement and career success.
0974.11.10	Demonstrate employability skills for workplace success.
0974.11.11	Complete various interest assessments/surveys to explore careers related to your interest, skills, and work values.

This course is designed to allow students to explore the robust tourism industry of West Virginia. This course will provide students with an overview of WV tourism's impact on the state, the tourism landscape, economic opportunities provided by tourism, and careers in tourism. This course will give students insight into what WV has to offer both residents and visitors to bolster state pride.

Impact of Tourism in West Virginia

0975.1	Impact of Tourism in West Virginia.
0975.1.1	Explore the factors that impact tourism.
0975.1.2	Discuss the relationship between employee attitude, appearance, actions, and customer satisfaction.
0975.1.3	Examine the training for Tourism Works.

Pride in the State of West Virginia

0975.2	Pride in the State of West Virginia.
0975.2.1	Investigate examples of positive and negative stereotyping of West Virginia.
0975.2.2	Identify strategies to increase a positive view of West Virginia.

West Virginia's Tourism Landscape

0975.3	West Virginia's Tourism Landscape.
0975.3.1	Name the nine travel regions of West Virginia on a map.
0975.3.2	Find historical/geographic places of interest in each of the travel regions.
0975.3.3	Discover information about significant West Virginia parks.
0975.3.4	Explore places of recreational interest in West Virginia.

Economic Opportunities in the Regions of West Virginia

0975.4	Economic Opportunities in the Regions of West Virginia.
0975.4.1	Identify the industries and products that are most important to West Virginia's economy.
0975.4.2	Explore the economic impact of special events such as fairs, festivals, etc.
0975.4.3	Determine how an increase or decrease in tourism affects businesses.

Careers in West Virginia Tourism

0975.5	Careers in West Virginia Tourism.
0975.5.1	Identify careers in the hospitality and tourism industry.
0975.5.2	Explore the benefits of a career in hospitality and tourism.
0975.5.3	Discover job seeking skills.

This course provides students with comprehensive knowledge and practical skills in handling large and small kitchen equipment, ensuring sanitation and safety in the culinary environment, and developing essential employability skills. Students will be equipped with the fundamental competencies required for a successful career in the food service industry.

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Large and Small Equipment

1013.1	Identify and demonstrate proper use of measuring devices.
1013.1.1	Demonstrate measuring and portioning using the appropriate smallware and utensils. (14.5)
1013.2	Identify large and small kitchen equipment.
1013.2.1	List the different types of food-preparation equipment and give examples of their uses. (11.2)
1013.3	Demonstrate proper use and care of large and small equipment.
1013.3.1	Demonstrate correct and safe use of food-preparation equipment (e.g., slicers, mixers, etc.) (11.3)

Sanitation and Safety

1013.4	Display knowledge of cleaning and sanitizing methods.
1013.4.1	Explain how to maintain a clean and sanitary operation. (7.6)
1013.4.2	Outline procedures for cleaning and sanitizing tools and equipment. (7.7)
1013.4.3	Identify factors that affect the effectiveness of sanitizers. (7.8)
1013.4.4	List the elements of a master cleaning schedule. (7.9)
1013.4.5	Outline procedures for managing pests. (7.10)
1013.5	Maintain basic principles of nationally recognized sanitation protocols (e.g., ServSafe, CPFM, ACF).
1013.5.1	Define what a foodborne-illness outbreak is, and list the costs associated with one. (6.1)
1013.5.2	Recognize risks associated with high-risk populations. (6.2)
1013.5.3	Identify factors that affect the growth of pathogens (FAT TOM). (6.3)
1013.5.4	Identify characteristics of TCS food and list examples. (6.4)
1013.5.5	Identify ways food becomes unsafe. (6.5)
1013.6	Exhibit understanding of prevention, causes, and response to workplace injuries.
1013.6.1	Describe various types of protective clothing, footwear, and equipment used in a foodservice setting. (10.1)
1013.6.2	Identify procedures for preventing burns. (10.5)
1013.6.3	Identify procedures for preventing slips, trips, and falls in a foodservice operation. (10.6)
1013.6.4	Outline the procedure for cleaning up spills on floors. (10.7)
1013.6.5	Demonstrate how to use ladders safely. (10.8)
1013.6.6	Demonstrate proper lifting and carrying procedures to avoid injury. (10.9)

1013.6.7	Outline basic first aid concepts and procedures. (10.10)
1013.6.8	Identify external threats to an operation, and list ways to protect against them. (10.11)
1013.7	Describe fire extinguishers and fire safety procedures.
1013.7.1	Identify hazards that contribute to accidental fires. (10.2)
1013.7.2	Classify various types of fires and fire extinguishers. (10.3)
1013.7.3	Outline the actions to take in the event of a fire in a foodservice setting. (10.4)
1013.8	Demonstrate personal hygiene.
1013.8.1	List personal behaviors that can contaminate food. (7.1)
1013.8.2	List the steps to proper handwashing and identify when hands should be washed. (7.2)
1013.8.3	Identify proper personal hygiene practices and appropriate work attire. (7.3)
1013.8.4	Identify ways to handle ready-to-eat food safely. (7.4)
1013.8.5	Identify when food handlers should be prevented from working around food or from working in the operation. (7.5)
1013.9	Identify food allergen characteristics.
1013.9.1	Identify the most common allergens and methods for preventing allergic reactions. (6.6)
1013.9.2	Recognize the need for food defense systems. (6.7)
1013.10	Demonstrate proper food storage techniques (e.g., can goods, dry, refrigerated, frozen, fresh).
1013.10.1	Identify the equipment needed for receiving and storing food and supplies. (11.1)
1013.10.1	Identify ways to prevent cross-contamination. (8.1)
1013.10.2	Identify ways to prevent time-temperature abuse. (8.2)
1013.10.3	List the steps for calibrating a bimetallic stemmed thermometer using the ice-point method. (8.3)
1013.10.4	Identify characteristics of an approved food source. (8.4)
1013.10.5	Identify criteria for accepting or rejecting food during receiving. (8.5)
1013.10.6	Outline procedures for storing food. (8.6)
1013.10.7	Outline procedures for preparing and cooking various TCS food. (8.7)
1013.10.8	Outline procedures for holding, cooling, and reheating TCS food. (8.8)
1013.10.9	Identify ways to handle food ready for service. (8.9)
1013.10.10	Outline procedures for preparing and serving food for off-site service. (8.10)
1013.10.11	Explain what a food safety management system is and why it's important. (8.11)
1013.11	Exhibit knowledge of HACCP policies and procedures.
1013.11.1	Identify government agencies that regulate the restaurant and foodservice industry. (6.8)
1013.11.2	State who is legally responsible for providing a safe environment and ensuring safe practices. (9.1)
1013.11.3	Define the role of Occupational Safety and Health Administration regulations. (9.2)
1013.11.4	State the Hazard Communication Standard requirements for employers. (9.3)
1013.11.5	List the requirements for storing hazardous chemicals in an operation. (9.4)
1013.11.6	Explain the importance of general safety audits and safety training. (9.5)
1013.11.7	List the steps in an accident investigation. (9.6)
1013.11.8	Explain the purpose of an emergency plan. (9.7)
1013.11.9	Define the terms harassment-free environment and mutually respectful workplace. (9.8)
1013.11.10	List guidelines for handling harassment claims. (9.9)

Employability Skills

1013.12	Exhibit understanding of professional behavior, appearance, and job interview skills.
1013.12.1	Define professionalism and explain what it means to hospitality professionals. (3.1)
1013.12.2	Understand the importance of personal appearance and grooming standards to your employment. (3.2)
1013.12.3	Recognize the connections between your professional life and your personal life. (3.3)

1013.12.4	List the basic expectations that employers have for an employee in a foodservice setting. (3.4)
1013.12.5	Explain the concept of teamwork. (3.5)
1013.12.6	Describe ethics and explain their importance to the restaurant and foodservice industry. (3.6)
1013.12.7	Identify the benefits of diversity to a workplace. (3.7)
1013.12.8	Explain how stereotypes and prejudices can negatively affect working together. (3.8)
1013.12.9	Identify how employees' roles and jobs impact an organization's mission and goals. (3.9)
1013.12.10	Outline the steps to resigning from a job. (3.10)
1013.12.11	Describe the communication process. (4.1)
1013.12.12	Identify obstacles to effective communication and explain how to prevent them. (4.2)
1013.12.13	Demonstrate effective listening skills. (4.3)
1013.12.14	Demonstrate effective speaking skills. (4.4)
1013.12.15	Demonstrate effective writing skills. (4.5)
1013.12.16	Describe interpersonal communication in the workplace. (4.6)
1013.12.17	Outline a plan for an effective job search. (5.1)
1013.12.18	Read and complete a job application form. (5.2)
1013.12.19	List the steps to an effective job interview. (5.3)
1013.12.20	Identify the differences between closed- and open-ended questions in interviews. (5.4)
1013.12.21	Explain the follow-up steps for a job interview. (5.5)
1013.12.22	Define and give examples of an employee assessment test. (5.6)
1013.12.23	Outline the steps to choosing a college or trade school and identify resources for answering those questions. (5.7)
1013.12.24	List ways to find and apply for scholarships. (5.8)
1013.13	Display knowledge of various job profiles and chain of command.
1013.13.1	Identify the two segments of the restaurant and foodservice industry and give examples of businesses in each of them. (1.1)
1013.13.2	Categorize the types of businesses that make up the hospitality, lodging, and tourism industries, and identify their foodservice opportunities. (1.2)
1013.13.3	Outline the growth of the hospitality industry throughout the history of the United States. (1.3)
1013.13.4	Identify the two major categories of jobs in the restaurant and foodservice industry. (2.1)
1013.13.5	Identify skills needed by foodservice professionals. (2.2)
1013.13.6	Identify career opportunities in the restaurant and foodservice industry. (2.3)
1013.13.7	List factors for maintaining health and wellness throughout a restaurant or foodservice career. (2.4)
1013.13.8	List the major positions in a modern, professional kitchen. (13.1)

This comprehensive course integrates the foundations of culinary arts with essential knowledge in hospitality management, equipping students with a general understanding of the culinary industry. Students will master culinary techniques and prepare diverse dishes to help prepare them for success in the fast-paced world of food service and hospitality.

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Recipes

1014.1	Demonstrate an understanding of culinary terminology and techniques (e.g., braising, pan grilling, batters, breading).
1014.1.1	Describe and demonstrate basic preparation techniques. (13.4)
1014.2	Demonstrate how to read and follow standard recipes.
1014.2.1	Identify the components and functions of a standardized recipe. (14.2)
1014.2.2	Interpret information on a nutrition label. (13.5)
1014.3	Establish recipe mise en place.
1014.3.1	Explain the importance of mise en place. (13.2)
1014.3.2	Explain the difference between seasoning and flavoring. (13.3)

Knife Skills

1014.4	Identify and distinguish knife types and basic cuts.
1014.4.1	Identify hand tools and small equipment. (12.1)
1014.4.2	List the different types of knives used in the foodservice kitchen and give examples of their uses. (12.2)
1014.4.3	Demonstrate the classical knife cuts. (12.4)
1014.5	Demonstrate knife sharpening skills and safe knife usage and care.
1014.5.1	Demonstrate the correct holding and cutting motions for a chef’s knife. (12.3)

Food Preparation

1014.6	Prepare salads and dressings.
1014.6.1	Explain the roles of salads on the menu. (15.1)
1014.6.2	Identify and describe the various ingredients used to make salads. (15.2)
1014.6.3	List the four parts of a salad and explain the role of each. (15.3)
1014.6.4	Identify and prepare various types of salad. (15.4)
1014.6.5	Identify procedures for cleaning and storing salad greens. (15.5)

1014.6.6	Differentiate among various oils and vinegars. (15.6)
1014.6.7	Prepare vinaigrettes and other emulsions. (15.7)
1014.6.8	Describe and prepare various common dips. (15.8)
1014.7	Prepare sandwiches, spreads, and fillings.
1014.7.1	Give examples of different types of sandwiches, including simple hot, open-faced, tea (or finger), grilled, deep-fried, and simple cold. (16.1)
1014.7.2	Explain the roles of the three components of a sandwich: bread, spread, and filling. (16.2)
1014.7.3	Prepare several types of sandwiches. (16.4)
1014.7.4	Give examples of different styles of pizza. (16.5)
1014.7.5	Prepare various types of pizza. (16.6)
1014.8	Explain procedure for buffet preparation and maintenance.
1014.8.1	Identify the kitchen equipment needed for holding and serving food and beverages. (11.4)
1014.8.2	List the components of a sandwich station. (16.3)

Bakery Products

1014.9	Prepare batters and doughs using appropriate mixing methods.
1014.9.1	Prepare various types of cookies. (19.3)
1014.9.2	Prepare various types of quick bread. (19.4)

Stocks, Sauces, and Hot Soups

1014.10	Prepare and flavor stocks (bones and base) and reductions.
1014.10.1	Identify the four essential parts of stock and the proper ingredients for each. (17.1)
1014.10.2	List and explain the various types of stock and their ingredients. (17.2)
1014.10.3	Demonstrate three methods for preparing bones for stock. (17.3)
1014.10.4	Prepare the ingredients for and cook several kinds of stocks. (17.4)
1014.10.5	Explain how and why to remove fat from stock. (17.5)
1014.10.6	List the ways to cool stock properly. (17.6)
1014.11	Prepare mother (foundation) sauces.
1014.11.1	Prepare the mother sauces, and describe other sauces made from them. (17.7)
1014.12	Prepare roux and thickening agents.
1014.12.1	List the proper ingredients for sauces and explain how to create them. (17.8)
1014.12.2	Prepare various small sauces. (17.9)
1014.12.3	Identify ways to use sauces. (17.10)
1014.13	Identify and prepare soups.
1014.13.1	Identify the two basic kinds of soups and give examples of each. (17.11)
1014.13.2	Prepare the basic ingredients for broth, consommé, purée, clear, and cream soups. (17.12)

Meats and Poultry

1014.14	Identify various cooking methods.
1014.14.1	List and explain the three types of heat transfer. (18.1)
1014.14.2	Describe dry-heat cooking methods and list the foods to which they are suited. (18.2)
1014.14.3	Describe moist-heat cooking methods and list the foods to which they are suited. (18.3)
1014.14.4	Describe combination-heat cooking methods and list the foods to which they are suited. (18.4)
1014.14.5	Describe sous vide and microwave cooking techniques. (18.5)
1014.15	Determine proper degrees of doneness.
1014.15.1	Identify ways to determine if a food has reached the correct degree of doneness. (18.6)

Culinary Math

1014.16	Convert standard recipes.
1014.16.1	Perform basic math calculations using numbers or fractions. (14.1)
1014.16.2	Convert recipes to yield smaller and larger quantities based on operational needs. (14.3)
1014.16.3	Calculate ingredient weights using baker's percentages. (19.1)
1014.16.4	Convert baking recipes to a new yield. (19.2)
1014.17	Calculate food costs, percentages, and mark-up.
1014.17.1	Given a problem, calculate as purchased (AP) and edible portion (EP) amounts. (14.6)
1014.17.2	Calculate the total cost and portion costs of a standardized recipe. (14.7)
1014.17.3	Identify the types of costs incurred by a foodservice business and give examples of each. (8.1)
1014.17.4	Explain the purpose of a budget. (8.2)
1014.17.5	Explain the purpose of a profit-and-loss report. (8.3)
1014.17.6	Explain the purpose of invoices in a foodservice business. (8.4)
1014.17.7	Identify tools to help control costs. (8.5)
1014.17.8	Define and calculate food cost and food cost percentage. (9.1)
1014.17.9	Develop a recipe cost card for a standardized recipe. (9.2)
1014.17.10	Calculate a recipe's yield and the number of portions it will produce. (9.3)
1014.17.11	Use a conversion factor to calculate a new yield for an existing recipe. (9.4)
1014.17.12	Explain the importance of portion control to food cost. (9.5)
1014.17.13	Explain the food cost percentage method for menu pricing. (9.6)
1014.17.14	List and describe purchasing, receiving, and storage procedures that help to preserve quality and control costs. (9.7)
1014.17.15	List ways to evaluate a finished product for quality. (9.8)
1014.17.16	Explain the importance of inventory value as it relates to cost control. (9.9)
1014.18	Calculate guest check with tax and gratuity.
1014.18.1	List methods for processing payment. (21.14)
1014.19	Convert weights and measurements.
1014.19.1	Explain the difference between customary and metric measurement units and convert units between the two systems. (14.4)

Dining Service

1014.20	Perform basic duties of a wait person (e.g., take orders, selling techniques, serve properly, bus, side-work duties).
1014.20.1	Explain the importance of customer service to the restaurant and foodservice industry. (20.1)
1014.20.2	List the reasons for making a good first impression and give examples of how to make one. (20.2)
1014.20.3	Describe special needs that some customers might have. (20.3)
1014.20.4	List ways to obtain feedback from guests and determine their satisfaction. (20.4)
1014.20.5	Explain how customer complaints should be resolved. (20.5)
1014.20.6	Identify various server tools and the correct way to stock a service station. (21.2)
1014.20.7	Outline the process for receiving and recording reservations and special requests. (21.3)
1014.20.8	Demonstrate taking orders at the table, beginning with the greeting. (21.4)
1014.20.9	Define suggestive selling and give examples of how to do it. (21.5)
1014.20.10	Identify basic guidelines for serving alcohol to guests. (21.6)
1014.20.11	Demonstrate setting and clearing items properly. (21.9)
1014.20.12	Prepare various types of hot beverages. (21.10)

1014.20.13	Demonstrate service procedures for hot beverages. (21.11)
1014.20.14	Prepare various types of cold beverages. (21.12)
1014.20.15	Demonstrate service procedures for cold beverages. (21.13)
1014.21	Describe various types of service (e.g., lunch, a la carte, banquet, family-style).
1014.21.1	Describe the four traditional styles of service: American, French, English, and Russian. (21.7)
1014.21.2	Identify contemporary styles of service. (21.8)
1014.22	Identify roles of service staff (e.g., hostess, cashier, server, busser).
1014.22.1	Describe service staff roles and list the duties and responsibilities of each. (21.1)

Introduction to Management

1014.23	Explain the functions and expectations associated with managerial roles and leadership behaviors.
1014.23.1	List the major responsibilities of a manager. (22.1)
1014.23.2	Identify the behaviors of a leader. (22.2)
1014.23.3	Identify common expectations that employees have of managers. (22.3)
1014.23.4	List ways to promote diversity in the workplace. (22.4)
1014.23.5	List the steps for solving a problem and explain how each step contributes to finding a solution. (22.5)
1014.23.6	Explain what a SMART goal is. (22.6)
1014.23.7	Explain the purpose of vision statements and mission statements and contrast their differences. (22.7)

This course is designed to provide an exploration of hospitality management, covering topics such as industry trends analysis, organizational staffing structures, customer service strategies, and ethical considerations in the workplace. Through a combination of theoretical learning and practical exercises, students will develop essential skills in areas such as banquet service, beverage preparation, dining etiquette, and guest room management, preparing them for diverse roles within the hospitality sector.

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Organization of Hospitality Service

1015.1	Organization of Hospitality Service
1015.1.1	Analyze the impact of hospitality trends on operations.
1015.1.2	Develop organizational diagrams for front-of-house and back-of-house staffing in foodservice and lodging sectors.
1015.1.3	Prepare a chart of key professional associations and student organizations in the hospitality industry.
1015.1.4	Write a report on customer satisfaction, highlighting six key characteristics of customer-focused employees.
1015.1.5	Create a presentation on customer service, emphasizing qualities of successful hospitality employees.
1015.1.6	Role-play various "critical moments" service encounters common in the hospitality industry.

Entrepreneurship

1015.2	Entrepreneurship
1015.2.1	Discuss small business opportunities in the hospitality industry.
1015.2.2	Research entrepreneurial opportunities within the hospitality sector.
1015.2.3	Outline governmental regulations for operating a hospitality business.
1015.2.4	Chart the process of developing a business plan.
1015.2.5	Research the past, present, and future trends in the hospitality industry.

Ethics and Customer Service

1015.3	Ethics and Customer Service
1015.3.1	Discuss the importance of ethical behavior in the workplace.
1015.3.2	Describe the consequences of unethical behavior in the workplace.
1015.3.3	Outline seven questions that can help address ethical dilemmas.
1015.3.4	Collaborate with peers to create work ethic guidelines for a hospitality business.
1015.3.5	Explain four common law rights guaranteed to guests.
1015.3.6	Discuss the importance of ethical behavior in the workplace.

Setup and Maintaining

1015.4	Setup and Maintaining
1015.4.1	Demonstrate the setup of tables for various banquet services.
1015.4.2	Show different plating and table dressing techniques for different types of functions.
1015.4.3	Select appropriate décor and table settings based on the type of function.

1015.4.4	Outline the steps to break down a banquet room.
1015.4.5	Restock items in the side station.
1015.4.6	Describe the major functions of the rooms division.
1015.4.7	Identify tasks for maintaining guest and public rooms.

Beverage and Equipment

1015.5	Beverage and Equipment
1015.5.1	Operate hot and cold beverage equipment.
1015.5.2	Prepare cold beverage equipment for service.
1015.5.3	Create a preparation chart for specialty beverages.

Dining Environments

1015.6	Dining Environments
1015.6.1	Outline five types of dining environments.
1015.6.2	Explain the characteristics of various meal service types.
1015.6.3	Demonstrate proper dining etiquette.
1015.6.4	Demonstrate different styles of meal service.

Serving Techniques in Food and Beverage

1015.7	Serving Techniques in Food and Beverage
1015.7.1	Demonstrate proper techniques for serving food and beverages.
1015.7.2	Demonstrate proper techniques for taking customer orders.
1015.7.3	Use suggestive selling to increase sales.
1015.7.4	Calculate customer checks accurately.
1015.7.5	Present checks to customers using proper techniques.
1015.7.6	Demonstrate service skills that ensure exceptional customer service.
1015.7.7	Discuss effective time and motion management for employees.

The Lodging Industry

1015.8	The Lodging Industry
1015.8.1	Outline lodging business and service concepts.
1015.8.2	Demonstrate skills for guest and public room service.
1015.8.3	Identify and explain characteristics and functions of lodging guest and public room service.

Management roles and financial responsibilities, staff supervision and training, marketing, and advertising, menu planning, food safety, sanitation, labor rules and regulations, and HACCP planning are incorporated in the coursework.

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Foodservice Management Roles and Financial Responsibilities

1016.1	Foodservice Management Roles and Financial Responsibilities
1016.1.1	Outline the qualities of an effective manager.
1016.1.2	Articulate the concept of leadership.
1016.1.3	Create an effective manager's time management profile.
1016.1.4	Relate the role of communication in a foodservice operation.
1016.1.5	Illustrate the management structure in a food production and service operation.
1016.1.6	Demonstrate the use of different types of foodservice computerized point-of-sale software programs.
1016.1.7	Compute food, beverage, and labor cost percentages.
1016.1.8	Create a profit and loss statement.
1016.1.9	Relate the role of forecasting and breakeven analysis used in foodservice operations.
1016.1.10	Outline the process used in determining purchasing decisions.
1016.1.11	Create a list of criteria used for inspecting food at delivery.
1016.1.12	Demonstrate effective inventory control procedures using an inventory control tracking system.
1016.1.13	Articulate the importance of portion control and how to minimize waste in an operation.

Food and Beverage Menu Planning and Development

1016.2	Food and Beverage Menu Planning and Development
1016.2.1	Articulate basic menu planning principles.
1016.2.2	Summarize the factors that influence a menu.
1016.2.3	Research different menu types with their advantages and disadvantages.
1016.2.4	Outline the Truth-In-More Guidelines.
1016.2.5	Develop a list of effective menu item descriptions.
1016.2.6	Research the element that influences menu style and design.
1016.2.7	Contrast basic menu formats.
1016.2.8	Create a chart of the basic menu categories and how they are organized.
1016.2.9	Relate the influences that affect menu pricing.
1016.2.10	Use the factor method and markup-on-cost method of pricing to determine menu costs.
1016.2.11	Contrast the competitors' pricing method with the psychological pricing method.
1016.2.12	Create a menu for a foodservice operation incorporating; menu influences, menu type, menu style and design, menu format, types of meals to be served, menu categories, and menu pricing considerations.

Safety Procedures in the Workplace

1016.3	Safety Procedures in the Workplace
1016.3.1	Report on the eight ways to prevent fires.
1016.3.2	Create a chart identifying class of fire, type of flammable materials and the type of extinguisher.

1016.3.3	Demonstrate using a fire extinguisher.
1016.3.4	Demonstrate fire emergency procedures to be used in the event of fire.
1016.3.5	Compile a list of emergency phone numbers.
1016.3.6	Outline first aid measures for burns and wounds.
1016.3.7	Determine eight ways to prevent falls.
1016.3.8	Demonstrate the Heimlich Maneuver and CPR.
1016.3.9	Perform a safety audit in a commercial kitchen.

Employee Personal Hygiene Responsibilities

1016.4	Employee Personal Hygiene Responsibilities
1016.4.1	Demonstrate appropriate grooming practices for the workplace.
1016.4.2	Demonstrate standard operating procedures related to personal hygiene.

HACCP

1016.5	HACCP
1016.5.1	Articulate the concept of HACCP.
1016.5.2	Outline the seven steps necessary in setting up a HACCP system.
1016.5.3	Determine food safety hazards.
1016.5.4	Relate the purpose of a critical control point.
1016.5.5	Create an HACCP analysis chart, illustrating the flow of food with potential hazards, control points and corrective actions.
1016.5.6	Chart the safe internal cooking temperatures and times for poultry, meats, fish, and eggs.
1016.5.7	Research the role of thermometers in keeping food safe and how they are calibrated.

Maintenance and Sanitation

1016.6	Maintenance and Sanitation
1016.6.1	Inspect all food products for damage and spoilage when they are received.
1016.6.2	Outline the potential problem areas when receiving food.
1016.6.3	Chart the twelve general preparation and cooking guidelines.
1016.6.4	Demonstrate the correct procedures for holding foods, serving foods, cooling foods and reheating foods.
1016.6.5	Show the proper procedure for setting up a three-bowl sink for manual dishwashing.
1016.6.6	Chart types of sanitizers and their advantages and disadvantages.
1016.6.7	Demonstrate the proper way to use, clean and maintain a commercial dishwasher.
1016.6.8	Create a safety poster illustrating where potential problems can occur in receiving, storing, preparing, cooking, holding, and serving food.

Nutrition basics and the guidelines used for foodservice meal planning are covered in Culinary Nutrition and the Menu. Dietary guidelines and special dietary needs will be used in modifying menu choices.

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Nutrition Basics

1017.1	Nutrition Basics
1017.1.1	Create a table of the six categories of nutrients and the characteristics of each.
1017.1.2	Create vitamin and mineral charts identifying functions in the body.
1017.1.3	Report on the functions of trace minerals.
1017.1.4	Create a chart of additives and the foods in which they are used.
1017.1.5	Report on the purpose of the Dietary Guidelines for Americans, nutrition labels, and the Food Guide Pyramid.

Nutritional Value of Flavorings, and Seasonings

1017.2	Nutritional Value of Flavorings, and Seasonings
1017.2.1	Discuss how nutrients in food are affected by time and water.
1017.2.2	Create a poster on ways to reduce the amount of fat, cholesterol, and sodium in recipes.
1017.2.3	Compare the three methods a foodservice operation uses to prepare healthful meals.
1017.2.4	Make a chart of flavorings and seasonings with their characteristics as they pertain to healthy cooking.
1017.2.5	Compare characteristics of different cooking oils and their uses.
1017.2.6	Evaluate a restaurant menu for nutritional value, variety, and appeal.

Balanced Meal Planning

1017.3	Balanced Meal Planning
1017.3.1	Compare traditional menu selections with nutritional menu selections.
1017.3.2	Perform a nutritional analysis on items from traditional and nutritional menu selections.
1017.3.3	Demonstrate how color affects plate appeal of nutritional food products.
1017.3.4	Plan a nutritionally balanced meal.
1017.3.5	Prepare a nutritionally balanced meal.
1017.3.6	Create a nutritionally balanced menu.

Meal Planning for Special Diets

1017.4	Meal Planning for Special Diets
1017.4.1	Discuss why low-fat diet choices should be offered on a menu.
1017.4.2	Plan a menu with low-fat diet choices.
1017.4.3	Discuss why diabetic diet choices should be included in the menu planning process.

Culinary Nutrition and the Menu**Course #: 1017****Allowable Teacher Endorsement:** 1615, 1700, 1705, 1706, 7094, 7095, 7097

1017.4.4	Plan a menu for a person with diabetes.
1017.4.5	Discuss the role of nutritional menu item descriptions.
1017.4.6	Report on the most common foods and additives known to cause allergic reactions.
1017.4.7	Report on considerations used when planning and preparing a vegetarian menu.
1017.4.8	Plan items on a menu for a vegetarian.

Baking and Pastry is an elective course which focuses on weights, measures, and general baking, classifications, handling and storage of ingredients, safety and handling, yeast raised dough products, cakes, cookies, batters, breads, biscuits, muffins, pies, and special dessert preparation.

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Basics of Frozen and Scratch Goods

1018.1	Basics of Frozen and Scratch Goods
1018.1.1	Calculate bakeshop formulas.
1018.1.2	Select correct ingredients when given formula.
1018.1.3	Demonstrate preparation of baked good when given formula.
1018.1.4	Finish baked product.
1018.1.5	Convert recipes using a baker's percentage formula.
1018.1.6	Demonstrate the function/ use of bakeshop equipment and tools.
1018.1.7	Demonstrate the use and cleaning of pastry bags and decorator tips.
1018.1.8	Chart the function and use of various flours, liquids, fats, sugars and sweeteners, eggs and egg products, leavening.
1018.1.9	Agents, spices, flavorings, nuts, and additives in baking.

Batters and Dough Preparation

1018.2	Batters and Dough Preparation
1018.2.1	Examine the ingredients' ratio used in batters and doughs.
1018.2.2	Prepare bread doughs and batters using the nine different ways to mix them.
1018.2.3	Discuss the impact of carryover baking.

Dough Preparation and Baking

1018.3	Dough Preparation and Baking
1018.3.1	Examine the purpose of the ingredients in a starter mixture.
1018.3.2	Demonstrate the rolled-in fat yeast dough process.
1018.3.3	Chart the twelve stages that apply to all yeast dough products.
1018.3.4	Contrast the three basic methods of mixing yeast dough ingredients: the straight dough method, the modified straight dough method, and the sponge method.
1018.3.5	Relate the process of fermentation in yeast dough.
1018.3.6	Research common causes of failure in yeast bread production.
1018.3.7	Demonstrate dividing, rounding, punching, proofing, shaping, and panning dough.
1018.3.8	Report how washing, slashing, and docking affect the baking quality and eye appeal of finished products.
1018.3.9	Create a chart of the four stages of the baking process that contribute to the final product.

1018.3.10	Relate why glazing, staling prevention, and proper packaging and storage of yeast products are important to dough preparation and baking.
1018.3.11	Evaluate a finished yeast product according industry standards.

Quick Bread Preparation and Baking

1018.4	Quick Bread Preparation and Baking
1018.4.1	Chart the characteristics of quick breads.
1018.4.2	Compare quick bread, doughs, and batters.
1018.4.3	Examine the nutrients contained in quick breads.
1018.4.4	Articulate the difference in the actions of baking soda versus baking powder in the baking process.
1018.4.5	Prepare a loaf bread.
1018.4.6	Prepare muffins.
1018.4.7	Articulate how quick breads are leavened.

Biscuit Preparation and Baking

1018.5	Biscuit Preparation and Baking
1018.5.1	Demonstrate the biscuit method of baking.
1018.5.2	Chart the quality standards and characteristics of biscuits, scones, and shortcakes.
1018.5.3	Demonstrate how biscuits are prepared, cut, and formed.

Cakes and Cookie Preparation and Baking

1018.6	Cakes and Cookie Preparation and Baking
1018.6.1	Relate the factors that influence the spread of cookies.
1018.6.2	Demonstrate the one-stage and creaming methods used in mixing cookies.
1018.6.3	Demonstrate how to mix, pan, bake, cool, serve, and store two types of cookies properly.
1018.6.4	Chart the five types of cakes and their ingredients.
1018.6.5	Demonstrate how to scale and pan cakes.
1018.6.6	Differentiate between the five types of butter creams.
1018.6.7	Demonstrate how to mix, pan, bake, cool, ice, serve, and store two types of cakes properly.

Pie Preparation and Baking

1018.7	Pie Preparation and Baking
1018.7.1	Complete the process of mixing, shaping, rolling, and panning a basic pie dough.
1018.7.2	Contrast the three major types of pie fillings.
1018.7.3	Prepare a single and double crust pie.
1018.7.4	Demonstrate proper pie storage and serving techniques.

Specialty Desserts

1018.8	Specialty Desserts
1018.8.1	Contrast specialty dessert options.
1018.8.2	Contrast custards and puddings.

Baking and Pastry Applications**Course #: 1018****Allowable Teacher Endorsement:** 1615, 1700, 1705, 1706, 7094, 7095, 7097, 7967

1018.8.3	Articulate common ingredients and preparation methods used in Bavarian cream, mousse, and chiffons.
1018.8.4	Articulate food safety concerns in cream dessert preparation and storage.
1018.8.5	Complete the process of preparing, serving, and storing two types of specialty desserts properly.

Safety Standards

1018.9	Safety Standards
1018.9.1	Utilize appropriate lifting procedures.
1018.9.2	Follow safety procedures when operating equipment.
1018.9.3	Demonstrate sanitation practices in bakery.
1018.9.4	Use bakery equipment and tools in a bakery according to manufacturer's specifications.

Career Preparation in the Baking and Pastry Industry

1018.10	Career Preparation in the Baking and Pastry Industry
1018.10.1	Chart job opportunities and relevant employment factors when choosing to work in the baking and pastry industry.
1018.10.2	Recognize the reasons for self-marketing and personal promotion.
1018.10.3	Complete the stages of seeking employment.
1018.10.4	Complete a self-assessment of strengths, weaknesses, skills, and knowledge.

This course explores the complexities of advanced food production, marketing, and cost control. Students will enhance their culinary skills by identifying and preparing a diverse range of foods, with a focus on fruits, vegetables, breakfast items, and dairy products. Students will gain practical insights into the strategic aspects of marketing and the critical principles of cost control, equipping you for success in the culinary industry.

Notes: This program of study uses materials and resources that are proprietary. Skill sets align with the National Restaurant Association Educational Foundation (NRAEF) standards in the Foundations for Restaurant Management and Culinary Arts textbooks found at this link: <https://textbooks.restaurant.org/Educators>. The NRAEF standard is indicated by the number at the end of each concept.

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Sanitation and Safety

1019.1	Take physical and perpetual inventory.
1019.1.1	List the methods used to account for inventory. (11.7)

Fruits, Vegetables, and Starches

1019.2	Identify quality and grade of fruits and vegetables.
1019.2.1	Identify and describe different types of fruit. (5.1)
1019.2.2	List factors that affect produce selection decisions. (5.2)
1019.2.3	Identify procedures for storing fruit. (5.3)
1019.2.4	Identify and describe different types of vegetables. (6.1)
1019.2.5	Identify procedures for storing vegetables. (6.2)
1019.3	Prepare fruits and vegetables for cooking.
1019.3.1	Prepare various types of fruit. (5.4)
1019.3.2	Cook various types of fruit using appropriate methods. (5.5)
1019.3.3	Demonstrate the preparation of various types of vegetables. (6.3)
1019.3.4	Cook various types of vegetables using appropriate methods. (6.4)
1019.3.5	Identify ways to hot-hold vegetables for safety and quality. (6.5)
1019.4	Identify and prepare potato dishes.
1019.4.1	Identify and describe different types of potatoes. (7.1)
1019.4.2	Identify procedures for storing potatoes. (7.2)
1019.4.3	Prepare potatoes using a variety of methods. (7.3)
1019.5	Identify and prepare pasta, grains, and legumes.
1019.5.1	Identify and describe different types of grains and legumes. (7.4)
1019.5.2	Explain how to store grains and legumes. (7.5)
1019.5.3	Prepare various types of grains and legumes. (7.6)
1019.5.4	Identify and describe different types of pasta. (7.7)
1019.5.5	Prepare pasta using a variety of methods. (7.8)
1019.5.6	Prepare dumplings using a variety of methods. (7.9)

Breakfast Foods

1019.6	Identify and prepare breakfast starches.
1019.6.1	Describe the types of breakfast service. (4.1)
1019.6.2	Prepare various pancakes, crêpes, waffles, and French toast. (4.2)
1019.6.3	Prepare various breakfast starches. (4.4)
1019.7	Identify and prepare breakfast meats.
1019.7.1	Prepare various breakfast meats. (4.3)
1019.8	Identify and prepare different styles of eggs.
1019.8.1	List the characteristics of eggs and identify ways to keep them safe. (3.6)
1019.8.2	Prepare eggs using a variety of cooking methods. (3.7)
1019.9	Identify and prepare cereals.
1019.9.1	Apply cooking methods to prepare a basic cereal.
1019.9.2	Utilize creativity to modify a basic cereal recipe based on personal or cultural preferences.

Dairy Products and Alternatives

1019.10	Identify and use various dairy products (e.g., sour cream, butter, yogurt, creams, milk).
1019.10.1	Identify the different forms of cream and their fat content. (3.2)
1019.10.2	Identify different forms of cultured dairy products and their fat content. (3.3)
1019.10.3	Differentiate between butter and butter substitutes and recognize the characteristics of each. (3.4)
1019.11	Identify and use dairy alternatives (e.g., soymilk, almond milk, low-fat alternatives).
1019.11.1	Describe dairy milk and milk alternatives and their fat content. (3.1)
1019.12	Identify and use cheese varieties.
1019.12.1	Identify the varieties and characteristics of cheese and give examples of each. (3.5)

Introduction to Marketing

1019.13	Exhibit understanding of marketing and public relations.
1019.13.1	Define the term marketing. (1.1)
1019.13.2	Describe the components of the traditional marketing mix. (1.2)
1019.13.3	Describe the contemporary marketing mix. (1.3)
1019.13.4	Describe the elements of a marketing plan. (1.4)
1019.13.5	Define target market and explain why it is important to a business. (1.5)
1019.13.6	Identify the parts of a SWOT analysis. (1.6)
1019.13.7	Identify various elements of a promotion mix. (1.7)
1019.13.8	Recognize different types of sales promotions. (1.8)
1019.13.9	List the benefits of public relations. (1.9)
1019.13.10	Identify opportunities for public relations. (1.10)

Menu Management

1019.14	Exhibit understanding of menus and pricing.
1019.14.1	Explain the importance of the menu to a foodservice operation. (2.1)
1019.14.2	Describe à la carte, table d'hôte, California, limited, du jour, and cycle menus. (2.2)
1019.14.3	Organize the information on a menu. (2.3)
1019.14.4	Explain principles of menu layout and design. (2.4)
1019.14.5	Explain the purposes of a menu sales mix analysis. (2.5)
1019.14.6	Define profitability and target margin. (2.6)

1019.14.7	Classify menu items according to their popularity. (2.7)
1019.14.8	Compare the food cost percentage methods and the contribution margin method for menu pricing. (2.8)

Labor Costing

1019.15	Exhibit knowledge of labor costs.
1019.15.1	Explain the importance of standard labor costs to a business's success. (10.1)
1019.15.2	List factors that affect labor costs. (10.2)
1019.15.3	Describe the relationship between sales volume and labor costs. (10.3)
1019.15.4	Explain the difference between a master schedule and a crew schedule. (10.4)

Purchasing

1019.16	Exhibit understanding of purchasing processes.
1019.16.1	Describe the purchasing function. (11.1)
1019.16.2	Describe the factors that contribute to the purchasing process. (11.2)
1019.16.3	List goods and services that might be purchased by a foodservice operation. (11.3)
1019.16.4	Explain quality standards and how they should be used. (11.4)
1019.16.5	Describe how to determine what and when to order. (11.5)
1019.16.6	Explain what happens after good are purchased. (11.6)

Covering advanced culinary techniques, this course focuses on elevated food production in desserts, bakery products, meats, poultry, fish, and seafood. Students will also gain a broad understanding of various culinary elements, from international flavors to the principles of nutrition and sustainable practices in the culinary world.

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Food Preparation

1020.1	Prepare soups, appetizers, and desserts.
1020.1.1	Prepare various types of frozen desserts. (21.5)
1020.1.2	Prepare various poached fruits and tortes. (21.6)
1020.1.3	Describe various types of dessert sauces. (21.7)
1020.2	Prepare cold garnishes.
1020.2.1	Explain why and how garnish is used. (22.1)
1020.2.2	Describe the guidelines for plating food that has finished cooking. (22.2)
1020.2.3	Explain how desserts should be plated and presented. (22.3)
1020.2.4	Explain how soups should be garnished. (22.4)

Bakery Products

1020.3	Prepare batters and doughs using appropriate mixing methods.
1020.3.1	Describe the two basic types of yeast bread dough. (19.1)
1020.3.2	Describe the two basic methods used to make yeast breads. (19.2)
1020.3.3	List the 10 basic steps to making yeast bread. (19.3)
1020.4	Prepare standard dessert items.
1020.4.1	Prepare cake batter using a variety of methods. (20.1)
1020.4.2	Identify the functions of icings and determine which are best suited for different baked goods. (20.2)
1020.4.3	Prepare various icings. (20.3)
1020.4.4	Prepare various soufflés. (20.4)
1020.4.5	Prepare pie dough using the 3-2-1 method. (20.5)
1020.4.6	Explain what it means to bake blind. (20.6)
1020.4.7	Prepare laminated dough. (20.7)
1020.4.8	Prepare pate a choux and phyllo dough. (20.8)
1020.4.9	Explain how chocolate is made, including chocolate liquor, cocoa butter, and cocoa powder. (21.1)
1020.4.10	Identify storing procedures for chocolate. (21.2)
1020.4.11	Execute the procedure for melting chocolate. (21.3)
1020.4.12	Prepare baked and stirred custards and explain how the products are used in desserts. (21.4)

Meats and Poultry

1020.5	Identify meat and poultry (e.g., grade, inspection).
1020.5.1	Outline the federal grading systems for meat. (16.1)
1020.5.2	Identify receiving and storage procedures for meat. (16.2)
1020.5.3	Outline the federal grading systems for poultry. (17.1)
1020.5.4	Describe various kinds of poultry. (17.2)
1020.5.5	Identify receiving and storage procedures for poultry. (17.3)
1020.6	Prepare meat and poultry.
1020.6.1	Apply basic techniques for cooking meat. (16.3)
1020.6.2	Match various cooking methods with different forms of meat. (16.4)
1020.6.3	Demonstrate the steps for fabricating poultry. (17.4)
1020.6.4	Apply basic techniques for cooking poultry. (17.5)
1020.6.5	Match various cooking methods with different forms of poultry. (17.6)

Fish and Seafood

1020.7	Identify market forms of fish and seafood.
1020.7.1	Outline the federal grading systems for seafood. (18.1)
1020.7.2	Describe the various kinds of seafood. (18.2)
1020.8	Prepare fish and seafood.
1020.8.1	Identify procedures for receiving and storing seafood. (18.3)
1020.8.2	Demonstrate the steps for fabricating seafood. (18.4)
1020.9	Identify various cooking preparations and methods.
1020.9.1	Apply basic techniques for cooking seafood. (18.5)
1020.9.2	Match various cooking methods with different forms of seafood. (18.6)

Culinary Nutrition

1020.10	Describe the basic food groups; make healthy food choices.
1020.10.1	List the six basic types of nutrients found in food. (14.2)
1020.10.2	Explain the role of digestion in nutrition and health. (14.10)
1020.10.3	Describe a healthy diet and the reasons to follow one. (15.1)
1020.10.4	Use the Dietary Guidelines for Americans and Choose My Plate to plan meals. (15.2)
1020.10.5	Describe the three major vegetarian diets. (15.3)
10.20.11	Describe healthy cooking techniques.
1020.11.1	List and describe techniques for food preparation that preserve nutrients. (15.4)
1020.12	Describe primary functions and food sources of major nutrients.
1020.12.1	Explain how phytochemicals and fiber function in the body. (14.3)
1020.12.2	Describe the role carbohydrates have in people's diets. (14.4)
1020.12.3	Describe the role of fats in people's diets. (14.5)
1020.12.4	Describe the role of proteins in people's diets. (14.6)
1020.12.5	Describe the role of vitamins and minerals in people's diets. (14.7)
1020.12.6	Describe the role of water in people's diets. (14.8)
1020.12.7	Explain what food additives are and how they function in food. (14.9)
1020.13	Describe food and dietary trends (e.g., farm to table, organics, religious, dietary concerns).
1020.13.1	Describe why nutrition is important to the restaurant and foodservice industry. (14.1)
1020.13.2	Suggest ways to make menus and recipes more healthful. (15.5)

1020.13.3	List and define recent developments in food production that may affect nutrition. (15.6)

Building Successful Teams

1020.14	Exhibit understanding of hiring processes, employee training, and appraisals.
1020.14.1	Explain what is included in a job description and why this document is important to a business. (12.1)
1020.14.2	Explain a manager's responsibility for maintaining labor law knowledge. (12.2)
1020.14.3	Identify methods for ensuring a fair and consistent hiring process. (12.3)
1020.14.4	Identify discriminatory language and practices in the hiring process. (12.4)
1020.14.5	Describe the typical phases of onboarding and explain its importance to a business. (12.5)
1020.14.6	Explain what employees can expect during orientation. (12.6)
1020.14.7	Identify the benefits of training. (12.7)
1020.14.8	Identify the key points of effective employee training. (12.8)
1020.14.9	Summarize and discuss effective cross-training, group training, and on-the-job training. (12.9)
1020.14.10	Describe the importance of performance appraisals and ongoing feedback. (12.10)

Sustainability

1020.15	Display knowledge of sustainable products and foodservice operations.
1020.15.1	Identify the issues surrounding the global production of seafood, coffee, animals, and how sustainability and conservation are connected. Explain why each is important. (13.1)
1020.15.2	Describe the steps a restaurant or foodservice operation should take to purchase and then promote the use of sustainable food products. (13.2)
1020.15.3	Describe local sourcing. (13.3)
1020.15.4	List the different types of growing practices. (13.4)
1020.15.5	List the issues surrounding the global production of seafood, coffee, animals, and organic food. (13.5)
1020.15.6	Explain why water conservation is important and list the ways a restaurant or foodservice operation can improve its water usage efficiency. (13.6)
1020.15.7	Explain the differences between renewable and nonrenewable energy sources. (13.7)
1020.15.8	Describe why energy efficiency is important and in what ways a restaurant or foodservice operation can improve its energy usage efficiency. (13.8)
1020.15.9	Describe ways a restaurant or foodservice operation can build or make structural improvements to its facility in a sustainable way. (13.9)
1020.15.10	Describe how a restaurant or foodservice operation can reduce the total amount of its waste. (13.10)
1020.15.11	List items that a restaurant or foodservice operation can reuse or recycle. (13.11)
1020.15.12	Describe greenwashing and ways a restaurant or foodservice operation can avoid it. (13.12)

This comprehensive course explores the intricate world of baking by focusing on the identification, classification, and properties of ingredients, as well as baking preparation (*Mise en Place*), basic baking techniques, and recipe comprehension. Students will learn to identify, compare, and contrast various ingredients and their sources, such as flours, sweeteners, and fats, while understanding the importance of factors like gluten and ingredient sustainability. They will explore the strengthening or weakening effects of ingredients in doughs and batters, selecting appropriate ingredients for desired outcomes, and considering substitutions when necessary. Additionally, the course covers the identification and description of physical, chemical, and biological leaveners, as well as herbs, spices, and flavor extracts.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Identification, Classification, and Properties of Ingredients

1024.1	Identify, compare, and contrast ingredients and their sources.
1024.1.1	Identify different types of flours, sweeteners, and fats.
1024.1.2	Explain gluten and its importance in the bakeshop.
1024.1.3	Identify a variety of fruits.
1024.1.4	Describe the function of bakeshop ingredients.
1024.1.5	Investigate the various sources from which each ingredient can be obtained, considering options such as local markets, specialty stores, or online suppliers.
1024.1.6	Assess the freshness and quality of ingredients available from different sources, considering factors like seasonality and regional variations.
1024.1.7	Compare different brands or suppliers for each ingredient, taking into account reputation, reviews, and any specific characteristics that may impact the recipe.
1024.1.8	Compare the prices of ingredients across different sources and determine their availability based on location and season.
1024.1.9	Investigate the sustainability practices of suppliers, especially for ingredients like dairy, eggs, and flour, to align with ethical and environmental considerations.
1024.1.10	Compare the nutritional content of different ingredient options, especially if health considerations are a factor.
1024.1.11	Compare the flavor profiles of different ingredient sources, especially for items like vanilla extract or spices, to choose the one that complements the overall recipe.
1024.2	Explain the strengthening or weakening effect of ingredients in the production of doughs and batters.
1024.2.1	List the primary ingredients used in the production of doughs and batters.
1024.2.2	Explain how gluten, a protein formed from wheat flour, contributes to the structure and strength of doughs.
1024.2.3	Differentiate between types of flour (all-purpose, bread, cake, etc.) and their impact on gluten development and overall dough strength.
1024.2.4	Explore the role of liquids, like water or milk, in adjusting the hydration level of the dough and influencing its consistency and strength.
1024.2.5	Discuss the effects of leavening agents (yeast, baking powder, baking soda) on dough expansion and the resulting texture.
1024.2.6	Explain how fats (butter, oil, shortening) contribute to tenderness, flavor, and the weakening of gluten in doughs.

1024.2.7	Examine the role of sugar in doughs, including its ability to weaken gluten, enhance flavor, and influence browning during baking.
1024.2.8	Explain how salt affects the fermentation process, enhances flavor, and strengthens gluten structure in doughs.
1024.2.9	Discuss the role of eggs in providing structure, moisture, and leavening to doughs and batters.
1024.2.10	Explore the chemical interactions between ingredients, such as the Maillard reaction and caramelization, and their impact on dough strength and flavor.
1024.2.11	Discuss the role of enzymes in certain ingredients (e.g., malt, enzymes in flour) and their effect on dough fermentation and strength.
1024.2.12	Explore how mixing techniques, such as kneading or folding, influence gluten development and dough strength.
1024.2.13	Explain the importance of resting and proofing times in allowing dough to relax, rise, and develop structure.
1024.2.14	Discuss the impact of temperature on ingredient interactions, fermentation rates, and the overall strength or weakness of doughs.
1024.3	Select specific ingredients and/or substitutions appropriate to method and desired product outcome.
1024.3.1	Identify the key ingredients crucial to the method and the desired outcome of a recipe.
1024.3.2	Consider the flavor profile desired for the product and select ingredients that contribute to the intended taste.
1024.3.3	Assess the desired texture and structure of the final product and choose ingredients accordingly.
1024.3.4	Identify potential substitutions for specific ingredients, especially if certain items are unavailable or if dietary considerations require alternatives.
1024.3.5	Choose fats and oils that align with the desired richness and moisture level of the final product.
1024.4	Identify and describe physical, chemical, and biological leaveners.
1024.4.1	List the different leavening agents used in baking, including physical, chemical, and biological options.
1024.4.2	Explain the functions of leavening agents in doughs and batters, focusing on how they contribute to the rising and texture of the final product.
1024.4.3	Explain how chemical leavening agents, such as baking powder and baking soda, release carbon dioxide gas to leaven doughs.
1024.4.4	Discuss biological leaveners, particularly yeast, and describe how yeast ferments sugars to produce carbon dioxide, leading to dough expansion.
1024.4.5	Describe physical leaveners, such as steam or air, and how they contribute to the lightness and texture of baked goods.
1024.4.6	Explain the biological leavening process, emphasizing how yeast metabolizes sugars to produce carbon dioxide and alcohol.
1024.4.7	Discuss sourdough starters and other naturally fermented mixtures as examples of biological leaveners, emphasizing the role of lactic acid bacteria in fermentation.
1024.4.8	Discuss the advantages and disadvantages of each type of leavener in terms of flavor, texture, and application.
1024.4.9	Discuss how the pH of ingredients can influence the effectiveness of certain leavening agents.
1024.5	Identify herbs, spices, and flavor extracts.
1024.5.1	List the herbs and spices commonly used in culinary applications.
1024.5.2	Differentiate between fresh and dried versions of herbs and spices, understanding the flavor nuances and appropriate uses for each.
1024.5.3	Compile a list of flavor extracts commonly used in cooking and baking, such as vanilla, almond, mint, and citrus extracts.

1024.5.4	Explain the concentration levels of flavor extracts and how they may impact the overall flavor intensity of a dish or baked good.
1024.5.5	Explore combinations of flavor extracts that complement each other, providing a balanced flavor profile.
1024.5.6	Differentiate between whole and ground versions of spices, considering factors like shelf life, potency, and ease of incorporation into recipes.
1024.5.7	Explore recommended culinary pairings for herbs and spices, discovering which combinations work well together to enhance flavors.
1024.5.8	Demonstrate herb and spice blends, understanding how different combinations can elevate the taste of dishes.
1024.5.9	Consider incorporating flavor enhancers such as extracts, spices, or herbs to elevate the overall taste of the product.

Baking Preparation (Mise en Place)

1024.6	Demonstrate mise en place by planning assignment inventory of ingredients, equipment, and tools.
1024.6.1	Compile a comprehensive list of ingredients, equipment and tools needed for a specific recipe.
1024.6.2	Recognize various measurement systems and techniques for measuring ingredients accurately.
1024.6.3	Explain the importance of weighing ingredients.
1024.6.4	Organize and arrange the ingredients, equipment, and tools in a systematic manner to facilitate efficient workflow.
1024.7	Break down assignments into tasks.
1024.7.1	Determine the logical order in which tasks should be performed, considering baking and resting times.
1024.7.2	Estimate the time required for each task to create a realistic timeline for completion.
1024.7.3	Identify critical steps that may require more attention or specific timing.
1024.7.4	Evaluate opportunities for multitasking without compromising the quality of each component.
1024.7.5	Be flexible and adapt the plan if unexpected challenges or changes arise during the baking process.
1024.8	Utilize convenience products if and when necessary, preparing a sequenced and prioritized timeline.
1024.8.1	Determine which convenience products, such as pre-made dough or ready-to-use fillings, are suitable for the baking or pastry task.
1024.8.2	Evaluate the quality of the chosen convenience products to ensure they meet the desired standards.
1024.8.3	Align the use of convenience products with critical stages in the baking or pastry preparation.

Basic Baking

1024.9	Read and prepare standardized recipes/formulas and menus.
1024.9.1	Identify key ingredients and their quantities in a recipe.
1024.9.2	Demonstrate cooking techniques and methods specified in the recipe.
1024.9.3	Determine serving sizes and portion control.
1024.9.4	Plan menus based on dietary requirements and preferences.
1024.9.5	Create balanced and cohesive menus for different occasions.
1024.9.6	Consider nutritional content and allergen information when planning menus.
1024.10	Define terms related to baking methods, processes, and techniques.
1024.10.1	Define terms related to baking ingredients (e.g., leavening agents, flour types).
1024.10.2	Define terms related to baking techniques (e.g., folding, creaming).
1024.11	Describe, compare, and contrast yeast and laminate dough types and related methods and processes.
1024.11.1	Explain the characteristics of yeast dough.
1024.11.2	Outline the steps involved in working with yeast dough.
1024.11.3	Compare different types of yeast dough (e.g., bread dough, pizza dough).

1024.11.4	Explain the characteristics of laminate dough.
1024.11.5	Outline the steps involved in working with laminate dough.
1024.11.6	Compare different types of laminate dough (e.g., puff pastry, croissant dough).
1024.12	Describe, compare, and contrast quick breads, including muffin and biscuit dough types and related methods and processes.
1024.12.1	Explain the characteristics of quick breads.
1024.12.2	Outline the steps involved in making quick breads.
1024.12.3	Compare different types of quick breads (e.g., banana bread, zucchini bread).
1024.12.4	Explain the characteristics of muffin and biscuit dough.
1024.12.5	Outline the steps involved in making muffins and biscuits.
1024.12.6	Compare different types of muffins and biscuit dough.
1024.13	Describe, compare, and contrast creaming and two-stage methods as they relate to cakes, cookies, quick breads, brownies, and short dough.
1024.13.1	Explain the creaming method and its application in baking.
1024.13.2	Identify baked goods that use the creaming method (e.g., cakes, cookies).
1024.13.3	Explain the two-stage method and its application in baking.
1024.13.4	Identify baked goods that use the two-stage method (e.g., muffins, brownies).
1024.14	Describe proper gluten development in relationship to product outcomes.
1024.14.1	Describe the role of gluten in baking.
1024.14.2	Explain how gluten development affects the texture and structure of baked goods.
1024.14.3	Identify methods to control gluten development.
1024.15	Relate cooking times and temperatures to methods, products, and ingredients.
1024.15.1	Explain the relationship between cooking times and temperatures.
1024.15.2	Adjust cooking times and temperatures based on specific methods, products, and ingredients.
1024.16	Indicate order for adding ingredients given various methods.
1024.16.1	Identify the proper order for adding ingredients in different baking methods.
1024.16.2	Explain how the order of ingredient addition can affect the final product.

This course is designed to polish your skills in Baking Preparation (Mise en Place). In this course, students will master a variety of cooking methods including baking, frying, and steaming. From carefully reviewing recipes to executing each step with precision, you'll learn the fundamentals of baking like preheating the oven, measuring ingredients, and checking for doneness. Students will explore the realm of Basic Baking as you explore the intricacies of pie dough types, fruit pie filling methods, and egg foam techniques such as sponge, génoise, and angel food. Students will learn the science behind various frosting, icing, and glaze types, and discover the versatility of Pâte à Choux such as cream puffs and éclairs.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Baking Preparation (Mise en Place)

1025.1	Demonstrate a variety of cooking methods: baking, frying, and steaming.
1025.1.1	Review recipes to understand the specific steps and techniques involved in baking, frying, and steaming.
1025.1.2	Demonstrate the methods for baking (preheating oven, measure and prepare ingredients, bake according to recipe, check for doneness).
1025.1.3	Demonstrate the methods for frying (heating oil, coating ingredients per recipe, fry ingredients, use thermometer to check internal temperature, drain excess oil and absorb residual grease).
1025.1.4	Demonstrate the methods for steaming (set up steaming apparatus, season ingredients, arrange ingredients ensuring proper spacing for even cooking, steam per recipe, check for doneness).

Basic Baking

1025.2	Describe, compare, and contrast pie dough types and related methods and processes.
1025.2.1	List the ingredients and proportions for shortcrust pastry dough.
1025.2.2	Explain the mixing method and its impact on texture for shortcrust pastry dough.
1025.2.3	Discuss variations like sweet shortcrust and savory shortcrust.
1025.2.4	Outline the layering process for puff pastry and how it creates flakiness.
1025.2.5	Explain the role of butter and folding in puff pastry.
1025.2.6	Outline the methods for phyllo dough.
1025.2.7	Explain the layering process and the use of butter or oil.
1025.2.8	Compare the different dough types.
1025.3	Describe, compare, and contrast fruit pie filling methods.
1025.3.1	Explain the process of cooking fruits for pie fillings.
1025.3.2	Discuss sugar, thickeners, and flavorings used in cooked fillings.
1025.3.3	Detail the preparation of fresh fruits for pie fillings.
1025.3.4	Explain the challenges and advantages of using fresh fruits.
1025.4	Describe, compare, and contrast egg foam method as it relates to sponge, génoise, angel food.
1025.4.1	Define the sponge method and its key ingredients.
1025.4.2	Explain the technique of incorporating air through eggs.
1025.4.3	Outline the génoise method and its distinctive features.
1025.4.4	Discuss the role of eggs and flour in génoise cakes.
1025.4.5	Contrast génoise with other egg foam methods.

1025.4.6	Describe the angel food method and its unique characteristics.
1025.4.7	Discuss the absence of fat and leavening agents in angel food.
1025.4.8	Compare variations between sponge, genoise and chiffon cakes.
1025.5	Describe, compare, and contrast frosting, icing, and glaze types and methods.
1025.5.1	Detail the ingredients and preparation of buttercream.
1025.5.2	Discuss variations like Swiss, Italian, and American buttercream.
1025.5.3	Compare the texture, flavor, and usage of different buttercreams.
1025.5.4	Outline the ingredients and process for making royal icing.
1025.5.5	Discuss applications and decorations using royal icing.
1025.5.6	Compare royal icing with other types of icing.
1025.5.7	Define meringue and its basic components.
1025.5.8	Discuss the three types of meringue: French, Italian, and Swiss.
1025.5.9	Define glazes and their purpose in pastry.
1025.5.10	Describe different types of glazes (mirror glaze, simple syrup).
1025.5.11	Discuss methods of applying and setting glazes.
1025.6	Describe Pâte à Choux and other products.
1025.6.1	Define choux pastry and its key components.
1025.6.2	Describe the method of cooking and the role of steam for choux pastry.
1025.6.3	Detail the preparation of cream puffs and éclairs using Pâte à Choux.
1025.6.4	Discuss filling options and presentation for cream choux pastries.
1025.6.5	Explain the assembly and presentation of profiteroles.
1025.6.5	Discuss the construction of a croquembouche.
1025.6.6	Compare cream puffs, eclairs, profiteroles, and croquembouche.
1025.7	Describe, compare, and contrast custard types and related methods.
1025.7.1	List the ingredients and methods for making baked custards.
1025.7.2	Discuss variations like crème brûlée and flan.
1025.7.3	Detail the process of making stovetop custards.
1025.7.4	Discuss applications and variations such as pastry cream.
1025.7.5	Describe custards made with fruit curds.
1025.7.6	Discuss the incorporation of eggs and fruit flavors.
1025.7.7	Compare curd-based custards with traditional custards.

This course focuses on product merchandising in the baking and pastry domain, understanding strategies to effectively promote baked goods, learning seasonal trends and customer preferences. Students will develop proficiency in food presentation techniques, ensuring visually appealing displays that attract customers. Students will learn the importance of accurate labeling to meet regulatory standards, incorporating allergen information and nutritional content. Students will gain hands-on experience in creating an assorted selection of desserts, including ice cream products, tortes, specialty cakes, petits fours, confections, as well as mastering techniques in chocolate and sugar work, preparing them with comprehensive skills for success in the baking and pastry industry.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Product Merchandising

1026.1	Determine methods of promoting baked goods, including seasonal merchandising strategies.
1026.1.1	Research market trends and customer preferences for baked goods.
1026.1.2	Identify popular seasonal themes and events that can be leveraged for promotions.
1026.1.3	Develop promotional strategies for regular and seasonal baked goods.
1026.1.4	Analyze the effectiveness of promotions.
1026.2	Create menu item descriptions for bakery goods.
1026.2.1	Research and understand the ingredients and unique features of each product.
1026.2.2	Develop concise and enticing menu item descriptions that highlight key ingredients, flavors, and textures.
1026.2.3	Ensure that descriptions are accurate, appealing, and aligned with the brand image.
1026.2.4	Consider dietary restrictions and preferences when crafting descriptions.
1026.2.5	Consider the preparation and sourcing of ingredients in menu descriptions.
1026.3	Demonstrate food presentation techniques.
1026.3.1	Demonstrate proper plating and display techniques for different products.
1026.3.2	Emphasize the use of appealing colors, textures, and arrangements in product presentation.
1026.4	Discuss proper labeling requirements.
1026.4.1	Research local and national food labeling regulations.
1026.4.2	Create a comprehensive list of all ingredients used in baked goods.
1026.4.3	Develop clear and accurate labels for each product, including allergen information.
1026.4.4	Ensure compliance with nutritional labeling requirements, if applicable.

Baking Preparation (Mise en Place)

1026.5	Display understanding of basic bakery production and planning principles, including the importance of planning to the overall operation of a baking facility.
1026.5.1	Demonstrate health and safety guidelines in bakery production, including sanitation practices and compliance with food safety regulations.
1026.5.2	Demonstrate fundamental principles of bakery productions including ingredient handling, mixing, fermentation, shaping, proofing, baking, and finishing.
1026.5.3	Explore various baking techniques and methods employed in a bakery, such as artisanal baking, laminating dough, and creating specialty items.

1026.5.4	Explain the importance of accurate scaling and measuring of ingredients to maintain consistency in bakery products.
1026.5.5	Demonstrate proper and safe usage and maintenance of bakery equipment, such as mixers, ovens, proofers, and sheeters.
1026.5.6	Demonstrate how to scale recipes based on production needs, considering batch sizes and yield requirements.
1026.5.7	Explain basic principles of inventory management, including tracking ingredient levels, ordering supplies, and minimizing waste.
1026.5.8	Explain cost control measures, including efficient use of ingredients, energy, and labor to maximize profitability.
1026.5.9	Explain allergen management in bakery operations to address safety concerns and comply with regulations.

Ice Cream and Frozen Desserts

1026.6	Prepare commercial ice cream products and frozen desserts.
1026.6.1	Evaluate commercially prepared ice cream and frozen products.
1026.6.2	Explain the churning method for making ice creams and sorbets.
1026.6.3	Explain the still-freezing method for preparing frozen desserts.
1026.6.4	Prepare a variety of ice creams, sorbets, and frozen desserts.
1026.6.5	Prepare a variety of frozen soufflés, mousses, tortes, and bombes.

Tortes and Specialty Cakes

1026.7	Prepare tortes and specialty cakes.
1026.7.1	Prepare a variety of tortes.
1026.7.2	Prepare a variety of specialty torte fillings.
1026.7.3	Assemble tortes using basic and advanced icing techniques.
1026.7.4	Assemble and decorate a variety of specialty cakes.

Petits Fours and Confections

1026.8	Prepare petit fours and confections.
1026.8.1	Explain the uses of petit fours.
1026.8.2	Prepare an assortment of traditional petits fours and confections.
1026.8.3	Create petits fours using different components.

Chocolate and Sugar Work

1026.9	Prepare chocolate and sugar products.
1026.9.1	Identify a variety of chocolate products.
1026.9.2	Explain the various procedures for tempering chocolate.
1026.9.3	Prepare chocolate decorations and candies.
1026.9.4	Prepare marzipan and nougatine.
1026.9.5	Make and use pastillage.
1026.9.6	Prepare and use caramel to create spun sugar and caramel decorations.
1026.9.7	Prepare sugar showpieces.

This course is designed to provide students with the knowledge and skills needed to assist the legal industry with court preparation, legal interventions, research, and office management. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Students are encouraged to become active members of the student organization SkillsUSA. Teachers should provide each student with real world learning opportunities and instruction. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Court Systems and Practices

1031.1	Courtroom Proceedings
1031.1.1	Explain the structure of the American court system.
1031.1.2	Define the roles of the judiciary.
1031.1.3	Identify the different types of attorneys.
1031.1.4	Demonstrate knowledge of adjudication procedures from arrest to arraignment.
1031.1.5	Describe the various court systems for the federal government, states, and sovereign partners.
1031.1.6	Explain why federal criminal and civil cases are adjudicated in the different courts.
1031.1.7	Explain the jurisdictions of the following: military courts, federal courts, state courts, military tribunals, justice, municipal and county courts.
1031.1.8	Describe the process of how a criminal case is adjudicated from the first appearance to the appeals process.
1031.1.9	Describe the functions of various participants in the courtroom including the judge, prosecutor, court clerk, court reporter, bailiff, defense attorneys, witnesses, and victims.
1031.1.10	Describe the types and roles of juries.
1031.1.11	Explain the appeal process.
1031.1.12	Identify and explain types of evidence.
1031.1.13	Identify and explain the rules of evidence.
1031.1.14	Demonstrate an understanding of and explain arrest and custody.
1031.1.15	Examine pretrial proceedings including motions, hearings, plea negotiations and pre-trial release.
1031.1.16	Explain jurisdictional determination of cases.
1031.1.17	Differentiate substantive and procedural law.
1031.1.18	Discuss and review criminal and civil litigation process.

Legal Case Management

1031.2	Managing Legal Cases
1031.2.1	Identify and explain the importance of good interviewing techniques to focus, test, and expand on initial information.
1031.2.2	Demonstrate the ability to apply rules of English grammar to legal writing.
1031.2.3	Explain proper citation formatting.

1031.2.4	Discuss formatting differences with regulations, agency material, and arbitration decisions.
1031.2.5	Examine the structure of opinions and properly research and analyze cases.
1031.2.6	Analyze the process and procedures of a lawsuit, including pleading, discovery, and litigation processes.
1031.2.7	Investigate specialized legal office software for case management.

Legal Office Management

1031.3	Legal Office Procedures
1031.3.1	Explain the types of law offices and their services to clients.
1031.3.2	Explain and review components of law office procedures manuals.
1031.3.3	Discuss ethical considerations or concerns in relation to the legal team, client relations, and billing/fees.
1031.3.4	Investigate specialized legal office software for practice management including timekeeping, billing, calendaring, etc.
1031.3.5	Examine procedures for file and library management.
1031.3.6	Investigate legal marketing plans.
1031.3.7	Analyze different management styles.
1031.3.8	Examine methods for giving and receiving supervision.
1031.3.9	Demonstrate knowledge and understanding of office rules for professional behavior.
1031.3.10	Follow all policies and procedures for practice management.
1031.3.11	Demonstrate ability to maintain documents and file systems.
1031.3.12	Demonstrate the ability to access and utilize law libraries and reference materials.

The Skill Sets in this course focus on the knowledge and skills needed in the public safety field to conduct criminal investigations. This course is an elective for the Law and Public Safety Program of Study.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Roles and Responsibilities of an Officer/Investigator

1032.1	Roles and Responsibilities of an Officer/Investigator
1032.1.1	Outline major historical developments in the field of criminal investigation.
1032.1.2	Explore the roles and responsibilities of the criminal investigator.
1032.1.3	Discuss attributes desirable in a criminal investigator.
1032.1.4	Relate skills and abilities to possible career pathways.
1032.1.5	Outline the purposes and functions of a crime scene investigation.
1032.1.6	Explain the duties of the first officer at a crime scene.
1032.1.7	Identify the potential threats to investigators' health and safety.
1032.1.8	List sources of information available to the criminal investigator.
1032.1.9	Discuss arrest and search procedures as they relate to criminal investigations.

Concepts of Crimes and Offenses

1032.2	Concepts of Crimes and Offenses
1032.2.1	Assess principle elements of various types of crimes.
1032.2.2	Interpret sociological and demographic variables associated with various crimes.
1032.2.3	Articulate types of homicide.
1032.2.4	Discuss information used to distinguish between homicide and suicide.
1032.2.5	Discuss the concept of serial killing.
1032.2.6	Identify types of drug-related offenses.
1032.2.7	Explain the characteristics of poisoning.
1032.2.8	Determine elements of various types of sex-related offenses.
1032.2.9	Articulate the elements of the legal definition of rape.
1032.2.10	Assess the importance of rape offender files.
1032.2.11	Determine elements of the crime of arson.
1032.2.12	Identify and explain the elements of robbery/burglary.
1032.2.13	Discuss various terrorist groups and their actions.

Legal Issues

1032.3	Legal Issues
1032.3.1	Assess malum in se and malum prohibitum types of behavior.
1032.3.2	Examine components of corpus delicti.
1032.3.3	Explore the impact of <i>Miranda v. Arizona</i> and other Supreme Court cases on police interrogation.
1032.3.4	Explain the concept of due process.
1032.3.5	Apply the concept of case law.
1032.3.6	Apply the concept of rules of evidence.

1032.3.7	Determine legal issues involved in the collection, preservation, and processing of physical evidence.
1032.3.8	Articulate legal issues involved in crime scene processing.
1032.3.9	Explain criteria for ensuring that evidence of guilt is admissible in court.

Communication

1032.4	Communication
1032.4.1	Interpret verbal and nonverbal communication.
1032.4.2	Apply basic speaking and active listening skills including reflection, restatement, and clarification techniques.
1032.4.3	Recognize barriers to communication.
1032.4.4	Recognize the elements of communication using a sender-receiver model.
1032.4.5	Apply speaking and active listening skills.
1032.4.6	Recognize elements of written and electronic communication including writing a letter (spelling, grammar, and formatting).
1032.4.7	Recognize the importance of courtesy and respect for customers and colleagues and maintain good interpersonal relationships.
1032.4.8	Discuss how to adapt communication skills to varied levels of understanding and cultural orientation including diverse age, cultural, economic, ethnic, and religious groups.
1032.4.9	Investigate methods of supervision such as giving and receiving feedback and instruction.
1032.4.10	Distinguish between and report subjective and objective information.
1032.4.11	Report relevant information in order of occurrence.
1032.4.12	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
1032.4.13	Locate, organize, and reference written information from various sources.
1032.4.14	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
1032.4.15	Develop and interpret tables and charts to support written and oral communication.

Investigative Techniques

1032.5	Investigative Techniques
1032.5.1	Discuss the major events in the investigation of a crime.
1032.5.2	Explain the major steps in a preliminary investigation.
1032.5.3	Describe activities conducted in a follow-up investigation.
1032.5.4	Define a crime scene.
1032.5.5	Define crime scene reconstruction and state the types of reconstruction.
1032.5.6	Explain the role of intelligence units and types of intelligence.
1032.5.7	Distinguish between types of evidence including impressions, biological evidence, trace evidence and firearms/weapons).
1032.5.8	Outline procedures for proper protocol.
1032.5.9	Articulate procedures for processing a crime scene.
1032.5.10	Describe the process for securing and protecting a crime scene.
1032.5.11	Execute proper crime scene documentation (photograph/video/sketch).
1032.5.12	Write effective notes (crime scene, interview, etc.) and accurate investigative reports.
1032.5.13	Discuss the use of databases and photo line-ups.
1032.5.14	Discuss the use of physical surveillance.
1032.5.15	Discuss the use of informants.

1032.5.16	Explain the purpose of psychological profiling.
1032.5.17	Describe a psychological autopsy.
1032.5.18	Assess the importance of establishing the motive for certain crimes.
1032.5.19	Describe action, physical and situational stereotyping.
1032.5.20	Compare and contrast interrogation and interviewing.
1032.5.21	Demonstrate proper interrogation and interviewing techniques.
1032.5.22	Interpret various types of body language.
1032.5.23	Explain the use of body language in criminal investigations.
1032.5.24	Discuss how memory and perception may affect eyewitness reports.
1032.5.25	Determine the characteristics of an effective witness.
1032.5.26	Assess the key aspects of suspect identification.
1032.5.27	Describe polygraphs, computer voice stress analysis, facial recognition software, the internet and other technology and discuss their applications.
1032.5.28	Describe time-event charting, link analysis and telephone record analysis.
1032.5.29	Identify financial difficulty indicators.
1032.5.30	Chart the fundamental characteristics of gunshot wounds.
1032.5.31	Explore the types of wounds associated with asphyxiation/strangulation.
1032.5.32	Show the primary characteristics of cutting, stabbing, and blunt force wounds.
1032.5.33	Explain the role and importance of DNA analysis and describe current technologies for analysis and data banking.
1032.5.34	Utilize proper collection, marking, preservation and processing methods for physical evidence.
1032.5.35	Describe processes for transmitting physical evidence to the crime laboratory while maintaining chain of custody.
1032.5.36	Describe processes for preserving footwear and tire prints and impressions.
1032.5.37	Outline procedures for locating and handling soil and pollen evidence.
1032.5.38	Summarize techniques for collecting glass and paint evidence.
1032.5.39	Discuss methods of collecting and storing fibers, cloth fragments and impressions.
1032.5.40	Discuss the identification and analysis of bloodstains and blood spatter.
1032.5.41	Explain the importance of forensic dentistry and odontology.
1032.5.42	Discuss the process of fingerprint identification and comparison.
1032.5.43	Describe AFIS, IAFIS and NIBIN.
1032.5.44	Discuss use of tools to obtain fingerprints.
1032.5.45	Explain determinations that can be made from firearm evidence.
1032.5.46	Apply the results of crime lab analysis on trace evidence to the investigation of a case.
1032.5.47	Discuss the role of the forensic entomologist in determining time of death.
1032.5.48	Explain autopsy protocol.
1032.5.49	Describe methods for initiating cold case investigations.

This course is designed to provide students with fundamental principles in the corrections field including: the evolution of correctional practices and philosophies including treatment models; correctional law; the relationship of correctional activities to other aspects of the criminal justice system; detention facilities; and probation and parole programs. The differences between levels of security and characteristics of offenders (such as gender and age) and the development of inmate cultures will be examined. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Students are encouraged to become active members of the student organization SkillsUSA. Teachers should provide each student with real world learning opportunities and instruction. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Corrections

1034.1	Identify corrections concepts, methods, and history.
1034.1.1	Describe the correctional framework.
1034.1.2	Demonstrate knowledge and understanding of the correctional system and settings.
1034.1.3	Examine the components and functions of the correctional system.
1034.1.4	Discuss the history of social control, crime, and punishment.
1034.1.5	Describe theories of criminology and imprisonment and their impact on current corrections practices including administration.
1034.1.6	Discuss correctional ideologies including classical vs. positive treatments.
1034.1.7	Examine issues relating to punishment including data on effectiveness.
1034.1.8	Demonstrate understanding of crime and the correctional process.
1034.1.9	Discuss the goals of corrections including incapacitation, retribution, deterrence, and rehabilitation.
1034.1.10	Explain the roles of various administrators within the management of correctional institutions including the warden, deputy, and officer.
1034.1.11	Discuss critical issues relating to current correctional practices.
1034.1.12	Describe the rights of prisoners in confinement.
1034.1.13	Outline the path of a criminal case through the justice system.
1034.1.14	Describe roles in the sentencing process and sentencing alternatives.
1034.1.15	Explore a variety of sentencing practices -- including sentencing alternatives -- and their purposes in the correctional system.
1034.1.16	Describe the appellate review process.
1034.1.17	Examine the purpose and organization of probation and parole including the types and conditions.
1034.1.18	Describe problem encountered upon parole.
1034.1.19	Explore characteristics of prisoners and aspects of prison culture.
1034.1.20	Explain the effects of social and cultural factors on correctional clients.
1034.1.21	Compare and contrast types of correctional facilities both past and present.
1034.1.22	Examine community-based programs including issues related to treatment.
1034.1.23	Examine offender classification systems.

1034.1.24	Describe the roles and responsibilities of correctional officers.
1034.1.25	Apply standard operating procedures related to safety and security in correctional systems applying to contraband, searches, key and tool control, restraint, shakedown, escape, transporting, security threats such as gangs and suicide, etc.
1034.1.26	Discuss issues related to the management of housing and other custodial issues.
1034.1.27	Examine the effects of mental disorders, including drug abuse, on the correctional environment.
1034.1.28	Discuss opportunities for professional development within the field of corrections.
1034.1.29	Describe various ACA standards and classifications.
1034.1.30	Define and discuss the principals of PREA.
1034.2	Identify various types, security levels, and classifications of correctional institutions.
1034.2.1	Identify and explain the different levels of security and custody in correctional facilities.
1034.2.2	Discuss the components of the correctional process including the organization of correctional departments, security levels of prisons and prison management styles.
1034.2.3	Compare and contrast prisons systems for males, females, both males and females, adults, and juveniles.
1034.3	Understand methods and history of capital punishment.
1034.3.1	Discuss the history of Capital punishment.
1034.3.2	Explain some of the moral and ethical concerns related to capital punishment.
1034.4	Display knowledge of intake procedures.
1034.4.1	Describe the steps of the intake and booking process.
1034.4.2	Demonstrate the process of finger printing and processing an inmate.
1034.5	Examine the purpose and organization of probation and parole including the types and conditions.
1034.5.1	Explain the process, types, and conditions of probation.
1034.5.2	Explain the process and conditions of parole.
1034.5.3	Examine institutional based programs related to work, recreation, education, and pre-release.
1034.5.4	Explain the supervisory process related to probation and parole.
1034.5.5	Discuss probation and parole violations.
1034.5.6	Discuss some of the ways that individuals can violate the terms of parole and probation.
1034.6	Explore characteristics of prisoners and aspects of prison culture.
1034.6.1	Define the term institutionalization.
1034.6.2	Explain the effects of social and cultural factors on correctional clients.

This course is designed to provide students with fundamental principles of the law enforcement field such as the history of policing in the US, the characteristics of law enforcement agencies and types of police activities including criminal investigation. Current issues and trends in law enforcement will be investigated. Aspects of criminal investigation such as evidence collection, fingerprinting, latent dusting, interviewing and report writing will be presented. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Law Enforcement Policies and Practices

1035.1	The history of Law Enforcement
1035.1.1	Examine the history and functions of various local, state, and federal law enforcement agencies including municipal police agencies, Sheriff's offices, state police agencies, the FBI and other federal law enforcement agencies and multi-jurisdictional task forces.
1035.1.2	Explain the role of history and the US Constitution on the development and mission of law enforcement.
1035.1.3	Compare and contrast the functions of law enforcement, corrections, and security fields.
1035.1.4	Explain and discuss the implications of criminal and civil law.
1035.1.5	Explain the critical role of written communication in law enforcement including initial, continuation and supplemental reports; field note taking; press releases; and investigative and incident reports.
1035.1.6	Discuss appropriate intervention strategies along the force continuum.
1035.1.7	Discuss methods for increasing community awareness and participation in crime reduction.
1035.1.8	Compare and contrast the functions, roles, and responsibilities of various types of law enforcement agencies and units.
1035.1.9	Assess the effects of various constitutional provisions, legislative acts, and court decisions on law enforcement procedure.
1035.1.10	Demonstrate law enforcement techniques/procedures for various situations including crisis negotiations, crowd management, domestic violence calls, motor vehicle stops and accidents, explosive and hazardous material handling, transporting people in custody, crime response, child abuse and neglect investigation, sexual abuse investigation and narcotics and other drugs investigation.
1035.1.11	Demonstrate the correct use of various types of equipment in a law enforcement setting including motor vehicles, RADAR, and dispatch center equipment.
1035.1.12	Display appropriate written communication skills necessary for a law enforcement professional.
1035.1.13	Apply appropriate level of the force continuum to various deadly and non-deadly situations.
1035.1.14	describe the dynamics of integrity and the consequences to a law enforcement office if s/he violates a citizen's rights.
1035.1.15	Explore methods of enhancing the public's trust.
1035.1.16	Examine programs for teaching crime prevention.
1035.1.17	Explore methods for promoting concern for victims and other specific groups of people.

1035.1.18	Analyze terrorism as it relates to the duties of a law enforcement officer.
1035.1.19	Demonstrate steps of crime scene processing: note-taking; photography; sketching to scale; evidence collection; chain of custody.
1035.1.20	Identify evidence which encompasses materials establishing a link between a crime and its victim or a crime and its perpetrator: impressions (tire, tool, teeth, shoes); prints (finger, lip, voice); hair and fiber analysis; drugs and poisons; ballistics; soil and pollen; glass; serology/ questioned documents.
1035.1.21	Distinguish between types of evidence: testimonial; physical: individual and class; quantitative; qualitative.
1035.1.22	Analyze modes of transfer and the factors affecting persistence of evidence (Locard's Exchange Principle): indirect; direct.
1035.1.23	Demonstrate steps of crime scene processing: note-taking; photography; sketching to scale; evidence collection; chain of custody.
1035.1.24	Describe and model techniques of collecting and developing prints on various objects and textures: physical (dusting powders); chemical (ninhydrin; iodine; cyanoacrylate).
1035.1.25	Validate, classify, and analyze fingerprints as individual evidence: type; pattern; minutiae.
1035.1.26	Examine the absorption and effects of toxins in the human body: alcohol; drugs; poisons.
1035.1.27	Describe the benefits of social media and the investigation of crimes. (West Virginia Standard).
1035.1.28	Demonstrate proper media release (West Virginia Standard).

This course is designed to provide students with the knowledge and skills needed for the development and implementation of protective security operations including: the protective security law and management; procedures for basic instant response; methods of collecting intelligence and security related investigations; chemical, biological, radiological and nuclear weapons use; and aspects of domestic and international terrorism and the U.S. government's efforts to protect our country and its citizens.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Security and Protective Policies and Practices

1037.1	Display knowledge of different types of investigation (juvenile, robbery).
1037.1.1	Discuss and describe the history and functions of the security and protective services fields.
1037.1.2	Identify the settings, systems and personnel protected by the field.
1037.1.3	Explain the law relating to the security and protective services field.
1037.1.4	Discuss various security systems.
1037.1.5	Describe various crime prevention approaches.
1037.1.6	Describe and discuss crime prevention strategies.
1037.1.7	Define risk management.
1037.1.8	Demonstrate understanding of management and supervision principles.
1037.1.9	Define the basic incident response procedures.
1037.1.10	Demonstrate understanding of emergency procedures handbooks.
1037.1.11	Discuss employee security programs.
1037.1.12	Conduct security surveys and inspections.
1037.1.13	Analyze risk management as it applies to the field.
1037.1.14	Examine laws relevant to the field.
1037.1.15	Describe the responsibilities of a security supervisor.
1037.1.16	Demonstrate basic incident response procedures.
1037.1.17	Develop an emergency procedures handbook.

Security: National, International, and Private

1037.2	Exhibit awareness of sources and types of domestic and international terrorism.
1037.2.1	Discuss the history of domestic and international terrorism.
1037.2.2	Identify the difference between domestic and international terrorism.
1037.2.3	Analyze terrorism as it relates to the duties of a security officer.
1037.3	Identify and understand different types of criminal organizations.
1037.3.1	Discuss the history and evolution of organized crime in America.
1037.3.2	Identify the different types of criminal organizations that exist today.
1037.4	Exhibit knowledge of private security and property protection.
1037.4.1	Describe the characteristics of proprietary and contract security operations.

1037.4.2	Describe the duties of private security personnel.
1037.4.3	Explain the different duties of private security and property security personnel.
1037.4.4	Explain the protection of sensitive material.
1037.4.5	Analyze specific settings that security systems and personnel protect.
1037.4.6	Describe security systems commonly used in the field.
1037.4.7	Contrast security surveys and security inspections.
1037.4.8	Describe employee security training programs.
1037.4.9	Differentiate between government and commercial needs relative to security.

Security and Law Enforcement

1037.5	Compare and contrast the functions of law enforcement, corrections, and security fields.
1037.5.1	Describe and compare the functions of law enforcement, corrections, and security personnel.
1037.5.2	Explain the differences and similarities in authority and jurisdiction between criminal justice and security professionals.
1037.5.3	Discuss the principles of investigation within the security and protective services fields.

This course is designed to give students the opportunity to connect theory and practice by interacting with Public Safety professionals. Students will study various requirements for employability in the Public Safety field including ethics, teamwork, and professionalism. Students may participate in activities associated with Public Safety agencies (such as county and local law enforcement, county judicial offices, correctional facilities, training academies, social services, etc.) for hands-on or work-based experiences. Preparation includes construction of a portfolio that can be utilized in obtaining employment upon completion of the student's program. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Students are encouraged to become active members of the student organization SkillsUSA. Teachers should provide each student with real world learning opportunities and instruction. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Careers in Public Safety

1039.1	Industry-Based Integration and Transition
1039.1.1	Explain the requirements and competencies within specializations of Law and Public Safety careers.
1039.1.2	Explore the history and functions of various local, state, and federal law enforcement agencies including municipal police agencies, Sheriff's offices, state police agencies, the FBI and other federal law enforcement agencies and multi-jurisdictional task forces.
1039.1.3	Discuss and compare the functions of law enforcement, corrections, and security fields.
1039.1.4	Discuss various court systems and describe the functions of participants in the courtroom including the judge, prosecutor, court clerk, court reporter, bailiff, defense attorneys, witnesses, and victims.
1039.1.5	Examine the components and functions of the correctional system.
1039.1.6	Explain the differences and similarities in authority and jurisdiction between criminal justice and security professionals.
1039.1.7	Explain the types of law offices and their services to clients.
1039.1.8	Discuss industry, organization, and company profiles/resources.
1039.1.9	Demonstrate knowledge and understanding of different supervision models.
1039.1.10	Discuss methods of socialization to various employment settings within the chosen specialization area.
1039.1.11	Compare organizational mission statements to organizational performance.
1039.1.12	Identify conceptual frameworks applied in various settings.
1039.1.13	Engage with individual, family, group, organization, or community clients/representatives to identify concerns and activities to alleviate identified problems related to specific situations.
1039.1.14	Articulate a personal framework for human services delivery within public safety leadership.
1039.1.15	Apply research-based knowledge to practice situations.
1039.1.16	Examine methods of giving and receiving supervision.
1039.1.17	Explain requirements and competencies for careers in public safety leadership.
1039.1.18	Explore involvement in professional organizations.
1039.1.19	Create a personal portfolio for use when applying for employment.
1039.1.20	Practice simulated job interviews.

Industry- Based Integration & Transition

1039.2	Professional Networking
1039.2.1	Discuss methods of socialization to various employment settings within the chosen specialization area.
1039.2.2	Examine organizational structures including policies and procedures of various industry settings.
1039.2.3	Articulate a personal framework for human services delivery within public safety leadership.
1039.2.4	Examine training curriculum for city, county, state, and federal officers.
1039.2.5	Examine organizational structures including policies and procedures of various industry settings.
1039.2.6	Articulate a personal framework for human services delivery within public safety leadership.
1039.2.7	Compare organizational mission statements to organizational performance.
1039.2.8	Identify conceptual frameworks applied in various settings.
1039.2.9	Apply research-based knowledge to practice situations.
1039.2.10	Engage with individual, family, group, organization, or community clients/representatives to identify concerns and activities to alleviate identified problems related to specific situations.

West Virginia Standards

1039.3	Professional Accountability
1039.3.1	Discuss the duties and responsibilities of Internal affairs
1039.3.2	Examine both the personal and professional repercussions of officer misconduct.
1039.3.3	Discuss employment and screening processes for officers.
1039.3.4	Examine training curriculum for city, county, state, and federal officers.
1039.3.5	Explain the presence and role of civilian review boards.
1039.3.6	Describe the utilization of police surveillance cameras (in-car cameras, body cameras, etc.)
1039.3.7	Discuss the oath of office.

The Skill Sets in the course focus on knowledge necessary for improved capability to perform specific physical tasks, mobilize the body efficiently, reduced risk during physical tasks, psychological preparation, reduce stress and associated health risk. This course is an elective for Law Enforcement Services and Emergency and Fire Management Services Pathways.

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Basic Nutrition

1055.1	Basic Nutrition
1055.1.1	Explain why nutrition is important in an exercise plan.
1055.1.2	Articulate why vitamins are essential.
1055.1.3	List complex carbohydrates.
1055.1.4	List complete protein.
1055.1.5	Identify the different types of fat.
1055.1.6	Name the recommended beverage during physical fitness.

Emotional/Physical Well-Being

1055.2	Emotional/Physical Well-Being
1055.2.1	Explain shift work and how does it correlate to sleep patterns.
1055.2.2	Identify health problems associated with poor sleeping habits.
1055.2.3	Define stress.
1055.2.4	Identify ways to deal with stress.
1055.2.5	Define Time Management.
1055.2.6	Explain the benefits of Time Management.
1055.2.7	Explain how failing to manage your time effectively can have consequences.
1055.2.8	Explore ways to improve your time management skills.

Fitness

1055.3	Fitness
1055.3.1	Define fitness.
1055.3.2	Explain the importance of being physically fit in Law Enforcement/Emergency Personnel.
1055.3.3	Explain how unhealthiness effects the job performance/safety.
1055.3.4	Identify the benefits of/and perform stretching exercises.
1055.3.5	State the approximate time for warming up and cool down period.
1055.3.6	Explain the benefits of running.
1055.3.7	Perform one mile run in 10:00 minutes.
1055.3.8	Identify and perform exercises that enhance cardiovascular level.
1055.3.9	Identify and perform drills that increase speed and agility.
1055.3.10	Name and perform common strength training exercises.

Personal and Environmental Safety

1055.4	Personal and Environmental Safety
1055.4.1	Identify how airborne transmission occurs.
1055.4.2	Distinguish between fact and fallacy about the transmission and treatment of diseases caused by blood-borne pathogens.
1055.4.3	Apply infections control techniques designed to prevent the spread of diseases caused by blood-borne pathogens as followed in the Center for Disease Control (CDC) guidelines.

Injury Prevention

1055.5	Injury Prevention
1055.5.1	List the main types of job-related firefighter fatalities, injuries, and illness.
1055.5.2	Describe the National Fire Protection Association standards related to firefighter safety and health.
1055.5.3	Identify Occupational Safety and Health Administration (OSHA) regulations and how they relate to firefighters.
1055.5.4	Describe ways to help prevent accidents and injuries in the fire stations and facilities.
1055.5.5	Describe ways to maintain safety and training.
1055.5.6	State the practices a firefighter I uses for emergency scene procedures and safety.

Essentials of Addiction and Prevention**Course #: 1060****Allowable Teacher Endorsement:** 1601, 1700, 1705, 1706, 7041, 7042, 7043, 7045, 7048, 7050, 7171, 7172, 7185, 7606, 7607, 7608, 7627, 7710, 7714

This course is designed to introduce the essential components of addictions to substances, objects, behaviors and/or activities as well as programs for the prevention of addictions. The addictive process will be defined, and the physical, psychological, social, emotional, and spiritual characteristics of addiction will be described both individually and within the family system. Students will overview signs and symptoms of various addictions such as drugs, gambling, eating disorders, etc., and understand physical addiction and psychological dependence. Theories on addiction will be summarized. Prevention for addictions including an overview of risk and protective factors and program strategies will be examined.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Patient Education Intervention Skills

1060.1	Patient Education Intervention Skills
1060.1.1	Examine the sign and symptoms of various addictions.
1060.1.2	Define the addictive process.
1060.1.3	Analyze theories of addictions.
1060.1.4	Discuss risk and protective factors.
1060.1.5	Develop ATOD prevention education and skill development activities based on target audience analysis.
1060.1.6	Connect prevention theory and practice to implement effective prevention education and skill development activities.
1060.1.7	Maintain program fidelity when implementing evidence- based programs.
1060.1.8	Assure that ATOD education and skill activities are appropriate to the culture of the community being served.
1060.1.9	Use appropriate instructional strategies to meet the needs of the target audience.
1060.1.10	Ensure all ATOD prevention education and skill development programs accurate, relevant, timely, and appropriate content information.
1060.1.11	Identify, adapt, or develop instructor and participant materials for use when implementing ATOD prevention activities.
1060.1.12	Provide professionals in related fields with accurate, relevant, timely, and appropriate ATOD prevention information.
1060.1.13	Provide technical assistance to community members and organizations regarding ATOD prevention strategies and best practices.

Needs Assessment and Other Planning Strategies

1060.2	Needs Assessment and Other Planning Strategies
1060.2.1	Use needs assessments strategies to gather relevant data for ATOD.
1060.2.2	Identify gaps and prioritize needs based on the assessment of community conditions.
1060.2.3	Select prevention strategies, programs, and best practices to meet the identified needs of the community.
1060.2.4	Develop an ATOD prevention plan based on research and theory that addresses community needs and desired outcomes.
1060.2.5	Identify resources to sustain prevention activities.

Allowable Teacher Endorsement: 1601, 1700, 1705, 1706, 7041, 7042, 7043, 7045, 7048, 7050, 7171, 7172, 7185, 7606, 7607, 7608, 7627, 7710, 7714

1060.2.6	Identify appropriate ATOD prevention program evaluation strategies.
1060.2.7	Conduct evaluation activities to document program implementation and effectiveness.
1060.2.8	Use evaluation findings to determine whether and how to adapt ATOD prevention strategies.

Community Organization

1060.3	Community Organization
1060.3.1	Identify the community's demographic characteristics and core values.
1060.3.2	Identify key community leaders to ensure diverse representation in ATOD prevention programming activities.
1060.3.3	Build community ownership of ATOD prevention programs by collaborating with key community leaders/members when planning, implementing, and evaluating prevention activities.
1060.3.4	Provide technical assistance to community members/leaders in implementing ATOD prevention activities.
1060.3.5	Develop capacity within the community by recruiting, training, and mentoring ATOD prevention- focused volunteers.
1060.3.6	Assist in creating and sustaining community-based coalitions.

Public and Organizational Policy

1060.4	Public and Organizational Policy
1060.4.1	Examine the community's public policies and norms to determine environmental change needs.
1060.4.2	Make recommendations to policy makers/stakeholders that will positively influence the community's public policies and norms.
1060.4.3	Provide technical assistance, training, and consultation that provide environmental change.
1060.4.4	Participate in public policy development and enforcement initiatives to effect environmental change.
1060.4.5	Use media strategies to enhance prevention efforts in the community.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Notes: JROTC is a Federal program sponsored by the U.S. Armed Forces in high schools nationwide. Its purpose is to instill in cadets the values of citizenship, service to their country, living drug-free and personal responsibility. The program helps students develop self-reliance, oral and written communication, leadership, team building and an appreciation for physical fitness.

[Official Website of the U.S. Army JROTC \(usarmyjrotc.com\)](http://usarmyjrotc.com)

[Air Force Junior Reserve Officer Training Corps \(af.edu\)](http://af.edu)

[Home \(marines.mil\)](http://marines.mil)

[Navy Junior Reserve Officers Training Corps](#)

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[Navy Junior Reserve Officers Training Corps](#)

JROTC 1

Course #: 1065

Allowable Teacher Endorsement: 7700

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Army – [U.S. Army JROTC – "To motivate young people to be better citizens" \(usarmyjrotc.com\)](http://usarmyjrotc.com)

Air Force - [Air Force Junior Reserve Officer Training Corps \(af.edu\)](http://af.edu)

Marine Corp – [Home \(marines.mil\)](http://marines.mil)

Navy – [Navy Junior Reserve Officers Training Corps](http://navyjrotc.com)

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JROTC 4

Course #: 1081

Allowable Teacher Endorsement: 7700

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Air Force - [Air Force Junior Reserve Officer Training Corps \(af.edu\)](http://af.edu)

Marine Corp – [Home \(marines.mil\)](http://marines.mil)

Navy – [Navy Junior Reserve Officers Training Corps](http://navyjrotc.com)

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

JROTC 4

Course #: 1081

Allowable Teacher Endorsement: 7700

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Course description

The Outdoor Education course provides students with a dynamic and immersive learning experience in natural environments. This course is designed to foster an appreciation for the outdoors, develop outdoor skills, and environmental awareness. Through a combination of classroom instruction, field activities, and experiential learning, students will explore the principles of outdoor education, environmental science, and sustainable outdoor practices.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Outdoor Skills Development

1086.1	Navigation Skills
1086.1.1	Develop proficiency in map reading, compass use, and GPS navigation for effective outdoor orientation.
1086.1.2	Interpret topographic maps.
1086.1.3	Demonstrate accurate compass navigation.
1086.1.4	Utilize GPS devices for location tracking.
1086.2	Basic Survival Skills
1086.2.1	Develop fundamental survival skills essential for outdoor adventures.
1086.2.2	Identify edible and medicinal plants.
1086.2.3	Construct basic tools for survival situations.
1086.3	Rope and Knot Skills
1086.3.1	Master the use of ropes and knots for various outdoor applications.
1086.3.2	Tie essential knots for securing gear and creating structures.
1086.3.3	Use ropes for climbing and rappelling.
1086.4	Flora and Fauna Identification
1086.4.1	Develop knowledge of local plant and animal species for safety and appreciation.
1086.4.2	Identify common plants and wildlife.
1086.4.3	Understand ecological relationships in outdoor environments.
1086.5	Camping Equipment Use and Maintenance
1086.5.1	Understand safety protocols and risk management strategies for outdoor activities.
1086.5.2	Assess environmental risks.
1086.5.3	Develop and implement safety plans.
1086.6	Outdoor Photography
1086.6.1	Develop basic photography skills to capture outdoor experiences.
1086.6.2	Use cameras and smartphones for outdoor photography.
1086.6.3	Apply composition techniques for compelling outdoor shots.

Risk Management and Safety in the Outdoors

1086.7	Risk Assessment
1086.7.1	Conduct comprehensive risk assessments for outdoor activities.
1086.7.2	Identify potential hazards and risks.

1086.7.3	Evaluate the likelihood and severity of identified risks.
1086.8	Emergency Response Planning
1086.8.1	Develop effective emergency response plans for various outdoor scenarios.
1086.8.2	Establish communication protocols during emergencies.
1086.8.3	Formulate evacuation and response strategies.
1086.9	First Aid Proficiency
1086.9.1	Demonstrate proficiency in providing first aid in outdoor environments.
1086.9.2	Assess and address common outdoor injuries.
1086.9.3	Administer CPR and basic life support.
1086.10	Weather Monitoring and Response
1086.10.1	Monitor weather conditions and respond appropriately to changing weather.
1086.10.2	Interpret weather forecasts.
1086.10.3	Implement safety measures in adverse weather situations.
1086.11	Group Management and Supervision
1086.11.1	Effectively manage and supervise groups during outdoor activities.
1086.11.2	Establish clear communication channels within the group.
1086.11.3	Monitor participant behavior and well-being.

Adventure Education

1086.12	Leadership Development
1086.12.1	Foster leadership skills through outdoor adventure experiences.
1086.12.2	Provide opportunities for participants to take on leadership roles.
1086.12.3	Facilitate debrief sessions to enhance leadership insights.
1086.13	Team Building Strategies
1086.13.1	Develop and implement effective team-building strategies for diverse groups.
1086.13.2	Analyze group dynamics.
1086.13.3	Tailor team-building activities to address specific group needs.
1086.14	Adventure Programming Design
1086.14.1	Design adventure programs that align with educational and developmental goals.
1086.14.2	Develop curriculum for adventure education programs.
1086.14.3	Integrate learning outcomes into program design.
1086.15	Adaptive Leadership
1086.15.1	Cultivate adaptive leadership skills to respond to changing outdoor conditions.
1086.15.2	Train participants to adapt to unexpected challenges.
1086.15.3	Demonstrate flexibility and resilience in outdoor scenarios.
1086.16	Program Evaluation and Assessment
1086.16.1	Assess the effectiveness of adventure education programs and make improvements.
1086.16.2	Implement participant evaluations.
1086.16.3	Conduct post-program assessments for continuous improvement.

Interpretation and Outdoor Education Programming

1086.17	Educational Program Design
1086.17.1	Design educational programs that align with learning objectives and participant needs.
1086.17.2	Identify educational goals and outcomes.
1086.17.3	Tailor programs to diverse participant backgrounds.
1086.18	Activity Planning and Sequencing

1086.18.1	Plan and sequence activities to create a cohesive and educational outdoor experience.
1086.18.2	Develop itineraries for outdoor programs.
1086.18.3	Ensure a logical flow of activities based on learning objectives.
1086.19	Multidisciplinary Integration
1086.19.1	Integrate various disciplines into outdoor education programming for a holistic learning experience.
1086.19.2	Collaborate with experts in relevant fields (e.g., ecology, history).
1086.19.3	Incorporate interdisciplinary concepts into programs.
1086.20	Curriculum Development
1086.20.1	Develop curriculum materials that support outdoor education programs.
1086.20.2	Create lesson plans and instructional materials.
1086.20.3	Align content with educational standards.
1086.21	Community Involvement
1086.21.1	Involve and engage the local community in outdoor education programs.
1086.21.2	Collaborate with local organizations and experts.
1086.21.3	Facilitate community-based learning experiences.

Leave No Trace Principles

1086.22	Principles Understanding
1086.22.1	Demonstrate a comprehensive understanding of the Leave No Trace principles.
1086.22.2	Explain each of the seven Leave No Trace principles.
1086.22.3	Understand the rationale behind the principles and their environmental impact.
1086.23	Application of Principles
1086.23.1	Apply Leave No Trace principles in various outdoor settings.
1086.23.2	Implement principles during camping, hiking, and other outdoor activities.
1086.23.3	Adapt principles to specific ecosystems and environments.
1086.24	Integration into Outdoor Programming
1086.24.1	Integrate Leave No Trace principles into outdoor education and tourism programs.
1086.24.2	Design programs that educate participants on responsible outdoor practices.
1086.24.3	Incorporate Leave No Trace principles into trip planning and itineraries.
1086.25	Evaluation of Leave No Trace Programs
1086.25.1	Evaluate the effectiveness of Leave No Trace education and advocacy programs.
1086.25.2	Develop assessment tools for program evaluation.
1086.25.3	Gather feedback from participants and stakeholders.
1086.26	Continuous Learning and Adaptation
1086.26.1	Participate in ongoing education on Leave No Trace.
1086.26.2	Adjust practices based on new information and best practices.

This course is designed to focus on “hands-on” and academic activities geared toward management opportunities and skills in event design and planning. This course develops students’ abilities to manage materials, staff, entertainment, and other event planning resources. Students gain practical experience in setting up events and making sure all aspects of the program are organized properly. Topics include serving staff coordination, food delivery, and guest registration.

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Event Binder

1116.1	Create an event binder.
1116.1.1	Create an event binder.
1116.1.2	Manage email and electronic files for specific events.
1116.1.3	Create a business portfolio.
1116.1.4	Present a business portfolio.

Communication with the Event Team

1116.2	Communicating with the event team
1116.2.1	Confirm details while communicating with teams.
1116.2.2	Resolve team problems using communication success tips.
1116.2.3	Confirm registration, speakers, and entertainment for the event.
1116.2.4	Arrange a pre-event meeting.
1116.2.5	Finalize transportation details for events.
1116.2.6	Meet, confirm, and walk through the event personnel.

Manage the Event

1116.3	Managing the event
1116.3.1	Implement effective negotiation skills to acquire the best deals with vendors.
1116.3.2	Develop a contingency plan for problems.
1116.3.3	Develop solutions for last-minute crises.
1116.3.4	Evaluate vendors to determine which best suits the event's needs.

Final Touches

1116.4	Final touches to the event
1116.4.1	Implement an overview of all details for an event.
1116.4.2	Review an inspection of rooms form for an event.
1116.4.3	Examine a checklist for working with professional speakers/entertainers.

Safety and Security Measures

1116.5	Ensure safety and security measures
1116.5.1	Determine possible health and natural environmental hazards.
1116.5.2	Recognize potential, real, and perceived natural, social, or terrorism emergency situations to respond appropriately.

1116.5.3	Review a film, photo, or recording to identify and describe an emergency.
1116.5.4	Observe guests and surroundings to identify potentially dangerous situations.
1116.5.5	Create a resource base using alternative plans and solutions to manage any emergency.
1116.5.6	Determine methods to resolve or eliminate potential safety hazards.
1116.5.7	Create a proactive solution to address common safety hazards including lighting, sound, surface areas, political, and social climate.
1116.5.8	Create a reactive solution to guests, exposure to a health hazard.
1116.5.9	Suggest ways to manage guests and groups facing safety hazards.
1116.5.10	Role play mock emergencies that implement appropriate measures to deal with hazardous situations.
1116.5.11	Research sources to utilize in various emergencies for self, co-workers, and customers/guests.
1116.5.12	Examine resources for assistance with communication, law enforcement, environmental issues, legal issues, and medical and emergency services.
1116.5.13	Determine the need for adequate lighting.
1116.5.14	Measure sound levels for security.

Course description

The Parks and Recreation Program Management course is designed to provide students with comprehensive knowledge and practical skills required for the effective planning, implementation, and management within the field of parks and recreation. Through a combination of theoretical frameworks, case studies, and hands-on projects, students will explore the intricacies of designing and overseeing programs that contribute to community well-being, environmental stewardship, and the overall enhancement of recreational spaces.

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Program Planning and Development

1125.1	Recreational Agencies
1125.1.1	Monitor visitors' activities to ensure compliance with establishment or tour regulations and safety practices.
1125.1.2	Provide directions and other pertinent information to visitors.
1125.1.3	Greet and register visitors and issue any required identification badges or safety devices.
1125.1.4	Perform routine maintenance on park structures.
1125.1.5	Manage the daily operations of recreational facilities.
1125.1.6	Supervise and coordinate the work activities of personnel, such as training staff members and assigning work duties.
1125.1.7	Monitor visitors' activities to ensure compliance with establishment or tour regulations and safety practices.
1125.1.8	Provide directions and other pertinent information to visitors.
1125.2	Working with Park Staff
1125.2.1	Confer with park staff to determine subjects and schedules for park programs.
1125.2.2	Assist with operations of general facilities, such as visitor centers.
1125.2.3	Plan, organize and direct activities of seasonal staff members.
1125.3	Visitor Services
1125.3.1	Prepare brochures and write newspaper articles.
1125.3.2	Distribute brochures, show audiovisual presentations, and explain establishment processes and operations at tour sites.
1125.3.3	Provide visitor services by explaining regulations; answering visitor requests, needs and complaints; and providing information about the park and surrounding areas.
1125.3.4	Prioritize the enhancement of the visitor experience through well-designed programs.
1125.3.5	Collect feedback from visitors and use it to improve future programs.
1125.3.6	Implement measures to ensure accessibility and inclusivity for all visitors.
1125.4	First Aid/CPR
1125.4.1	Access nationally recognized First Aid and CPR standards
1125.4.2	Explain principles of infection control
1125.4.3	Understand the importance of proper handwashing according to the Center for Disease Control

1125.4.4	Understand the Good Samaritan Act
1125.4.5	Discuss informed consent
1125.4.6	Apply skills to obtain training and/or certification in CPR and First Aid
1125.5	Essentials of Communication
1125.5.1	Describe communication and the key steps involved.
1125.5.2	Describe verbal, nonverbal, and written communication.
1125.5.3	Describe conflict stimulation.
1125.5.4	Identify steps for resolving unhealthy conflict.
1125.5.5	Earn essentials of communications credentials.
1125.5.6	Describe communication and the key steps involved.
1125.5.7	Describe verbal, nonverbal, and written communication.

Program Planning and Design

1125.6	Marketing and Promotion
1125.6.1	Develop programs that cater to diverse demographics and interests.
1125.6.2	Consider the local culture, environment, and community needs in program design.
1125.6.3	Ensure programs are aligned with the overall goals of the park and contribute to sustainable tourism.
1125.6.4	Develop comprehensive marketing strategies to promote programs and attract tourists.
1125.6.5	Utilize online platforms and social media to reach a broader audience.
1125.6.6	Create promotional materials that highlight the unique aspects of the park and its recreational offerings.
1125.7	Training and Professional Development
1125.7.1	Develop training for staff to enhance their skills and knowledge.
1125.7.2	Encourage continuous professional development to stay informed about industry trends.
1125.7.3	Foster a culture of learning and innovation within the Parks and Recreation team.

The Advanced Pet Grooming course is an advanced specialization course designed for students to create a pet grooming business within the Simulated Workplace environment. Students will manage and operate a pet grooming business in the school laboratory.

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1180.1	Detailed Grooming Techniques
1180.1.1	Clean breeds facial wrinkles.
1180.1.2	Pluck terrier breeds according to standards.
1180.1.3	Expel anal glands.
1180.1.4	Practice stripping on terrier breeds.
1180.1.5	Trim hair around paw pads.
1180.1.6	Pull ear hair with proper tools and techniques.
1180.1.7	Perform sanitary cuts on appropriate breeds.
1180.1.8	Groom dogs from all groups recognized by the AKC.
1180.1.9	Use Dremel to smooth and file nails.
1180.1.10	Polish nails or apply nail covers.

1180.2	Cat Grooming
1180.2.1	Wear protective equipment while cat grooming.
1180.2.2	Practice using different holds and restraining devices on cats.
1180.2.3	Identify and properly use specialty combs and brushes.
1180.2.4	Unsheathe nails.
1180.2.5	Identify nail anatomy.
1180.2.6	Clip nails.
1180.2.7	Select proper blades to shave cat.
1180.2.8	Be familiar with the lion cut.
1180.2.9	Identify and clean chin and tail.
1180.2.10	Complete eye preparation prior to bathing.
1180.2.11	Bathe cat using proper equipment.
1180.2.12	Be familiar with types of shampoos to use on cats.
1180.2.13	Carefully groom whiskers, tail, ears, eyes, and skin of cats.

1180.3	Clipper Care and Use
1180.3.1	Describe different types of clippers and their use.
1180.3.2	Identify parts of the clipper.
1180.3.3	Maintain the clipper- oil and grease regularly.
1180.3.4	Change blades and use tool lube.

1180.3.5	Understand depth of cut of blades according to number.
1180.3.6	Select proper blade for a particular cut.
1180.3.7	Sanitize blades after use.
1180.3.8	Utilize blade guards efficiently.
1180.3.9	Handle clippers properly during use.

1180.4	Grooming Equipment
1180.4.1	Use proper grooming brushes according to coat type.
1180.4.2	Use combs properly for intended purpose.
1180.4.3	Identify and use dematting, deshedding, and stripping tools effectively.
1180.4.4	Safely operate the Dremel tool.
1180.4.5	Use proper size nail clippers and quikstop as needed.
1180.4.6	Select proper shears accordingly.
1180.4.7	Use clippers according to cut and maintain operation.
1180.4.8	Identify types and uses of clipper blades and guard sizes.
1180.4.9	Perform clipping on dogs according to breed.
1180.4.10	Dry dogs using forced air and cage dryers properly.
1180.4.11	Use nooses, loops, leashes, muzzles, and chokers properly.
1180.4.12	Perform animal grooming duties such as washing, brushing, clipping, and trimming coats, cutting nails, and cleaning ears.
1180.4.13	Restrain animal by loops, slings, muzzles, harnesses, etc. according to need.
1180.4.14	Follow recommended grooming procedures according to breed, coat, and customer preferences.

Foundations of Agriculture, Food, and Natural Resources

1180.5	Demonstrate knowledge of leadership development through FFA.
1180.5.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
1180.5.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
1180.5.3	Participate in community service and career awareness activities at the local, state, and national level.

The Pet Boarding and Obedience course is an advanced specialization course designed for students to create a pet boarding and obedience business within the Simulated Workplace environment. Students will manage and operate a pet boarding and obedience business in the school laboratory.

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1181.1	Establishing a Kennel
1181.1.1	Develop a plan for a kennel.
1181.1.2	Determine type of kennel operation to develop.
1181.1.3	Identify the needs and work areas required for kennels.
1181.1.4	Provide proper lighting within the kennel.
1181.1.5	Consider traffic flow within the kennel.
1181.1.6	Identify types of fencing used in kennels.
1181.1.7	Understand proper separation of animals (aggressive/small/cats).
1181.1.8	Use runs, play yards, wired topped, and isolation pens correctly.
1181.1.9	Use the proper disinfectants and cleaning supplies for kennels.
1181.1.10	Develop a sanitation plan for the kennel.
1181.1.11	Provide proper air flow and ventilation within the kennel.
1181.1.12	Develop protocols to eliminate the chance of disease transmission.
1181.1.13	Address medical issues when needed.
1181.1.14	Understand nutritional needs of dogs
1181.1.15	Develop feeding schedules and types of foods for kenneled dogs
1181.1.16	Develop protocols in dealing with owners.
1181.1.17	Provide double doors for customers' entry to contain animals.
1181.1.18	Understand orphaned animals at kennels.
1181.1.19	Develop a plan for placement of orphaned animals.

1181.2	Animal Behaviors and Psychology
1181.2.1	Identify instinctive and genetic behaviors.
1181.2.2	Understand dominance theory.
1181.2.3	Recognize the pack order and behavior of alpha dogs.
1181.2.4	Research specific and common breed temperaments and behaviors.
1181.2.5	Research breed genetics and how they affect behaviors.
1181.2.6	Acquire dog's focus during training sessions.
1181.2.7	Train basic commands using rewards-based techniques.
1181.2.8	Become familiar with proper use of chokers, prong collars, electric shock, and harnesses to restrain dogs during training.
1181.2.9	Understand the theory of off-leash control.
1181.2.10	Use 3 basic commands when training dogs.

1181.2.11	Identify markers for dogs to modify behaviors.
1181.2.12	Use repetition and re teaching during dog training sessions.
1181.2.13	Understand and practice the use of eye contact in training dogs.
1181.2.14	Remove emotion from training sessions.
1181.2.15	Practice reward training for desired behaviors.
1181.2.16	Define compulsion training.
1181.2.17	Use compulsion training only with aggressive animals.
1181.2.18	Identify corrections from soft to hard.
1181.2.19	Use corrections according to need from soft to hard.
1181.2.20	Identify fearful behaviors (loud noise, gunshot).
1181.2.21	De-escalate fearful behaviors using proper techniques.

1181.3	Police Dog Training
1181.3.1	Research behavioral requirements of dogs for police work.
1181.3.2	Identify skill sets for dogs training for police work.
1181.3.3	Identify behaviors needed for dogs training in search/rescue/drug.
1181.3.4	Obtain focus to motivate dogs using reward-based techniques.
1181.3.5	Set boundaries and limitations on dogs in training.
1181.3.6	Define the 3 levels of corrections for aggressive behaviors
1181.3.7	Practice compulsion training properly to motivate aggressive animals.
1181.3.8	Define imprinting/bonding.
1181.3.9	Practice imprinting/bonding while working with customers.
1181.3.10	Teach customers the 3 basic commands.
1181.3.11	Control affection during training sessions.
1181.3.12	Understand the black/white world of dogs.
1181.3.13	Identify breeds with potential to be air scent/cadaver dogs.
1181.3.14	Research behaviors required to be air scent/cadaver dogs.

1181.4	Kennel Services
1181.4.1	Define traditional vs. cage free kennels.
1181.4.2	Identify services available for kennels to add income to the business.
1181.4.3	Groom or train animals within the kennel.
1181.4.4	Identify requirements for vaccinations/flea control/etc.
1181.4.5	Develop a procedure to organize customer/dog leashed, toys, foods, etc.
1181.4.6	Understand the need and profitability for k-9 daycares.
1181.4.7	Understand the need for geriatric areas/rest areas/play areas.
1181.4.8	Research new services within daycares to add income such as taxi services, hydrotherapy, etc.
1181.4.9	Develop a plan for customer waiting areas.
1181.4.10	Explore use of webcams for customer satisfaction.

1181.5	Animal Shelter Operations
1181.5.1	Research the goals and mission of animal shelters.
1181.5.2	Define kill vs. no kill facilities.

Pet Boarding and Obedience**Course #: 01181****Allowable Teacher Endorsement:** 0200, 0201, 7720, 7801, 7962

1181.5.3	Identify stray animal laws.
1181.5.4	Research breed ban laws.
1181.5.5	Research jobs within the animal shelter operation.
1181.5.6	Visit the local animal shelter.
1181.5.7	Research laws and penalties for fighting and abuse of animals.
1181.5.8	Define the goals of the breed rescue organization.
1181.5.9	Research how rescue organizations operate.

Foundations of Agriculture, Food, and Natural Resources

1181.6	Demonstrate knowledge of leadership development through FFA.
1181.6.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
1181.6.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
1181.6.3	Participate in community service and career awareness activities at the local, state, and national level.

Course description

The Tourism Internship Program provides students with a unique opportunity to gain practical experience and apply theoretical knowledge in a real-world tourism setting. Through immersive internships with reputable tourism organizations, participants will develop a comprehensive understanding of the industry, refine their professional skills, and build valuable connections within the tourism sector.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Practical Application of Knowledge

1210.1	Tourism Industry Insight
1210.1.1	Analyze industry reports, case studies, and real-world examples.
1210.1.2	Demonstrate an understanding of the interconnected components of the tourism sector.
1210.1.3	Apply theoretical knowledge to understand the dynamics, trends, and challenges within the tourism industry.
1210.2	Destination Analysis
1210.2.1	Conduct destination assessments considering factors such as infrastructure, attractions, and sustainability.
1210.2.2	Propose strategic recommendations based on destination analysis.
1210.2.3	Apply knowledge of destination management to assess and analyze tourism destinations.
1210.3	Customer Experience Enhancement
1210.3.1	Develop strategies to improve customer satisfaction and loyalty.
1210.3.2	Address customer concerns and provide effective solutions.
1210.3.3	Apply customer service principles to enhance the overall visitor experience.
1210.4	Event Planning and Execution
1210.4.1	Apply event management concepts to plan and execute tourism-related events.
1210.4.2	Create event proposals, including budgets and timelines.
1210.4.3	Coordinate logistics, promotion, and on-site management for events.
1210.5	Tour Operation Logistics
1210.5.1	Design detailed tour itineraries considering transportation, accommodations, and attractions.
1210.5.2	Address challenges related to tour logistics and adapt plans accordingly.
1210.5.3	Apply knowledge of tour operations to plan and manage travel experiences.
1210.6	Marketing Strategy Implementation
1210.6.1	Develop and execute marketing campaigns.
1210.6.2	Utilize digital marketing tools and social media for promotion.
1210.6.3	Apply marketing principles to implement effective strategies for tourism products or destinations.
1210.7	Crisis Management in Tourism
1210.7.1	Develop crisis communication plans.
1210.7.2	Implement strategies to mitigate the impact of crises on tourism activities.
1210.7.3	Apply crisis management concepts to address challenges within the tourism industry.

Professional Skill Development

1210.8	Communication Skills
1210.8.1	Articulate ideas clearly in both formal and informal settings.
1210.8.2	Craft professional emails, reports, and other written communications.
1210.8.3	Develop effective verbal and written communication skills relevant to the tourism industry.
1210.9	Customer Service Excellence
1210.9.1	Demonstrate empathy and responsiveness in addressing customer needs.
1210.9.2	Handle customer inquiries, complaints, and feedback with professionalism.
1210.9.3	Cultivate outstanding customer service skills to enhance visitor experiences.
1210.10	Team Collaboration
1210.10.1	Collaborate effectively with colleagues, industry professionals, and peers.
1210.10.2	Contribute positively to team dynamics and outcomes.
1210.10.3	Foster the ability to work collaboratively with diverse teams in tourism-related projects.
1210.11	Adaptability and Flexibility
1210.11.1	Develop adaptability and flexibility in navigating the dynamic tourism industry.
1210.11.2	Adapt to changing circumstances, schedules, and unexpected challenges.
1210.11.3	Embrace new ideas and approaches with an open mindset.
1210.12	Problem-Solving Skills
1210.12.1	Hone problem-solving skills to address challenges in tourism operations.
1210.12.2	Identify issues and analyze root causes.
1210.12.3	Propose and implement effective solutions.
1210.13	Time Management
1210.13.1	Develop effective time management skills for handling multiple tasks and deadlines.
1210.13.2	Prioritize tasks based on urgency and importance.
1210.13.3	Create and adhere to realistic timelines.
1210.14	Leadership Potential
1210.14.1	Cultivate leadership qualities applicable to roles within the tourism sector.
1210.14.2	Demonstrate initiative and take on leadership responsibilities.
1210.14.3	Motivate and guide others toward common goals.

Industry Exposure and Networking

1210.15	Industry Insight
1210.15.1	Gain a comprehensive understanding of the tourism industry through exposure to diverse sectors.
1210.15.2	Explore different segments of the industry, including hospitality, travel agencies, event management, and destination marketing.
1210.15.3	Analyze industry trends, challenges, and opportunities.
1210.16	Professional Etiquette
1210.16.1	Develop professional etiquette and conduct suitable for the tourism industry.
1210.16.2	Demonstrate appropriate behavior in professional settings, including industry events, conferences, and networking functions.
1210.16.3	Understand and adhere to industry-specific norms and expectations.
1210.17	Networking Strategies

1210.17.1	Develop effective networking strategies to establish connections within the tourism sector.
1210.17.2	Build a professional network through industry events, online platforms, and informational interviews.
1210.17.3	Utilize networking opportunities to create meaningful connections.
1210.18	Industry Event Participation
1210.18.1	Actively participate in industry events to expand knowledge and build connections.
1210.18.2	Attend conferences, trade shows, and seminars within the tourism sector.
1210.18.3	Engage with industry professionals, ask questions, and seek mentorship opportunities.
1210.19	Elevator Pitch Development
1210.19.1	Craft an effective elevator pitch to introduce oneself professionally in networking situations.
1210.19.2	Develop a concise and compelling introduction highlighting skills, interests, and career goals.
1210.19.3	Practice delivering the elevator pitch with confidence.

Project Management Experience

1210.20	Project Planning
1210.20.1	Develop comprehensive project plans for tourism-related initiatives.
1210.20.2	Define project objectives, scope, and deliverables.
1210.20.3	Create realistic timelines and milestones for project execution.
1210.21	Budget Management
1210.21.1	Effectively manage project budgets within the constraints of the tourism industry.
1210.21.2	Develop accurate cost estimates for project components.
1210.21.3	Monitor and control project expenses to ensure financial objectives are met.
1210.22	Risk Management
1210.22.1	Identify and mitigate potential risks associated with tourism projects.
1210.22.2	Conduct risk assessments and develop risk mitigation plans.
1210.22.3	Respond proactively to unexpected challenges during project implementation.
1210.23	Team Leadership
1210.23.1	Provide effective leadership for project teams within the tourism context.
1210.23.2	Foster a positive team culture and collaboration.
1210.23.3	Motivate team members to achieve project goals.
1210.24	Logistics and Operations Planning
1210.24.1	Implement effective communication strategies for project stakeholders.
1210.24.2	Arrange transportation, accommodations, and other operational elements.
1210.24.3	Ensure seamless coordination of project components.
1210.25	Communication Management
1210.25.1	Plan and coordinate logistics and operations for tourism projects.
1210.25.2	Develop a communication plan outlining key messages and channels.
1210.25.3	Regularly update stakeholders on project progress and milestones.
1210.26	Adaptability in Tourism Projects
1210.26.1	Demonstrate adaptability to changing circumstances and industry dynamics.
1210.26.2	Anticipate and address potential challenges in the tourism context.
1210.26.3	Modify project plans to align with evolving industry trends.

Course description

This course is designed introduced to needed skills for successful employment in the hospitality field. This course provides students with a comprehensive tour through the travel and tourism environment. Students will discover the characteristics of the hospitality industry, the relationship between hospitality and tourism, the economics and promotion of tourism, and an overview of the lodging and restaurant industries.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

General Hospitality and Tourism Technical Skills

1211.1	Lodging
1211.1.1	Apply customer service techniques for delivering services efficiently for the well-being and comfort of guests as it relates to the Lodging sector.
1211.1.2	Demonstrate an understanding of the lodging sectors that apply to the tourism industry in your travel region.
1211.1.3	Demonstrate an understanding of the lodging sectors that apply to the tourism industry in West Virginia and beyond.
1211.1.4	Demonstrate an understanding of careers available in the lodging sector of tourism in your travel region.
1211.1.5	Demonstrate an understanding of careers available in the lodging sector of tourism in West Virginia and beyond.
1211.1.6	Demonstrate an understanding of skills required for employment in the lodging sector of tourism.
1211.1.7	Demonstrate an understanding of the principles of marketing the lodging sector of tourism as an entrepreneur.
1211.1.8	Explore the lodging sector of tourism in your travel region through an onsite experience.
1211.1.9	Students demonstrate mastery of the lodging sector through creation of a culminating demonstration. (Ex. Menus, Floor Plans, Social Media Campaigns, Marketing Materials, Brochures, Presentations, PSA's etc.)
1211.1.10	Demonstrate mastery of reading, writing, and math skills required for a career within the lodging sector.
1211.2	Transportation
1211.2.1	Apply customer service techniques for delivering services efficiently for the well-being and comfort of guests as it relates to the transportation sector.
1211.2.2	Demonstrate an understanding of the transportation sectors that apply to the tourism industry in your travel region.
1211.2.3	Demonstrate an understanding of the transportation sectors that apply to the tourism industry in West Virginia and beyond.
1211.2.4	Demonstrate an understanding of careers available in the transportation sector of tourism in your travel region.
1211.2.5	Demonstrate an understanding of careers available in the transportation sector of tourism in West Virginia and beyond.
1211.2.6	Demonstrate an understanding of skills required for employment in the transportation sector of tourism.
1211.2.7	Demonstrate an understanding of the principles of marketing the transportation sector of tourism as an entrepreneur.

1211.3	Attractions
1211.3.1	Apply customer service techniques for delivering services efficiently for the well-being and comfort of guests as it relates to the Attractions sector.
1211.3.2	Demonstrate an understanding of the Attractions sectors that apply to the Lodging industry in your travel region.
1211.3.3	Demonstrate an understanding of the Attractions sectors that apply to the tourism industry in West Virginia and beyond.
1211.3.4	Demonstrate an understanding of careers available in the lodging sector of tourism in your travel region.
1211.3.5	Demonstrate an understanding of careers available in the Attractions sector of tourism in West Virginia and beyond.
1211.3.6	Demonstrate an understanding of skills required for employment in the Attractions sector of tourism.
1211.3.7	Demonstrate an understanding of the principles of marketing the Attractions sector of tourism as an entrepreneur.

Academic Foundations

1211.4	Ethics and Legal Responsibilities
1211.4.1	Apply appropriate laws, regulations, industry standards to tourism situations.
1211.5	Safety, Health and Environmental
1211.5.1	Identify and practice appropriate safety and health procedures for hospitality and tourism occupations.
1211.5.2	Demonstrate emergency and first-aid knowledge and procedures for hospitality and tourism occupations.
1211.6	Academic
1211.6.1	Apply reading skills in a hospitality and tourism career environment.
1211.6.2	Apply writing skills in a hospitality and tourism career environment.
1211.6.3	Apply mathematical skills in a hospitality and tourism career environment.
1211.6.4	Apply knowledge of economics in a hospitality and tourism career environment.

This course is designed to focus on “hands on” and academic activities geared toward management opportunities and skills in the hospitality industry. The coursework will provide the student with an overview of industry and will also provide competencies for successful performance in leadership and management skills in Travel and Tourism.

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Recreation, Theme Parks, and Clubs

1212.1	Recreation, Theme Parks, and Clubs
1212.1.1	Examine various departments of clubs.
1212.1.2	Outline the club management structure.
1212.1.3	Research the management of a leadership model.
1212.1.4	Create the organizational chart of a club.
1212.1.5	Outline different types of noncommercial recreation.
1212.1.6	Present on a government-sponsored recreation area.
1212.1.7	Research the current trends in recreation, theme parks and clubs.

Gaming Entertainment

1212.2	Gaming Entertainment
1212.2.1	Outline the background of the gaming industry.
1212.2.2	Research the expansion of gaming in North America.
1212.2.3	Research a presentation of one of the industry giants in the gaming industry.

Meetings, Conventions and Expositions

1212.3	Meetings, Conventions and Expositions
1212.3.1	Explain the different types of popular meetings.
1212.3.2	Research a local convention and visitor’s bureau to determine its makeup.
1212.3.3	Outline the makeup different types of meetings, conventions, and expositions.
1212.3.4	Outline the steps that go into meeting planning.
1212.3.5	Examine various venues for meetings, conventions, and expositions.
1212.3.6	Research the current trends in the meeting, convention, and exposition facet of the hospitality industry.
1212.3.7	Explain the different types of popular meetings.

Special Events

1212.4	Special Events
1212.4.1	Create a visual that defines special events.
1212.4.2	Research the event planner career path.
1212.4.3	Outline the event planning process.
1212.4.4	Classify different types of special events.

Management and Leadership

1212.5	Management and Leadership
1212.5.1	Chart the roles and skills needed to be a manager.
1212.5.2	Role play ethical behavior situations in the hospitality industry.
1212.5.3	Outline the dynamics of demand on managers in hospitality.

Hospitality Marketing

1212.6	Hospitality Marketing
1212.6.1	Explain marketing segmentation.
1212.6.2	Research positioning in the hospitality industry.
1212.6.3	Differentiate types of marketing.
1212.6.4	Examine the trends in hospitality marketing and sales.
1212.6.5	Develop marketing strategies to address specific needs.

Human Resources

1212.7	Human Resources
1212.7.1	Create a checklist of the elements that are important in an appropriate job description.
1212.7.2	Chart the major topics in recruitment.
1212.7.3	Research the selection and orientation process.
1212.7.4	Outline the various components of employee assistance programs.

Accounting, Finance and Cost Control

1212.8	Accounting, Finance and Cost Control
1212.8.1	Answer questions from different financial records.
1212.8.2	Outline cash flow in the hospitality industry.
1212.8.3	Research ways to control costs in the hospitality industry.

This course is designed to explore the leisure behavior of the individual, encompassing physical fitness, relaxation, social interaction, and creativity. Included is the investigation of the influences of leisure from a social, psychological, and theoretical perspective.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Leisure Education

1221.1	Leisure Education
1221.1.1	Examine the benefits of leisure planning and goal setting.
1221.1.2	Examine time management principles.
1221.1.3	Research the use of leisure as a category of time.
1221.1.4	Research recreation patterns of behavior.

Guiding Leisure Activities

1221.2	Guiding Leisure Activities
1221.2.1	Plan appropriate expeditions, instruction, and commentary.
1221.2.2	Conduct field trips to point out scientific, historic, and natural features of parks, forests, historic sites, or other attractions.
1221.2.3	Prepare and present illustrated lectures and interpretive talks about park features.
1221.2.4	Assist with operations of general facilities, such as visitor centers.

Parks, Forests, Historic Sites

1221.3	Parks, Forests, Historic Sites
1221.3.1	Research various topics, including site history, environmental conditions, and clients' skills and abilities.
1221.3.2	Organize, lead, and promote interest in recreational activities such as arts, crafts, sports, games, camping, and hobbies.
1221.3.3	Greet new arrivals to activities, introducing them to other participants.
1221.3.4	Explain facility rules.
1221.3.5	Encourage guest participation.

This course will present a broad view of one of the top industries for the 21st century. In this course students will explore the world of recreation and leisure and the opportunities that exist for an exciting career. This course will provide the 'big picture' of this diverse profession.

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Creating the Foundations of Recreation and Leisure

1222.1	Creating the Foundations of Recreation and Leisure
1222.1.1	Identify the unique qualities and opportunities afforded by this professional field.
1222.1.2	Identify and explain the historical development of recreation and leisure from historical societies to present day patterns in the United States.
1222.1.3	Identify government and professional organizations and how they impacted the development of recreation and leisure in the United States.
1222.1.4	Differentiate between philosophy and ethics, utilizing these traits to clarify leisure values.
1222.1.5	Develop personal ethics regarding recreation and leisure, and then be able to apply them to the decision-making process.
1222.1.6	Differentiate between philosophy and ethics - utilizing these traits to evaluate the worthiness of leisure services.
1222.1.7	Demonstrate how recreation and leisure affects and is affected by society.
1222.1.8	Explain how gender, ethnicity, race, religion, socioeconomic class affect recreation and leisure - and how recreation and leisure in turn affect these factors.

Discovering Leisure and Recreation as a Delivery System

1222.2	Discovering Leisure and Recreation as a Delivery System
1222.2.1	Develop a knowledge of the differences between the different levels of parks, including the agencies that run them and their management plans.
1222.2.2	Communicate the differences between preservation, wilderness, conservation, multiple use and wise use of natural resources and parks.
1222.2.3	Explain the different types of commercial recreation.
1222.2.4	Describe the leisure industry model and note examples in each category.
1222.2.5	Define tourists and understand the different reasons for travel.
1222.2.6	Clearly identify career opportunities in commercial recreation and tourism.
1222.2.7	Articulate the challenges and trends in the leisure industry.
1222.2.8	Describe what makes a business successful and why some businesses fail.
1222.2.9	Describe the development characteristics for each life stage that are most relevant to the design and delivery of leisure and recreation services.
1222.2.10	Explore and explain how developmental characteristics affect leisure and recreation programs.

Investigate Recreation and Service Areas

1222.3	Investigate Recreation and Service Areas
1222.3.1	Investigate career paths that the field of recreation offers.

1222.3.2	Explain program planning within the field of recreation.
1222.3.3	Discuss the variety of leisure activities that recreation can offer to its participants.
1222.3.4	Elaborate on the foundation of recreational sports management.
1222.3.5	List the broad scope of recreational sports activities and events.
1222.3.6	List career opportunities in recreational sports management.
1222.3.7	Recognize the shift in the medical world from treatment to prevention.
1222.3.8	Identify the current and emerging roles for parks and recreation related to health.
1222.3.9	Explain the important role that the environment plays in health lifestyles.
1222.3.10	State the importance of parks and recreation to the coming health crisis.
1222.3.11	Provide an overview of and summarize the history of outdoor recreation in the United States.
1222.3.12	Describe the social, economic, psychological, and cultural importance of outdoor recreation.
1222.3.13	Identify the organizations related to and careers available in outdoor recreation.
1222.3.14	Identify the organizations related to and careers available in outdoor recreation.
1222.3.15	Define the criteria that is used to characterize a professional.
1222.3.16	Identify factors limiting public recognition of the value of recreation and leisure services.
1222.3.17	Differentiate between accreditation and certification.
1222.3.18	Discuss the purpose of a code of ethics and its value to the leisure service profession.

This course is designed to present foundational principles of Public Safety Leadership including how public safety leaders protect a democratic society; public policy issues such as crime and justice; history, organization, and functions of components of public safety including the criminal justice system; and the issues and challenges relating to the administration of justice in a culturally diverse society. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Students are encouraged to become active members of the student organization SkillsUSA. Teachers should provide each student with real world learning opportunities and instruction. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Career Preparation Skills

1225.1	Career Preparation Skills
1225.1.1	Discuss the process of goal development and achievement.
1225.1.2	Discuss and relate skills and abilities to possible career pathways.
1225.1.3	Discuss methods of time management and task coordination.
1225.1.4	Practice professionalism in punctuality, appropriate dress, task completion, etc.
1225.1.5	Investigate methods of supervision such as giving and receiving feedback and instruction.
1225.1.6	Develop and present a statement of their personal work ethic beliefs.
1225.1.7	Prepare an application, cover letter, resume and thank you letter.
1225.1.8	Create a personal portfolio for use when applying for employment.
1225.1.9	Practice simulated job interviews.

Health and Safety

1225.2	Safety in Public Service
1225.2.1	Describe safety practices, policies, procedures, and strategies related to both personal and environmental safety.
1225.2.2	Define personal and environmental safety on the job.
1225.2.3	Analyze and discuss the legal responsibility to provide a safe environment.
1225.2.4	Develop a mindset to anticipate and avoid or mitigate potential safety risks for self and client.
1225.2.5	List health and safety tools of the trade and assemble a safety kit.
1225.2.6	Plan safe and appropriate responses to a variety of dangers and emergencies.
1225.2.7	Identify options for further preparedness training and research.
1225.2.8	Identify causes, prevention, and treatments for injuries.
1225.2.9	List responsible actions to create a safe and healthy environment.
1225.2.10	Demonstrate proficiency in first aid, CPR and AED.

Leadership Development

1225.3	Development of Leadership Skills
1225.3.1	Develop public speaking skills and deliver speeches.
1225.3.2	Participate in meetings using parliamentary procedures.
1225.3.3	Attend leadership conferences and training (local, state and/or national).
1225.3.4	Volunteer in community service opportunities.
1225.3.5	Participate in career development events.

Customer and Personal Service

1225.4	Communication
1225.4.1	Develop skills and procedures in customer and guest services.
1225.4.2	Develop interpersonal skills to build effective working relationships.
1225.4.3	Develop social perceptiveness by being aware of other's reactions and understanding why they react as they do.
1225.4.4	Assess customer and community needs.
1225.4.5	Develop skills to meet quality standards for service.
1225.4.6	Discuss ways to evaluate customer satisfaction.
1225.4.7	Develop and demonstrate concern for others.
1225.4.8	Develop and use good manners and show cooperation.
1225.4.9	Display willingness to work with diverse people by being flexible and open-minded.
1225.4.10	Develop the skills to negotiate with others to resolve conflicts and settle disputes.
1225.4.11	Demonstrate and maintain open communication with others.
1225.4.12	Accurately interpret the verbal and non-verbal behaviors of others;
1225.4.13	Respect diversity by demonstrating respect for, listening to, and considering.
1225.4.14	Respect the opinions, perspectives, customs, and individual differences of others.

Literacy and Numeracy

1225.5	Develop literacy and reasoning skills.
1225.5.1	Develop literacy and numeracy skills required to solve complex real-world problems associated with their career/technical content area.
1225.5.2	Develop and improve critical thinking and reasoning skills.
1225.5.3	utilize a variety of technical sources (e.g., Internet, manuals, journals, directions, reports, etc.) to complete career/technical assignments and projects.
1225.5.4	Demonstrate writing skills required to complete career/technical assignments and projects.
1225.5.5	Demonstrate accuracy in calculating and measuring graphical work required to complete career/technical assignments and projects.
1225.5.6	Analyze tables, charts, graphs and multiple data sources to complete career/technical assignments and projects.

Fundamentals of Public Safety Leadership

1225.6	Law, Government and Crime
1225.6.1	Examine major themes of constitutional and criminal law including those relating to search and seizure, juveniles, arrest, etc.

1225.6.2	Describe and apply laws of arrest to various situations.
1225.6.3	Analyze and discuss the rules of evidence.
1225.6.4	Explore surcharges and civil and criminal liabilities.
1225.6.5	Discuss and articulate differences in state and federal court systems.
1225.6.6	Discuss felony and misdemeanor violations.
1225.6.7	Describe prosecutorial and judicial discretion.
1225.6.8	Analyze the factors affecting a prosecutor's decision to charge someone.
1225.6.9	Describe trial and hearing procedures.
1225.6.10	Examine the process of preparing and providing testimony.
1225.6.11	Examine the process of jury selection.
1225.6.12	Discuss and assess the elements of various types of crimes including sex crimes, arson, and terrorism.
1225.6.13	Interpret sociological and demographic variables associated with various crimes.

This course is designed to examine the philosophical issues and applications of the objectives and processes of Public Safety Leadership including Constitutional limitations; accountability; civil liability; criminal investigation; criminal procedure; and forensics. By examining societal and psychological stressors that contribute to behavior, students will examine a variety of 10 serious offenses and apply concepts of profiling, behavioral analysis, and threat assessment within an ethical paradigm. Students will analyze and critique the system of dealing with convicted persons and the long-term implications of corrections policy. The principles and procedures used in criminal investigation will be introduced. Procedures for implementing criminal law such as the Incorporation Doctrine, search, and seizure, warrant requirements, arrest, the right to counsel, interrogation, identification procedures, entrapment, cruel and unusual punishment, etc. will be discussed.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Ethical Practices of Public Safety Leadership

1226.1	Professional practices & standards of public safety.
1226.1.1	Identify ethical practices regarding equipment, policies, procedures, strategies, and evidence-based practice.
1226.1.2	Describe the characteristics of ethical systems relating to law and public safety.
1226.1.3	Discuss the origins of the concept of justice and its components.
1226.1.4	Examine theories of moral development and behavior.
1226.1.5	Explain the concepts of moral and legal culpability.
1226.1.6	Explain the differences between formal ethics and personal values.
1226.1.7	Examine types of corruption in various settings.
1226.1.8	Analyze and evaluate ethical decision-making opportunities in law and public safety.
1226.1.9	Describe ethical issues relating to various specializations within the field.
1226.1.10	Articulate informed opinions about clear and consistent ethical decisions.
1226.1.11	Discuss strategies for resolving ethical dilemmas.
1226.1.12	Discuss the issues relating to the ethical practice of law and public safety.
1226.1.13	Demonstrate ethical methods for implementing policies and procedures discussed in Foundations of Public Safety Leadership.
1226.1.14	Explore the use of Bureau of Justice Statistics and other databases to support best practices.
1226.1.15	Discuss professional organizations and their resources such as standards, advocacy efforts, etc.

Law and Public Safety Policies and Procedures

1226.2	Use of force.
1226.2.1	Demonstrate understanding of policing concepts and procedures such as search and seizure, Miranda requirements, arrest, interviewing and interrogation.
1226.2.2	Develop knowledge of procedures related to the use of firearms and chemical agents.
1226.2.3	Demonstrate understanding of policies relating to the use of other related equipment.
1226.2.4	Explain the significance of the Fourth Amendment to the criminal justice system.
1226.2.5	Discuss the basis for unreasonable search and seizure.

1226.2.6	Discuss the purpose and procedures of the Miranda warning.
1226.2.7	Analyze and explain the determinants of arrest.
1226.2.8	Assess the role of police discretion.
1226.2.9	Explore rules and regulations governing the proper use of firearms and chemical agents.
1226.2.10	Demonstrate skills used for emergency and crisis response.
1226.2.11	Describe the types of data contained in criminal records and how to interpret them.
1226.2.12	Explain the duties of the first officer at a crime scene including the ability to secure and protect a crime scene.
1226.2.13	Assess sources of physical evidence and utilize proper collection, marking, preservation and processing including plaster casting, fingerprinting and the transmission of DNA via chain of custody.
1226.2.14	Complete proper crime scene documentation.
1226.2.15	Assess the significance of DNA testing and other roles of the crime laboratory.
1226.2.16	Examine the characteristics of various types of wounds.
1226.2.17	Explore the concept of psychological profiling.
1226.2.18	Demonstrate proper procedures for placing a subject under arrest.
1226.2.19	Determine the legal requirements governing the preparation and execution of various types of search warrants.
1226.2.20	Discuss the concept of probable cause.
1226.2.21	Analyze non-verbal communication messages to discern facts from fabrication.
1226.2.22	Describe the barriers to effective communication.
1226.2.23	Demonstrate strategies for promoting and improving communication.
1226.2.24	Demonstrate methods for repairing communication breakdowns.
1226.2.25	Discuss the elements and process of change.
1226.2.26	Describe methods to create positive change.
1226.2.27	Demonstrate teaching prevention and response strategies.

Understand and Work with Special Populations

1226.3	Display an understanding of cultural variations (e.g., racial profiling).
1226.3.1	Discuss communication within various cultural contexts.
1226.3.2	Explore the concept of racial profiling.
1226.3.3	Discuss behavior as a form of communication.
1226.3.4	Describe the factors that determine when an arrest should be made.

Course description

The Tourism Leadership course is designed to equip students with the knowledge, skills, and attributes essential for effective leadership within the dynamic and multifaceted tourism industry. Participants will explore theories of leadership, analyze case studies, and engage in practical activities to develop the competencies required to lead tourism organizations, teams, and initiatives successfully.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Leadership Theories and Styles

1240.1	Theoretical Understanding
1240.1.1	Demonstrate a comprehensive understanding of various leadership theories relevant to the tourism industry.
1240.1.2	Explain key concepts of leadership theories such as transformational, transactional, situational, and servant leadership.
1240.1.3	Analyze how different leadership theories apply to diverse tourism contexts.
1240.2	Application of Leadership Models
1240.2.1	Apply leadership models to real-world scenarios within the tourism sector.
1240.2.2	Identify appropriate leadership models for specific situations.
1240.2.3	Evaluate the effectiveness of different leadership approaches in achieving organizational goals.
1240.3	Leadership Self-Assessment
1240.3.1	Conduct self-assessment of leadership styles and preferences.
1240.3.2	Reflect on personal leadership strengths and areas for development.
1240.3.3	Utilize self-assessment tools to gain insights into leadership preferences.
1240.4	Effective Communication as a Leader
1240.4.1	Develop effective communication skills aligned with different leadership styles.
1240.4.2	Communicate with clarity, empathy, and persuasion.
1240.4.3	Adapt communication styles to resonate with diverse audiences.
1240.5	Team Leadership and Collaboration
1240.5.1	Apply team leadership theories to foster collaboration and cohesion.
1240.5.2	Build and lead effective teams within the tourism context.
1240.5.3	Facilitate teamwork and manage conflicts within diverse groups.

Strategic Leadership in Tourism

1240.6	Strategic Vision Development
1240.6.1	Develop a strategic vision for tourism organizations aligned with industry trends and opportunities.
1240.6.2	Identify and analyze trends shaping the future of the tourism sector.
1240.6.3	Craft a compelling and forward-looking vision for organizational success.
1240.7	Competitive Positioning
1240.7.1	Develop strategies for competitive positioning within the tourism market.

1240.7.2	Analyze competitors and identify unique selling points.
1240.7.3	Formulate strategies to enhance the organization's competitive advantage.
1240.8	Strategic Planning Execution
1240.8.1	Implement and execute strategic plans effectively within the tourism context.
1240.8.2	Develop action plans to achieve strategic goals.
1240.8.3	Monitor progress and adjust strategies based on changing circumstances.
1240.9	Risk Management and Mitigation
1240.9.1	Assess risks associated with strategic decisions and develop mitigation plans.
1240.9.2	Identify potential risks in the tourism industry.
1240.9.3	Formulate strategies to minimize and manage risks.
1240.10	Data-Driven Decision-Making
1240.10.1	Utilize data and analytics to inform strategic decision-making.
1240.10.2	Collect and analyze relevant data for strategic insights.
1240.10.3	Make informed decisions based on data-driven assessments.

Team Building and Management

1240.11	Team Formation
1240.11.1	Formulate diverse and effective teams within the tourism context.
1240.11.2	Identify individual strengths and skills for team composition.
1240.11.3	Consider cultural diversity and skill complementarity when forming teams.
1240.12	Team Dynamics Understanding
1240.12.1	Understand and analyze team dynamics in the context of tourism operations.
1240.12.2	Identify roles and responsibilities within the team.
1240.12.3	Assess and address factors influencing team cohesion and performance.
1240.13	Effective Communication within Teams
1240.13.1	Facilitate clear and open communication within tourism teams.
1240.13.2	Establish communication channels for effective information flow.
1240.13.3	Promote active listening and feedback mechanisms within the team.
1240.14	Leadership within Teams
1240.14.1	Develop leadership skills to guide and motivate tourism teams.
1240.14.2	Encourage shared leadership and empower team members.
1240.14.3	Lead by example and inspire team members toward common goals.
1240.15	Goal Setting and Alignment
1240.15.1	Establish clear goals and align team efforts with organizational objectives.
1240.15.2	Develop SMART goals for tourism projects and initiatives.
1240.15.3	Ensure team members understand and are committed to organizational goals.

Innovation and Change Management

1240.16	Innovation Mindset
1240.16.1	Cultivate an innovative mindset within the tourism context.
1240.16.2	Foster a culture that values creativity and idea generation.
1240.16.3	Encourage a mindset that embraces new and unconventional solutions.
1240.17	Identifying Opportunities for Innovation
1240.17.1	Identify and assess opportunities for innovation within the tourism sector.
1240.17.2	Analyze industry trends and consumer preferences for potential innovation.

1240.17.3	Evaluate the feasibility and impact of innovative ideas.
1240.18	Creative Problem Solving
1240.18.1	Develop skills in creatively solving problems within tourism operations.
1240.18.2	Implement brainstorming and ideation sessions.
1240.18.3	Apply design thinking principles to address challenges.
1240.19	Communication of Change
1240.19.1	Communicate change effectively to internal and external stakeholders.
1240.19.2	Craft clear and transparent messages about the reasons for change.
1240.19.3	Address concerns and provide a vision for the future.
1240.20	Learning from Failure
1240.20.1	Cultivate a culture that views failure as an opportunity for learning and improvement.
1240.20.2	Encourage experimentation and risk-taking.
1240.20.3	Analyze failures to extract lessons and insights for future endeavors.

Customer-Centric Leadership

1240.21	Customer Experience Understanding
1240.21.1	Develop a deep understanding of the customer experience within the tourism sector.
1240.21.2	Analyze customer touchpoints and interactions.
1240.21.3	Identify factors that contribute to positive and negative customer experiences.
1240.22	Customer Needs Assessment
1240.22.1	Assess and anticipate the diverse needs and expectations of tourism customers.
1240.22.2	Conduct market research to understand customer preferences.
1240.22.3	Utilize feedback mechanisms to gather insights into customer needs.
1240.23	Customer-Centric Vision
1240.23.1	Develop and communicate a customer-centric vision for tourism organizations.
1240.23.2	Craft a vision that prioritizes customer satisfaction and loyalty.
1240.23.3	Align organizational goals with delivering exceptional customer experiences.
1240.24	Customer Feedback Utilization
1240.24.1	Utilize customer feedback to drive improvements and innovations.
1240.24.2	Implement systems for collecting and analyzing customer feedback.
1240.24.3	Translate feedback into actionable strategies for enhancement.
1240.25	Personalization Strategies
1240.25.1	Develop strategies for personalizing customer experiences in tourism.
1240.25.2	Implement personalized services and offers based on customer preferences.
1240.25.3	Utilize technology to enhance personalized interactions.

Course description

The Tourism Operations course is designed to provide students with a comprehensive understanding of the principles, processes, and challenges involved in managing and operating tourism-related businesses. This course explores the dynamic and multifaceted nature of the tourism industry, focusing on the key components that contribute to successful tourism operations.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Operational Planning and Management

1241.1	Strategic Operational Planning
1241.1.1	Develop and execute strategic operational plans aligned with the goals of tourism businesses.
1241.1.2	Identify key objectives and priorities for operational success.
1241.1.3	Formulate plans that support the overall business strategy.
1241.2	Resource Allocation
1241.2.1	Effectively allocate resources to meet operational demands.
1241.2.2	Assess resource requirements and availability.
1241.2.3	Optimize resource allocation for maximum efficiency.
1241.3	Adaptability and Flexibility
1241.3.1	Demonstrate adaptability to changing operational environments in the tourism sector.
1241.3.2	Respond to unexpected challenges with flexibility.
1241.3.3	Modify operational plans to align with industry dynamics.
1241.4	Customer-Centric Operational Practices
1241.4.1	Implement operational practices that prioritize customer satisfaction.
1241.4.2	Align operational processes with customer expectations.
1241.4.3	Develop strategies to enhance the overall customer experience.
1241.5	Regulatory Compliance
1241.5.1	Navigate and ensure compliance with regulations within the tourism industry.
1241.5.2	Stay informed about legal and ethical considerations.
1241.5.3	Develop and implement processes that align with regulatory requirements.
1241.6	Effective Communication in Operations
1241.6.1	Communicate operational plans and changes effectively to internal stakeholders.
1241.6.2	Develop clear communication strategies.
1241.6.3	Ensure that operational changes are well-understood by the team.
1241.7	Project Management in Operations
1241.7.1	Apply project management principles to execute operational initiatives.
1241.7.2	Develop project plans with clear objectives and timelines.
1241.7.3	Monitor and evaluate project progress within the operational context.

Logistics and Supply Chain in Tourism

1241.8	Supply Chain Mapping
1241.8.1	Analyze and map the supply chain processes within the tourism industry.
1241.8.2	Identify key components and stakeholders in the tourism supply chain.
1241.8.3	Create visual representations of supply chain flows and relationships.
1241.9	Demand Forecasting
1241.9.1	Develop skills in forecasting demand for goods and services in tourism.
1241.9.2	Utilize historical data and market trends for demand predictions.
1241.9.3	Implement forecasting models for accurate demand estimation.
1241.10	Inventory Management
1241.10.1	Efficiently manage inventory levels to meet customer demands.
1241.10.2	Implement inventory control systems.
1241.10.3	Optimize stock levels to prevent overstock or shortages.
1241.11	Technology Integration in Logistics
1241.11.1	Integrate technology solutions to enhance logistics efficiency in tourism.
1241.11.2	Implement tracking and tracing systems for real-time visibility.
1241.11.3	Utilize technology for route optimization and communication.
1241.12	Risk Management in Supply Chain
1241.12.1	Identify and manage risks associated with supply chain operations in tourism.
1241.12.2	Conduct risk assessments for potential disruptions.
1241.12.3	Develop contingency plans to mitigate supply chain risks.
1241.13	Data Analytics for Supply Chain Optimization
1241.13.1	Utilize data analytics to optimize supply chain processes.
1241.13.2	Analyze data to identify inefficiencies and areas for improvement.
1241.13.3	Implement data-driven strategies for supply chain optimization.

Quality Service Delivery

1241.14	Customer-Centric Mindset
1241.14.1	Cultivate a customer-centric mindset focused on meeting and exceeding customer expectations.
1241.14.2	Understand customer needs and preferences.
1241.14.3	Prioritize customer satisfaction in all service delivery interactions.
1241.15	Service Standards Development
1241.15.1	Develop and implement service standards that align with organizational goals and customer expectations.
1241.15.2	Define clear service standards and expectations.
1241.15.3	Establish benchmarks for quality service delivery.
1241.16	Effective Communication
1241.16.1	Communicate with clarity, empathy, and professionalism in all customer interactions.
1241.16.2	Active listening to understand customer needs.
1241.16.3	Adapt communication style to different customer preferences.
1241.17	Personalization of Service
1241.17.1	Provide personalized service tailored to individual customer preferences.
1241.17.2	Gather and utilize customer information for personalized interactions.
1241.17.3	Anticipate and fulfill individualized customer needs.

1241.18	Consistency in Service Delivery
1241.18.1	Ensure consistent service delivery across different touchpoints and interactions.
1241.18.2	Implement processes to maintain service consistency.
1241.18.3	Train and monitor staff to uphold service standards.
1241.19	Continuous Training and Development
1241.19.1	Implement continuous training programs to enhance service delivery skills.
1241.19.2	Identify areas for improvement through regular feedback.
1241.19.3	Provide ongoing training to address skill gaps and improve service quality.
1241.20	Measuring Customer Satisfaction
1241.20.1	Implement methods for measuring and evaluating customer satisfaction.
1241.20.2	Utilize surveys, feedback forms, and other tools to collect customer feedback.
1241.20.3	Analyze data to identify areas for improvement.

Capacity Management

1241.21	Capacity Planning
1241.21.1	Develop and implement strategic plans for managing capacity in tourism operations.
1241.21.2	Analyze demand patterns and trends.
1241.21.3	Formulate capacity plans aligned with organizational goals.
1241.22	Forecasting Demand
1241.22.1	Utilize forecasting methods to predict demand for tourism services.
1241.22.2	Analyze historical data and market trends.
1241.22.3	Apply forecasting models to estimate future demand.
1241.23	Dynamic Pricing Strategies
1241.23.1	Implement dynamic pricing strategies to optimize revenue and manage demand fluctuations.
1241.23.2	Adjust pricing based on demand and supply dynamics.
1241.23.3	Utilize pricing strategies to maximize revenue during peak periods.
1241.24	Resource Allocation Optimization
1241.24.1	Optimize the allocation of resources to meet varying capacity needs.
1241.24.2	Efficiently allocate staff, equipment, and facilities.
1241.24.3	Adjust resource allocation based on demand changes.
1241.25	Real-Time Monitoring and Adjustments
1241.25.1	Monitor capacity in real-time and make adjustments as needed.
1241.25.2	Utilize technology for real-time monitoring.
1241.25.3	Implement contingency plans for sudden capacity changes.
1241.26	Seasonal Capacity Planning
1241.26.1	Develop plans to address seasonal variations in capacity demands.
1241.26.2	Identify peak seasons and plan for increased capacity.
1241.26.3	Implement strategies to retain flexibility during low seasons.
1241.27	Adaptability to Changing Demands
1241.27.1	Demonstrate adaptability to changing demands and unforeseen circumstances.
1241.27.2	Develop contingency plans for unexpected fluctuations.
1241.27.3	Adjust capacity plans based on evolving circumstances.

Customer Relationship Management (CRM)

1241.28	Customer-Centric Mindset
1241.28.1	Cultivate a customer-centric mindset that prioritizes building and maintaining positive relationships.
1241.28.2	Understand customer needs and preferences.
1241.28.3	Focus on delivering personalized experiences.
1241.29	CRM Strategy Development
1241.29.1	Develop and implement effective CRM strategies aligned with organizational goals.
1241.29.2	Define clear objectives for CRM initiatives.
1241.29.3	Formulate plans to enhance customer loyalty and satisfaction.
1241.30	Data Collection and Analysis
1241.30.1	Collect and analyze customer data to gain insights into preferences and behavior.
1241.30.2	Implement data collection systems.
1241.30.3	Utilize analytics tools to extract actionable insights.
1241.31	Customer Feedback Utilization
1241.31.1	Utilize customer feedback to drive improvements and enhance experiences.
1241.31.2	Implement systems for collecting and analyzing customer feedback.
1241.31.3	Translate feedback into actionable strategies for enhancement.
1241.32	Proactive Issue Resolution
1241.32.1	Proactively address customer issues and concerns to build trust.
1241.32.2	Implement systems for early detection of customer issues.
1241.32.3	Develop strategies for prompt issue resolution.
1241.33	Adaptability to Customer Needs
1241.33.1	Demonstrate adaptability to changing customer needs and preferences.
1241.33.2	Stay informed about industry trends and changing consumer behavior.
1241.33.3	Adjust strategies to align with evolving customer expectations.

Course description

Agritourism, the intersection of agriculture and tourism, offers a unique and immersive experience for individuals seeking a deeper connection with the rural landscape. This course provides a comprehensive introduction to the principles, practices, and opportunities within the dynamic field of agritourism. Participants will explore the diverse facets of agritourism, from sustainable farming practices to creating enriching visitor experiences.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Agritourism Business Planning

1242.1	Business Plan Development
1242.1.1	Identify key components of a business plan.
1242.1.2	Create a mission statement and define business goals.
1242.1.3	Conduct market research to assess demand and competition.
1242.1.4	Develop financial projections and budgets.
1242.2	Sustainability Integration
1242.2.1	Identify sustainable farming practices suitable for agritourism.
1242.2.2	Evaluate the environmental impact of agritourism activities.
1242.2.3	Incorporate sustainable resource management in the plan.
1242.3	Risk Assessment and Management
1242.3.1	Conduct a thorough risk assessment for agritourism operations.
1242.3.2	Develop contingency plans for potential challenges.
1242.3.3	Implement safety measures to mitigate risks.
1242.4	Financial Analysis and Feasibility
1242.4.1	Analyze financial statements and projections.
1242.4.2	Assess the return on investment (ROI) for agritourism activities.
1242.4.3	Determine pricing strategies for services.
1242.5	Marketing and Branding Strategies
1242.5.1	Create a marketing plan tailored to the target audience.
1242.5.2	Utilize digital marketing tools and social media for promotion.
1242.5.3	Establish a unique brand identity for the agritourism venture.
1242.6	Community Engagement and Partnerships
1242.6.1	Collaborate with local communities for mutual benefit.
1242.6.2	Identify potential partners in the agritourism industry.
1242.6.3	Implement community-oriented initiatives.
1242.7	Visitor Experience Design
1242.7.1	Create engaging and educational agritourism programs.
1242.7.2	Design guided tours and interactive activities
1242.7.3	Tailor experiences to diverse visitor demographics.
1242.8	Adaptability and Innovation
1242.8.1	Stay informed about industry trends and innovations.

1242.8.2	Foster a culture of innovation within the agritourism business.
1242.8.3	Adapt business strategies based on market dynamics.

Tour Design and Implementation

1242.9	Visitor Experience Planning
1242.9.1	Identify the target audience and their preferences.
1242.9.2	Design tours that provide a memorable and enjoyable experience
1242.9.3	Incorporate educational elements into the tour.
1242.10	Tour Route Planning
1242.10.1	Map out efficient and appealing tour routes on the farm.
1242.10.2	Consider safety, accessibility, and scenic elements in route planning.
1242.10.3	Develop alternate routes to accommodate different visitor interests.
1242.11	Interactive Activity Design:
1242.11.1	Develop hands-on activities suitable for different age groups.
1242.11.2	Create interactive stations and demonstrations on the farm.
1242.11.3	Incorporate storytelling and participatory elements.
1242.12	Guided Tour Leadership
1242.12.1	Develop strong communication and presentation skills.
1242.12.2	Navigate smoothly through the tour route while engaging with visitors.
1242.12.3	Handle questions and interactions with confidence and knowledge.
1242.13	Adaptability and Flexibility
1242.13.1	Anticipate and address potential challenges during tours.
1242.13.2	Modify tour plans based on weather, visitor dynamics, or unexpected events.
1242.13.3	Ensure a seamless experience despite changes in the itinerary.
1242.14	Evaluation and Feedback Analysis
1242.14.1	Develop feedback mechanisms for visitors.
1242.14.2	Analyze feedback to identify areas for improvement.
1242.14.3	Implement changes based on feedback to enhance future tours.
1242.15	Safety and Emergency Preparedness
1242.15.1	Establish safety protocols and guidelines for tours.
1242.15.2	Train staff on emergency procedures and first aid.
1242.15.3	Regularly review and update safety measures.

Community Engagement

1242.16	Stakeholder Collaboration
1242.16.1	Identify and engage key community stakeholders.
1242.16.2	Foster positive relationships with local businesses, residents, and organizations.
1242.16.3	Collaborate on initiatives that contribute to community development.
1242.17	Community Needs Assessment
1242.17.1	Conduct surveys and interviews to gather community input.
1242.17.2	Identify areas where tourism can positively impact the community.
1242.17.3	Address community concerns and integrate feedback into tourism plans.
1242.18	Capacity Building
1242.18.1	Identify opportunities for skill development and training.
1242.18.2	Facilitate workshops or training sessions for community members.

1242.18.3	Support initiatives that enhance the community's ability to participate in tourism activities.
1242.19	Community-Driven Initiatives
1242.19.1	Encourage and facilitate community-led projects.
1242.19.2	Empower local entrepreneurs to start and manage tourism-related businesses.
1242.19.3	Promote community events and festivals.
1242.20	Community Marketing and Promotion
1242.20.1	Develop marketing materials that highlight the community's unique attributes.
1242.20.2	Collaborate with local businesses for joint marketing efforts.
1242.20.3	Implement strategies that attract responsible and sustainable tourism.

Culinary Tourism Integration

1242.21	Local Culinary Knowledge
1242.21.1	Research and identify traditional local dishes and ingredients.
1242.21.2	Understand the historical and cultural significance of regional cuisine.
1242.21.3	Collaborate with local chefs and culinary experts to gain insights
1242.22	Farm-to-Table Concepts
1242.22.1	Identify local farms and producers for sourcing fresh ingredients.
1242.22.2	Design experiences that showcase the journey from farm to table.
1242.22.3	Educate visitors on the importance of sustainable and locally sourced food.
1242.23	Culinary Event Planning
1242.23.1	Organize food festivals, tastings, and culinary workshops.
1242.23.2	Coordinate with local chefs and vendors for event logistics.
1242.23.3	Develop event marketing strategies to attract visitors.
1242.24	Culinary Tourism Education
1242.24.1	Develop educational programs that highlight culinary traditions.
1242.24.2	Integrate storytelling and historical context into culinary experiences.
1242.24.3	Provide information on the origins of local dishes and cooking methods.

Interpersonal and Communication Skills

1242.25	Effective Verbal Communication
1242.25.1	Articulate information in a manner understandable to diverse audiences.
1242.25.2	Use appropriate language and tone for different communication contexts.
1242.25.3	Actively listen and respond to visitors' inquiries and feedback.
1242.26	Non-Verbal Communication
1242.26.1	Use body language and gestures to convey openness and friendliness.
1242.26.2	Be mindful of facial expressions to express empathy and understanding.
1242.26.3	Understand and interpret non-verbal cues from visitors.
1242.27	Conflict Resolution
1242.27.1	Identify underlying issues in conflicts and address them proactively.
1242.27.2	Mediate disputes between visitors or team members.
1242.27.3	Implement conflict resolution strategies to maintain positive experiences.
1242.28	Empathy and Customer Service
1242.28.1	Understand and acknowledge visitors' needs and concerns.
1242.28.2	Respond with empathy and a customer-centric mindset.
1242.28.3	Anticipate and exceed visitor expectations.
1242.29	Team Collaboration

1242.29.1	Communicate effectively within a team environment.
1242.29.2	Share information and insights to improve teamwork.
1242.29.3	Foster a positive and supportive team culture.
1242.30	Adaptability and Flexibility
1242.30.1	Adjust communication to suit different visitor demographics.
1242.30.2	Handle unexpected situations with flexibility and composure.
1242.30.3	Modify communication plans based on evolving needs.
1242.31	Public Speaking and Presentation Skills
1242.31.1	Speak confidently and clearly in front of groups.
1242.31.2	Use visual aids effectively to enhance presentations.
1242.31.3	Tailor presentations to the interests of the audience.

The course provides a comprehensive approach to childcare, addressing safety hazards, illness recognition, and fostering holistic child development. It covers cognitive, language, physical, social, and emotional development, alongside positive guidance techniques and adherence to professional practices like DAP. Promoting safe learning environments, the course provides skills and knowledge needed to ensure the well-being and development of young children. This course requires five hours of field experience observation.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Health and Safety

1321.1	Identify safety hazards in and around the childcare setting.
1321.1.1	Analyze needs for safety, health and comfort and convenience in an early childhood setting.
1321.1.2	Distinguish between safe and unsafe conditions within the childcare setting.
1321.1.3	Classify safety hazards according to their potential risk levels.
1321.1.4	Evaluate the potential consequences of each identified safety hazard on children's well-being.
1321.2	Instruct children in personal safety awareness (e.g., stranger danger, fire safety).
1321.2.1	Demonstrate how to recognize and respond to strangers in various scenarios.
1321.2.2	Role-play appropriate responses to fire emergencies with children.
1321.2.3	Formulate age-appropriate strategies for teaching personal safety awareness to children, considering developmental stages.
1321.2.4	Develop personalized safety plans tailored to individual needs and circumstances.
1321.3	Identify characteristics of common childhood illnesses.
1321.3.1	Identify symptoms associated with common childhood illnesses such as colds, flu, and chickenpox.
1321.3.2	Distinguish between viral and bacterial illnesses based on their characteristics.
1321.3.3	Categorize illnesses based on their modes of transmission (e.g., airborne, contact).
1321.3.4	Analyze the impact of cultural and socio-economic factors on the prevalence and management of common childhood illnesses.
1321.3.5	Develop preventive measures and interventions to minimize the spread of common childhood illnesses within childcare settings.
1321.4	Describe universal (standard) precautions and infection control.
1321.4.1	Explain the concept of universal precautions and its importance in preventing the spread of infections.
1321.4.2	Illustrate proper handwashing techniques using visual aids or demonstrations.
1321.4.3	Explain the use of personal protective equipment (PPE) in childcare settings.
1321.4.4	Evaluate the effectiveness of current infection control protocols in preventing the transmission of infectious diseases.
1321.5	Explain rest and relaxation techniques.
1321.5.1	Analyze different rest and relaxation techniques suitable for children's developmental stages.
1321.5.2	Discuss various relaxation methods such as deep breathing and guided imagery.
1321.5.3	Evaluate the effectiveness of different rest and relaxation techniques in promoting children's emotional well-being and resilience.
1321.5.4	Design a comprehensive rest and relaxation program tailored to the unique needs of children in childcare settings.

1321.6	Plan, prepare, and explain the importance of nutritionally balanced meals and snacks.
1321.6.1	Summarize the Child and Adult Care Food Program (CACFP).
1321.6.2	Discuss WVDE Policy 4321.1 Standards for School Nutrition.
1321.6.3	Develop a weekly meal plan that meets nutritional requirements for children.
1321.6.4	Justify the importance of incorporating fruits and vegetables into meals and snacks.
1321.6.5	Evaluate the nutritional content of common snacks and suggest healthier alternatives.
1321.6.6	Evaluate existing meal plans and snack options in childcare settings.
1321.6.7	Develop strategies to overcome common barriers to implementing nutritionally balanced meals and snacks in childcare settings.
1321.7	Identify indicators and reporting procedures involving child abuse and neglect.
1321.7.1	Discuss WV Child Abuse and Neglect Laws in WV State Code (Chapter 49 Child Welfare).
1321.7.2	Identify persons designated as mandated reporters under W. Va. Code §49-2-803.
1321.7.3	Recognize physical, emotional, and behavioral indicators of child abuse and neglect.
1321.7.4	Summarize legal obligations regarding reporting suspected cases of child abuse or neglect.
1321.7.5	Evaluate the potential impact of reporting suspected cases of child abuse and neglect on children, families, and childcare professionals.
1321.7.6	Develop protocols for supporting children and families affected by child abuse and neglect.
1321.7.7	Summarize the Child Abuse Prevention and Treatment Act (CAPTA).

Cognitive Development

1321.8	Explain cognitive development stages and how they correlate to social, emotional, and physical development.
1321.8.1	Explain cognitive development.
1321.8.2	Discuss the importance of cognitive development in early childhood.
1321.8.3	Differentiate among cognitive development stages and their impacts on social, emotional, and physical development.
1321.8.4	Analyze the connection between cognitive milestones and social, emotional, and physical growth.
1321.8.5	Discuss potential long-term effects of disruptions in cognitive development on overall well-being.
1321.9	Provide examples of cognitive development.
1321.9.1	Analyze case studies of cognitive development and identify common themes and patterns across different contexts.
1321.9.2	Explain key ideas about how kids learn to think and show how to use these ideas when working with children.
1321.9.3	Illustrate developmental milestones showcasing cognitive growth from infancy to early childhood.
1321.10	Describe equipment and activities that promote cognitive development.
1321.10.1	Evaluate various educational toys, games, and activities for their effectiveness in fostering cognitive skills.
1321.10.2	Identify specific equipment and activities to enhance cognitive growth.
1321.10.3	Create a resource guide detailing appropriate equipment and activities for different stages of cognitive development.
1321.10.4	Develop new approaches or modifications to existing equipment and activities to better accommodate individual learning styles and developmental needs.
1321.11	Identify learning opportunities and conditions that develop creative and critical thinking.
1321.11.1	Examine different learning environments and their impact on how kids think creatively and critically.
1321.11.2	Assess how different ways of teaching and different classroom setups affect how well kids can think creatively and critically.
1321.11.3	Discuss effective teaching strategies that promote creative and critical thinking in early childhood.

1321.12	Recognize the factors that impact brain development.
1321.12.1	Identify the key factors influencing brain development during early childhood.
1321.12.2	Evaluate the effects of environmental, genetic, and experiential factors on brain development.
1321.13	Identify important theories and research involving cognitive development.
1321.13.1	Summarize fundamental theories in cognitive development relevant to early childhood education, including the works of Piaget and Vygotsky.
1321.13.2	Evaluate the practical applications of cognitive development theories in designing curriculum and activities for preschool and elementary school-aged children.
1321.13.3	Develop age-appropriate activities that foster cognitive growth, problem-solving skills, and critical thinking in young learners.
1321.13.4	Discuss various assessment methods to monitor student progress and inform instructional decision-making.

Language Development and Communication

1321.14	Describe the stages of language development.
1321.14.1	Identify the stages of language development from infancy through early childhood, including prelinguistic communication, babbling, one-word stage, two-word stage, telegraphic speech, and beyond.
1321.14.2	Evaluate the language abilities observed at different stages of development.
1321.14.3	Identify strategies to promote children's communication and oral language development.
1321.14.4	Demonstrate how to support language development through meaningful conversation.
1321.14.5	Explain the use of oral language development assessment tools such as Teacher Rating of Oral Language and Literacy (TROLL).
1321.15	Describe factors affecting language development.
1321.15.1	Discuss biological factors influencing language development, such as genetics, brain maturation, and neurological conditions.
1321.15.2	Explore environmental influences affecting language development, including socioeconomic status, family dynamics, and cultural backgrounds.
1321.15.3	Investigate how caregivers, educators, and peers influence language development in early childhood.
1321.15.4	Examine how early childhood education programs, bilingualism, and language disorders impact the development of language skills.

Physical Development

1321.16	Explain the stages of fine and gross motor development.
1321.16.1	Distinguish between fine and gross motor skills.
1321.16.2	Explain how these developments progress from infancy through early childhood.
1321.16.3	Compare the typical milestones of motor development across different age groups.
1321.16.4	Create visual aids, like charts or diagrams, to illustrate each stage of fine and gross motor development.
1321.17	Recognize the factors that impact physical development.
1321.17.1	Identify biological factors such as genetics, nutrition, and health status, and their influence on physical growth.
1321.17.2	Examine how environmental elements like access to safe play spaces, participation in various activities, and socioeconomic environments influence physical development.
1321.17.3	Discuss how specific factors, such as access to nutritious food or exposure to certain toxins, affect physical development.
1321.18	Describe strategies and conditions that encourage physical development.

1321.18.1	Explain the importance of providing sufficient opportunities for free play, both indoors and outdoors, to promote physical exploration and gain new skills.
1321.18.2	Discuss the significance of offering varied and developmentally appropriate toys, tools, and environments that support the exploration of different movement patterns and activities.
1321.18.3	Create an ideal play environment that maximizes physical activity and skill development for children, considering safety measures and equipment availability.
1321.19	Select age-appropriate indoor and outdoor play equipment and activities for physical development.
1321.19.1	Assess the developmental needs and abilities of children at different stages to choose suitable equipment and activities.
1321.19.2	Analyze a range of options, including climbing structures, balance beams, balls, and sensory materials, to encourage the development of various motor skills.
1321.19.3	Evaluate existing play equipment and activities in terms of their suitability for different age groups and propose modifications or additions as needed.
1321.20	Describe the effects of play on children's physical development.
1321.20.1	Discuss how active play supports the development of strength, coordination, and sense of space.
1321.20.2	Discuss the role of imaginative play in refining motor skills, fostering creativity, and promoting social interaction.
1321.21	Explain how physical development correlates to social, emotional, and cognitive development.
1321.21.1	Describe how physical experiences, such as playing cooperative games or navigating obstacles, contribute to the development of social skills like teamwork and empathy.
1321.21.2	Discuss how physical challenges and successes can influence a child's self-confidence, resilience, and emotional regulation.
1321.21.3	Explain how activities requiring physical coordination, problem-solving, and decision-making can enhance cognitive abilities such as planning, organizing, and understanding space.
1321.22	Construct purposeful play activities that support essential learning in an early childhood setting.
1321.22.1	Develop activities that focus on enhancing gross motor skills, such as obstacle courses or relay races, and fine motor skills, such as threading beads or using tweezers to pick up objects.
1321.22.2	Design a purposeful play station that encourages children to practice balancing, jumping, throwing, catching, and other fundamental movement skills.
1321.22.3	Design sensory bins filled with materials like rice, sand, or water, along with objects of different textures, sizes, and shapes, to promote tactile exploration and hand-eye coordination.
1321.22.4	Develop activities to engage in sensory-rich experiences while developing fine motor control such as messy play with materials like playdough, clay, or finger paints.
1321.22.5	Design group games and cooperative activities that require children to collaborate, communicate, and problem-solve together, fostering teamwork and social development alongside physical skills.
1321.22.6	Observe children's engagement and participation during play sessions to assess the effectiveness of different activities in promoting physical development and learning.

Social and Emotional Development

1321.23	Discuss teaching techniques that encourage the development of a positive self-concept.
1321.23.1	Explain the concept of self-concept and its importance in early childhood development.
1321.23.2	Implement activities that celebrate individual strengths and accomplishments.
1321.23.3	Develop activities to promote self-expression through storytelling, art, and role-playing.
1321.24	Describe the stages of social and emotional development of children.
1321.24.1	Identify the key milestones associated with social and emotional development in early childhood.
1321.24.2	Summarize the stages of social and emotional development and their typical chronological progression.

1321.24.3	Differentiate the social and emotional development of children at different ages, identifying commonalities and differences.
1321.25	Recognize the factors that impact social and emotional development.
1321.25.1	Identify common factors that influence social and emotional development in early childhood.
1321.25.2	Explain how various factors such as family environment, peer interactions, and cultural background can shape a child's social and emotional development.
1321.25.3	Discuss strategies that help to reduce harmful effects on how people interact and handle their feelings.
1321.25.4	Assess the impact of external factors such as family dynamics or cultural influences on the social and emotional development of children.
1321.26	Discuss caregiving techniques that develop appropriate social skills.
1321.26.1	Explain the role of caregivers in promoting social skills through positive interactions and modeling.
1321.26.2	Demonstrate effective communication techniques for building understanding and trust with children.
1321.26.3	Analyze how different ways of taking care of others affect the ability to learn social skills, including being responsive and consistent, and understanding cultural differences.
1321.27	Identify positive techniques for conflict resolution and mediation.
1321.27.1	Explain the importance of teaching children constructive ways to resolve conflicts and manage disagreements.
1321.27.2	Compare different conflict resolution techniques and their effectiveness in different situations.
1321.27.3	Demonstrate how to use active listening and problem-solving skills to reach a resolution using role-play scenarios.
1321.28	List strategies to promote self-help skills and autonomy.
1321.28.1	Explain the importance of promoting independence and independence in young children.
1321.28.2	Evaluate the relevance of different self-help tasks and strategies based on children's abilities and interests.

Positive Guidance Techniques and Reinforcement

1321.29	Demonstrate positive adult-child communication.
1321.29.1	Identify basic principles of positive communication.
1321.29.2	Describe examples of positive communication strategies.
1321.29.3	Explain why positive communication is important in early childhood settings.
1321.29.4	Summarize key elements of effective adult-child communication.
1321.29.5	Evaluate the impact of positive communication on children's behavior and self-esteem.
1321.30	Describe positive classroom management.
1321.30.1	Identify key strategies for creating a positive classroom environment.
1321.30.2	Explain the importance of positive classroom management in promoting learning and development.
1321.30.3	Describe the role of the teacher in maintaining a positive classroom atmosphere.
1321.30.4	Discuss techniques for setting clear expectations and routines in the classroom.
1321.30.5	Assess the impact of positive classroom management on student engagement and behavior.
1321.30.6	Evaluate the effectiveness of different classroom management strategies in meeting the needs of diverse learners.
1321.30.7	Develop strategies for addressing challenging behaviors in a positive and proactive manner.
1321.31	Identify child guidance techniques.
1321.31.1	Explain the underlying principles of positive guidance.
1321.31.2	Describe the difference between punishment and positive guidance.
1321.31.3	Demonstrate an understanding of how to redirect challenging behaviors using positive reinforcement.
1321.31.4	Evaluate different guidance techniques based on children's individual needs and developmental levels.

1321.31.5	Assess the long-term impact of positive guidance on children's behavior and self-regulation.

Classroom Organization and Arrangement

1321.32	Arrange an age-appropriate classroom environment.
1321.32.1	Observe in an early childhood classroom for a minimum of five hours.
1321.32.2	Examine elements in program design such as décor, furnishings, visual cues, space, etc. in an early childhood setting
1321.32.3	Describe the importance of aesthetics, flexibility, and organization to effective childhood settings
1321.32.4	Describe visual cues that promote independence and decision making in early childhood
1321.32.5	Examine recommendations for color, light, sound, ventilation, and temperature specific for early childhood
1321.32.6	Analyze needs for safety, health and comfort and convenience in an early childhood setting
1321.32.7	Develop activity center plans that address different developmental domains and accommodate varying numbers of children in early childhood
1321.32.8	Identify warning signs for problematic physical environments in an early childhood setting
1321.32.9	Examine the economic and other benefits of universal pre-k.
1321.32.10	Discuss the child assessment system utilized in the pre-k or kindergarten class.
1321.33	Demonstrate awareness of licensing laws and regulations.
1321.33.1	Demonstrate an understanding of relevant laws, regulations, and industry standards relating to early childhood education including Section 504 of the Rehabilitation Act of 1973, Individuals with Disabilities Education Act (IDEA), Family Educational Rights and Privacy Act (FERPA), Title I of the Elementary and Secondary Education Act (ESEA), and Title IX of the Education Amendments of 1972.
1321.33.2	Examine WVDE Policy 2520.15 and discuss curriculum requirements.
1321.33.3	Discuss policies regarding employment in various child development settings, including WV public school systems, Head Start, and types of childcare centers/facilities/settings.
1321.33.4	Analyze WV DHHR Legislative rules regulatory requirements for child day care centers, out-of-school time childcare centers, family daycare facilities, and informal and relative family childcare home registration.
1321.33.5	Describe components of WV Early Learning Standards Framework (ELSF) Domain Areas.
1321.33.6	Correlate current West Virginia Content Standards and Objectives for preschool children to child development domains.
1321.33.7	Utilize the knowledge gained from each domain of child development to describe a comprehensive approach to an early childhood program.
1321.33.8	Explain WV STARS.

Early Childhood Developmentally Appropriate Practices (DAP)

1321.34	Explain Developmentally Appropriate Practices (DAP) in early childhood education settings.
1321.34.1	Describe the fundamental principles of DAP as catalogued by the National Association for the Education of Young Children (NAEYC).
1321.34.2	Encourage DAP independence in daily health and personal care routines.
1321.34.3	Describe developmentally appropriate safety practices such as danger symbols, rules for various settings and responses to potentially harmful situations.
1321.34.4	Communicate with children's parents or guardians about daily activities, behaviors, and related issues.
1321.34.5	Investigate work settings within Early Childhood Education and the application of DAP.

This course provides a comprehensive overview of early childhood education, focusing on the importance of fostering collaborative relationships with families, maintaining professionalism, embracing diversity, promoting inclusion, and understanding school readiness. Students will learn to cultivate strong partnerships with families, develop essential career-related skills, and navigate ethical dilemmas in the field. They will also gain insights into creating inclusive environments for children with diverse needs and crafting personalized plans to support their learning journey. By emphasizing the collective efforts of schools, families, and communities, the course aims to ensure children's overall development and readiness for future academic success. This course requires five hours of field experience observation.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Community and Family Relationships

1322.1	Describe the importance of cooperative relationships with families.
1322.1.1	Identify key reasons why cooperative relationships with families are important.
1322.1.2	Explain how family involvement enhances children's learning experiences.
1322.1.3	Discuss how collaboration with families promotes cultural responsiveness and inclusivity in early childhood settings.
1322.1.4	Design activities that encourage family participation and involvement in children's education.
1322.1.5	Discuss potential barriers to establishing effective partnerships with families and propose solutions.
1322.2	Identify and plan methods of family and community involvement.
1322.2.1	Identify types of family involvement activities, such as workshops, parent-teacher conferences, and family literacy events.
1322.2.2	Explain how specific activities promote family engagement and strengthen the home-school connection.
1322.2.3	Develop methods and strategies for involving families and the community in early childhood programs.
1322.2.4	Analyze data on participation rates in family engagement activities and assess their impact on children's outcomes.
1322.2.5	Develop strategies for barriers to family and community involvement.
1322.3	Describe the components of effective school and home communication.
1322.3.1	Identify common communication channels used in early childhood settings, such as newsletters, emails, and parent-teacher conferences.
1322.3.2	Explain how regular communication promotes parental involvement and support for children's learning.
1322.3.3	Identify common communication challenges faced by families and educators.
1322.3.4	Assess the impact of different communication strategies in fostering school-home partnerships.

Professionalism

1322.4	Identify career-related skills and employment opportunities.
1322.4.1	Define knowledge and performance skills required in the field of early childhood education.
1322.4.2	Identify various employment opportunities available in the early childhood education sector.
1322.4.3	Outline early childhood careers based on educational requirements and job responsibilities.
1322.5	Identify resources for professional development.
1322.5.1	Identify state and national professional organizations and membership benefits such as National Association for the Education of Young Children (NAEYC), Association for Childhood Education

	International (ACEI), National Head Start Association (NHSA), Council for Exceptional Children (CEC), and National Association for Family Child Care (NAFCC)
1322.5.2	Discuss the WV Infant and Toddler Professional Development Program for caregivers.
1322.5.3	Evaluate the effectiveness of various professional development resources in enhancing teaching practices.
1322.6	Recognize the need for self-assessment for continued professional growth.
1322.6.1	Identify personal strengths, weaknesses, and career goals from a self-assessment.
1322.6.2	Generate strategies for ongoing self-assessment and goal setting to enhance professional practices.
1322.7	Explain the role of a child advocate.
1322.7.1	Explain the responsibilities and duties of a child advocate in the context of early childhood education.
1322.7.2	Describe ethical considerations and challenges faced by child advocates.
1322.7.3	Analyze the impact of advocacy on children's rights and well-being.
1322.8	Identify the importance and legal mandates of confidentiality.
1322.8.1	Explain the significance of confidentiality in maintaining trust and professionalism in early childhood settings.
1322.8.2	Identify legal requirements and regulations related to confidentiality in early childhood education.
1322.8.3	Analyze potential consequences of breaching confidentiality.
1322.8.4	Develop strategies for maintaining confidentiality when communicating with families, colleagues, and others.
1322.9	Exhibit appropriate characteristics in an educational team setting.
1322.9.1	Observe in an early childhood classroom for a minimum of five hours.
1322.9.2	Demonstrate effective communication skills when interacting with colleagues, parents, and administrators.
1322.9.3	Collaborate with colleagues to achieve common goals and objectives.
1322.10	Identify research and current issues in the field of child development.
1322.10.1	Evaluate the relevance and credibility of research findings pertaining to early childhood education.
1322.10.2	Analyze how a current issue, such as screen time or nutrition, impacts child development, citing relevant research.
1322.10.3	Critique the validity and reliability of a research article on child development, considering the methods, sample size, and bias.
1322.10.4	Discuss emerging trends and issues in child development and their implications for early childhood education.
1322.11	Apply the NAEYC Code of Ethical Conduct to professional practices.
1322.11.1	Explain the principles outlined in the NAEYC Code of Ethical Conduct.
1322.11.2	Analyze ethical dilemmas commonly faced in early childhood education using the NAEYC Code as a guide.
1322.11.3	Develop strategies for ethical decision-making in challenging situations.
1322.11.4	Evaluate personal professional practices against the standards set forth in the NAEYC Code and identify areas for improvement.

Diversity in the Classroom

1322.12	Identify components of a diverse, multicultural curriculum.
1322.12.1	Identify various cultural heritages or backgrounds. (e.g., factors including nationality, ethnicity, religion, language, traditions)

1322.12.2	Identify resources or materials that represent different cultural perspectives, such as books, toys, music, and art.
1322.12.3	Explain the importance of having a diverse curriculum in early childhood education.
1322.12.4	Discuss how a multicultural curriculum fosters empathy, respect for diversity, and a positive self-identity among children from various cultural backgrounds.
1322.12.5	Examine the potential challenges and opportunities associated with integrating diverse cultural content into the curriculum, such as addressing stereotypes, language barriers, or cultural sensitivities.
1322.13	Display awareness of diversities in family structures.
1322.13.1	Identify different types of family structures (nuclear, extended, single-parent, etc.)
1322.13.2	Explain how diverse family structures can impact a child's development and learning.
1322.13.3	Identify common challenges and strengths associated with various family structures.
1322.13.4	Develop resources and activities to support children from different family backgrounds that will help them feel represented and valued.
1322.14	Describe ways to incorporate children's home language and traditions.
1322.14.1	Explain how language and cultural traditions contribute to a child's identity and sense of belonging.
1322.14.2	Identify potential barriers to incorporating home language and traditions and recommend solutions.
1322.14.3	Assess the effectiveness of activities designed to incorporate children's home language and traditions.

Inclusion of Children with Special Needs

1322.15	Identify characteristics of various types of exceptionalities.
1322.15.1	Explain the defining characteristics of various exceptionalities such as autism spectrum disorder, ADHD, dyslexia, Down syndrome, etc.
1322.15.2	Provide examples of behaviors or traits associated with each exceptional condition.
1322.15.3	Discuss the importance of educators recognizing and understanding exceptionalities to provide appropriate support and accommodations.
1322.15.4	Develop strategies for supporting children with various exceptionalities.
1322.16	Identify concerns and basic rights of children with special needs.
1322.16.1	Discuss the basic rights outlined in legislation such as the Individuals with Disabilities Education Act (IDEA).
1322.16.2	Describe common challenges and obstacles that children with special needs may encounter in educational settings.
1322.16.3	Explore the impact of neglecting the rights of children with special needs.
1322.16.4	Analyze the consequences of failing to uphold the rights of children with special needs on their academic, social, and emotional development.
1322.17	Differentiate the learning environment and curriculum to accommodate special needs.
1322.17.1	Identify key principles of inclusive education such as accessibility, individualization, and collaboration.
1322.17.2	Explain the importance of accommodating special needs in the learning environment.
1322.17.3	Describe how accommodations can support the learning and development of children with special needs.
1322.17.4	Evaluate the effectiveness of different accommodations for specific needs.
1322.17.5	Differentiate between an Individualized Education Plan (IEP) and a 504 plan.
1322.17.6	Summarize the purpose of a Student Assistance Team (SAT).
1322.17.7	Describe the key components and purpose of an Individualized Education Program (IEP).
1322.17.8	Demonstrate how to accurately read and document information within an IEP.
1322.17.9	Describe how each accommodation is intended to support the student's access to education and address their individual needs.
1322.17.10	Describe the key components and purpose of a 504-plan.

1322.17.11	Demonstrate how to accurately read and document information within a 504-plan.

School Readiness

1322.18	Discuss the school readiness framework and promoting the holistic development of young children to ensure they are prepared for success in school and beyond.
1322.18.1	Explain the significance of school readiness in early childhood development.
1322.18.2	Summarize how school readiness impacts children's future academic success.
1322.18.3	Explain how schools, families, and the community each contribute to the overall school readiness of children.

This comprehensive course covers the study of language development and literacy in young children, including a 70-hour field experience. Students explore expressive and receptive language strategies, literacy materials, classroom organization principles, and the Science of Reading, including the five pillars. Through hands-on practice, they develop skills to create enriching learning environments that foster language and literacy growth in early childhood.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Language Development and Communication

1323.1	Describe strategies to encourage expressive and receptive language.
1323.1.1	Identify various techniques to stimulate expressive language, such as storytelling, role-playing, or puppetry.
1323.1.2	Explain how storytelling enhances expressive language by encouraging creativity and vocabulary development.
1323.1.3	Describe how modeling language use during play activities helps children understand and absorb language.
1323.1.4	Design interactive activities that promote back-and-forth communication between children and adults.
1323.1.5	Analyze how environmental factors, such as noise level or group size, affect the effectiveness of receptive language strategies.
1323.2	Identify materials that encourage and support literacy skills.
1323.2.1	Identify books, both fiction and non-fiction, appropriate for early childhood education.
1323.2.2	Explain how books with colorful illustrations and simple texts support early reading comprehension.
1323.2.3	Identify educational games, puzzles, and digital resources like educational apps or interactive websites designed to enhance literacy skills.
1323.2.4	Describe how educational games can reinforce letter recognition and phonics skills.
1323.2.5	Explain how interactive digital resources engage children in learning letters, sounds, and vocabulary.
1323.2.6	Compare the benefits of hands-on materials versus digital resources in promoting literacy skills.
1323.3	Demonstrate effective literacy strategies.
1323.3.1	Explain how reciting rhymes and songs helps children recognize and manipulate sounds in language.
1323.3.2	Explain how modeling writing activities fosters fine motor skills and letter recognition.
1323.3.3	Analyze how different strategies impact children's literacy skills development.
1323.4	Describe various methods of story presentation.
1323.4.1	Explain how oral storytelling promotes listening skills, imagination, and cultural appreciation.
1323.4.2	Explain how reading aloud from a book enhances vocabulary, comprehension, and print awareness.
1323.4.3	Demonstrate the handling and viewing of a book.
1323.4.4	Develop strategies for presenting and exploring literature in early childhood.
1323.4.5	Develop strategies for literacy performance, including oral reading and dramatic interpretation, and apply them to various genres.
1323.4.6	Evaluate bias in children's literature and make decisions concerning book choice and presentation.
1323.4.7	Compare the accessibility and inclusivity of traditional versus modern storytelling methods.

Observation, Documentation, and Assessment

1323.5	Identify observation purposes, techniques, and tools.
1323.5.1	Participate in an early childhood classroom for a minimum of 70 hours.
1323.5.2	Explain the purpose of observation in early childhood education, such as assessing developmental milestones, understanding individual needs, and informing curriculum planning.
1323.5.3	Utilize different observation tools such as checklists, rating scales, and portfolios to document children's behavior and progress in different areas of development.
1323.5.4	Compare and contrast observation purposes, techniques, and tools, evaluating their appropriateness for different contexts and age groups.
1323.6	Observe and record children's developmental learning.
1323.6.1	Explain the significance of observing and documenting children's developmental learning in early childhood education.
1323.6.2	Analyze recorded observations to identify patterns, strengths, and areas for improvement in children's development.
1323.7	Interpret, communicate, and apply observation results.
1323.7.1	Discuss observation data by identifying trends, progress, and areas of concern in children's development.
1323.7.2	Analyze observation findings to identify potential developmental delays or areas requiring further assessment or intervention.
1323.7.3	Use observation results to inform individualized planning and instruction, adapting activities and materials to meet children's specific needs.
1323.8	Identify various age-appropriate assessment methods.
1323.8.1	Explain the purpose of age-appropriate assessment methods in monitoring children's progress and informing instructional practices.
1323.8.2	Identify assessment methods suitable for different age groups and developmental stages, considering cultural and individual differences.

Classroom Organization and Arrangement

1323.9	Prepare and maintain materials and equipment storage.
1323.9.1	Identify types of materials and equipment required for early childhood activities.
1323.9.2	Explain the importance of proper storage for materials and equipment in an early childhood classroom.
1323.9.3	Arrange materials and equipment in designated storage areas according to safety and accessibility guidelines.
1323.9.4	Develop a comprehensive plan for organizing and maintaining materials and equipment storage that includes labeling systems and inventory checks.
1323.10	Identify characteristics of a balanced daily schedule.
1323.10.1	Summarize the importance of structure and routine in a balanced daily schedule for young children.
1323.10.2	Explain how a balanced daily schedule supports children's physical, cognitive, social, and emotional development.
1323.10.3	Create a sample daily schedule incorporating various activities such as play, learning, rest, and outdoor time.
1323.10.4	Create a flexible template that can be customized to meet the unique needs of different groups of children.
1323.11	Implement developmentally appropriate activities.
1323.11.1	Explain the principles behind selecting and adapting activities to meet the developmental needs of young children.

1323.11.2	Demonstrate the ability to effectively implement activities that promote physical, cognitive, social, and emotional development.
1323.11.3	Evaluate the alignment between activity objectives and children's developmental milestones.
1323.12	Describe a variety of transition-time activities.
1323.12.1	List common transition times during a typical day in an early childhood classroom.
1323.12.2	Explain the importance of smooth transitions in maintaining a positive classroom environment.
1323.12.3	Demonstrate the use of transition-time activities such as songs, games, and simple exercises to ease transitions between activities.
1323.13	Identify recordkeeping and clerical functions in a childcare setting.
1323.13.1	Discuss the specific types of records and documents required by regulatory agencies and parents.
1323.13.2	Explain the legal and ethical responsibilities associated with maintaining accurate records in a childcare setting.
1323.13.3	Explain the role of recordkeeping in monitoring children's progress, identifying trends, and informing instructional planning.

Creativity

1323.14	Identify strategies for facilitating creative experiences.
1323.14.1	Identify strategies for promoting creativity in early childhood education such as brainstorming, open-ended questioning, role-playing, and storytelling.
1323.14.2	Explain why each strategy is important for nurturing creativity in young children, understanding how they stimulate imagination, problem-solving, and self-expression.
1323.14.3	Analyze how different strategies may need to be adapted for various age groups or cultural contexts, considering factors like developmental stages and resources available.
1323.15	Display or present creative products.
1323.15.1	Discuss creative products or other expressions made by young children such as artwork, storytelling, and imaginative play.
1323.15.2	Discuss the importance of providing opportunities for children to showcase their work, such as promoting self-esteem, fostering a sense of accomplishment, and willingness to engage in future creative activities.
1323.16	Identify appropriate materials and equipment that encourage creative development.
1323.16.1	Identify items commonly found in creative learning environments such as art supplies, building blocks, musical instruments, and play props.
1323.16.2	Explain how specific materials like clay or paint develop sensory exploration, while others like blocks or puzzles encourage problem-solving and understanding of space.
1323.17	Explain sensory activities and supporting materials.
1323.17.1	Identify activities such as finger painting, sensory bins, nature walks, or water play that engage multiple senses and promote exploration.
1323.17.2	Discuss how sensory activities help children develop cognitive, social-emotional, and physical skills by engaging their senses and encouraging hands-on exploration.
1323.17.3	Create sensory-rich activities that incorporate a variety of materials like textured fabrics, scented playdough, or musical instruments, considering the developmental needs and interests of children.
1323.17.4	Evaluate the effectiveness of different sensory activities in meeting specific learning objectives.

Science of Reading

1323.18	Explain the Science of Reading.
1323.18.1	Define the Science of Reading.

1323.18.2	Explain how the brain processes reading.
1323.19	Discuss the five pillars of reading.
1323.19.1	Define each of the five pillars of reading.
1323.19.2	Explain how each pillar contributes to proficient reading.
1323.19.3	Explain how deficiencies in any of the pillars can impact reading development.
1323.20	Develop strategies to support the connection between reading, writing, and comprehension.
1323.20.1	Discuss the connection between reading, writing, and comprehension.
1323.20.2	Explain phonemic awareness and phonics.
1323.20.3	Analyze the relationship between vocabulary development and reading comprehension.
1323.20.4	Describe how reading fluency impacts writing proficiency.
1323.20.5	Explain how writing can enhance reading comprehension.
1323.20.6	Create activities targeting specific pillars to improve reading skills.
1323.20.7	Develop instructional materials or lesson plans incorporating the five pillars of reading.

This course covers the fundamental math skills for young children. Emphasis is placed on understanding numeracy concepts, developing effective numeracy strategies through play, and addressing challenges such as dyscalculia. Students will engage in a 70-hour field experience to observe, document, and assess children's developmental learning, utilizing various observation techniques and assessment methods. Additionally, the course covers classroom organization and arrangement, including preparing materials, maintaining a balanced daily schedule, implementing developmentally appropriate activities, facilitating smooth transitions, and managing recordkeeping and clerical functions in childcare settings.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Observation, Documentation, and Assessment

1324.1	Identify observation purposes, techniques, and tools.
1324.1.1	Participate in an early childhood classroom for a minimum of 70 hours.
1324.1.2	Explain the purpose of observation in early childhood education, such as assessing developmental milestones, understanding individual needs, and informing curriculum planning.
1324.1.3	Utilize different observation tools such as checklists, rating scales, and portfolios to document children's behavior and progress in different areas of development.
1324.1.4	Compare and contrast observation purposes, techniques, and tools, evaluating their appropriateness for different contexts and age groups.
1324.2	Observe and record children's developmental learning.
1324.2.1	Explain the significance of observing and documenting children's developmental learning in early childhood education.
1324.2.2	Analyze recorded observations to identify patterns, strengths, and areas for improvement in children's development.
1324.3	Interpret, communicate, and apply observation results.
1324.3.1	Discuss observation data by identifying trends, progress, and areas of concern in children's development.
1324.3.2	Analyze observation findings to identify potential developmental delays or areas requiring further assessment or intervention.
1324.3.3	Use observation results to inform individualized planning and instruction, adapting activities and materials to meet children's specific needs.
1324.4	Identify various age-appropriate assessment methods.
1324.4.1	Explain the purpose of age-appropriate assessment methods in monitoring children's progress and informing instructional practices.
1324.4.2	Identify assessment methods suitable for different age groups and developmental stages, considering cultural and individual differences.

Classroom Organization and Arrangement

1324.5	Prepare and maintain materials and equipment storage.
1324.5.1	Identify types of materials and equipment required for early childhood activities.
1324.5.2	Explain the importance of proper storage for materials and equipment in an early childhood classroom.
1324.5.3	Arrange materials and equipment in designated storage areas according to safety and accessibility guidelines.

1324.5.4	Develop a comprehensive plan for organizing and maintaining materials and equipment storage that includes labeling systems and inventory checks.
1324.6	Identify characteristics of a balanced daily schedule.
1324.6.1	Summarize the importance of structure and routine in a balanced daily schedule for young children.
1324.6.2	Explain how a balanced daily schedule supports children's physical, cognitive, social, and emotional development.
1324.6.3	Create a sample daily schedule incorporating various activities such as play, learning, rest, and outdoor time.
1324.6.4	Create a flexible template that can be customized to meet the unique needs of different groups of children.
1324.7	Implement developmentally appropriate activities.
1324.7.1	Explain the principles behind selecting and adapting activities to meet the developmental needs of young children.
1324.7.2	Demonstrate the ability to effectively implement activities that promote physical, cognitive, social, and emotional development.
1324.7.3	Evaluate the alignment between activity objectives and children's developmental milestones.
1324.8	Describe a variety of transition-time activities.
1324.8.1	List common transition times during a typical day in an early childhood classroom.
1324.8.2	Explain the importance of smooth transitions in maintaining a positive classroom environment.
1324.8.3	Demonstrate the use of transition-time activities such as songs, games, and simple exercises to ease transitions between activities.
1324.9	Identify recordkeeping and clerical functions in a childcare setting.
1324.9.1	Discuss the specific types of records and documents required by regulatory agencies and parents.
1324.9.2	Explain the legal and ethical responsibilities associated with maintaining accurate records in a childcare setting.
1324.9.3	Explain the role of recordkeeping in monitoring children's progress, identifying trends, and informing instructional planning.

Basic Math Skills

1324.10	Identify the important concepts in early numeracy.
1324.10.1	Define numeracy.
1324.10.2	Develop number recognition techniques.
1324.10.3	Explain the correlation of counting and cardinality.
1324.10.4	Explain the Mathematical Habits of Mind.
1324.11	Discuss growth mindset and dyscalculia.
1324.11.1	Discuss the characteristics and challenges associated with dyscalculia.
1324.11.2	Discuss the impact of growth mindset on children's mathematical development.
1324.12	Demonstrate effective numeracy strategies.
1324.12.1	Demonstrate basic math skills through play.
1324.12.2	Identify strategies for recognizing and describing shapes and space.
1324.12.3	Develop early learning addition and subtraction activities using objects.

This course introduces students to accounting and covers accounting practices and principles. Students will explore accounting topics, including the foundational accounting equation, double-entry bookkeeping, transaction analysis, ledger posting, payroll preparation, cash and banking procedures, and the completion of the accounting cycle. Students will also explore advanced topics such as computerized accounting systems, internal controls, and the application of accounting in various business contexts. Through hands-on exercises and projects, students will develop practical skills and gain a foundational understanding of accounting, preparing them for further study in the finance cluster.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Journalizing

1401.1	Apply the accounting equation to journalize an opening entry.
1401.1.1	Explain the accounting equation (Assets = Liabilities + Owner's Equity) and its importance in maintaining financial balance.
1401.1.2	Identify the components needed for an opening entry, including initial assets, liabilities, and owner's equity.
1401.1.3	Apply the accounting equation to journalize an opening entry accurately, recording initial balances for assets, liabilities, and owner's equity in the general journal.
1401.2	Follow principles of double-entry bookkeeping in the journalizing process.
1401.2.1	Understand the basic principles of double-entry bookkeeping.
1401.2.2	Explain how each transaction affects at least two accounts and maintains the accounting equation.
1401.2.3	Distinguish between debit and credit entries.
1401.2.4	Explain how debit and credits affect different types of accounts (assets, liabilities, and equity).
1401.2.5	Apply double-entry bookkeeping principles to journalize various financial transactions accurately.
1401.2.6	
1401.3	Analyze transactions involving owner's equity.
1401.3.1	Identify different types of transactions that affect owner's equity, such as investments, withdrawals, revenues, and expenses.
1401.3.2	Understand how various transactions increase or decrease owner's equity, and how these changes are reflected in the accounting equation.
1401.3.3	Analyze transactions involving owner's equity and accurately record them in the journal
1401.3.4	Explain how transactions involving owner's equity impact the overall financial position of the business.

Posting

1401.4	Post to general and subsidiary ledger accounts.
1401.4.1	Understand the purpose and structure of both general and subsidiary ledger accounts.
1401.4.2	Explain how ledgers are used to organize and summarize financial information.
1401.4.3	Demonstrate how to post journal entries to the appropriate general and subsidiary ledger accounts.
1401.4.4	Demonstrate how to maintain accurate balances in general and subsidiary ledger accounts by regularly updating them with posted transactions and verifying that the totals are consistent with the journal entries.
1401.5	Demonstrate understanding of multicolumn ledgers.

1401.5.1	Understand the structure and purpose of multicolumn ledgers.
1401.5.2	Differentiate single-column ledgers and multicolumn ledgers, including the advantages they offer in organizing financial data.
1401.5.3	Explain how debits and credits are properly allocated across multiple columns.
1401.5.4	Record various types of financial transactions in multicolumn ledgers.
1401.5.5	Analyze and summarize financial data using multicolumn ledgers.
1401.5.6	Explain how to use the information from multicolumn ledgers to prepare financial statements and reports.
1401.6	Demonstrate familiarity with computerized posting methods.
1401.6.1	Understand the basics of computerized accounting systems.
1401.6.2	Compare and contrast computerized accounting systems to manual accounting methods. (e.g., features, advantages, and differences)
1401.6.3	Create financial transactions in computerized accounting software to accurately record data.
1401.6.4	Generate financial reports using computerized accounting systems. (e.g., ledgers, trial balances, and financial statements)
1401.6.5	Interpret computerized accounting records and data to assess the financial position of a business.
1401.7	Reconcile subsidiary to general ledgers.
1401.7.1	Explain how transactions in subsidiary ledgers aggregate into the general ledger.
1401.7.2	Identify and analyze discrepancies between subsidiary ledgers and the general ledger.
1401.7.3	Explain how common errors can occur and the impact on financial statements.
1401.7.4	Perform reconciliation procedures to ensure that subsidiary ledger balances match the corresponding general ledger accounts.
1401.8	Use appropriate posting references.
1401.8.1	Understand the purpose of posting references in the accounting process.
1401.8.2	Explain how posting references help track the origin and destination of financial entries.
1401.8.3	Apply appropriate posting references when recording transactions in journals and ledgers.
1401.8.4	Explain the importance of traceability and paper trail regarding posting and posting references.
1401.8.5	Verify the accuracy of posting references by cross-checking entries between journals and ledgers, ensuring that all transactions are correctly documented and easily traceable.

Payroll Preparation

1401.9	Calculate employee earnings, including salary, hourly, overtime, and commission.
1401.9.1	Calculate employee earnings based on salary and hourly wages, understanding how to determine gross earnings using specified rates and hours worked.
1401.9.2	Compute earnings for overtime hours and commission-based payments.
1401.9.3	Apply appropriate formulas to determine total earnings.
1401.10	Demonstrate familiarity with electronic payroll data entry.
1401.10.1	Understand the basics of electronic payroll systems. (e.g., purpose, benefits, and how they streamline the process)
1401.10.2	Navigate the interface of a payroll software program.
1401.11	Complete payroll register.
1401.11.1	Understand the purpose of a payroll register.
1401.11.2	Describe how a payroll register assists with summarizing and organizing payroll information for individual employees.

1401.11.3	Demonstrate how to enter employee payroll data into a payroll register, including information such as employee names, hours worked, rates of pay, deductions, and net pay.
1401.11.4	Calculate and verify totals in the payroll register. (e.g., gross wages, deductions, and net pay)
1401.12	Prepare a payroll check and check stub with appropriate information.
1401.12.1	Understand the components of a payroll check and check stub.
1401.12.2	Prepare a payroll check and check stub with appropriate information
1401.12.3	Discuss the importance of payroll records.
1401.12.4	Discuss payroll legal requirements.
1401.13	Record information found on W-4 forms in employee data section.
1401.13.1	Understand the purpose of the W-4 form.
1401.13.2	Discuss how employers to determine federal income tax withholding for employees.
1401.13.3	Identify key information found on W-4 forms. (e.g., employee name, address, filing status, allowances, and additional withholding requests)
1401.13.4	Record employee information in the employee data section.
1401.13.5	Explain the importance of accurately recording W-4 information in employee records.
1401.13.6	Formulate federal income tax withholding.
1401.13.7	Discuss the relationship between the IRS and W-4 form.
1401.14	Calculate appropriate employee payroll taxes.
1401.14.1	Understand the components of employee payroll taxes, including federal income tax, FICA (Social Security and Medicare) taxes, and state/local income taxes.
1401.14.2	Calculate federal income tax withholding based on employee W-4 information, using appropriate tax tables or formulas provided by the IRS.
1401.14.3	Compute FICA taxes (Social Security and Medicare) based on employee earnings.
1401.15	Calculate appropriate employer payroll tax liabilities.
1401.15.1	Understand the various types of employer payroll taxes, including federal and state unemployment taxes, Social Security taxes (FICA), and Medicare taxes.
1401.15.2	Understand the applicable rates, wage base limits, and any credits or adjustments that may apply.
1401.15.3	Calculate federal and state unemployment taxes (FUTA and SUTA).
1401.15.4	Compute employer contributions for Social Security and Medicare taxes (FICA).
1401.16	Determine appropriate deposit dates and documentation and prepare federal tax forms.
1401.16.1	Understand the importance of determining appropriate deposit dates for employer payroll taxes.
1401.16.2	Identify the required documentation needed for accurate reporting.
1401.16.3	Calculate the amount of employer payroll taxes owed.
1401.16.4	Prepare federal tax forms related to employer payroll taxes. (e.g., Form 941 Employer's Quarterly Federal Tax Return)
1401.16.5	Discuss employer's completion and compliance with IRS requirements.
1401.17	Journalize payroll entries at end of earnings period in general journal.
1401.17.1	Understand the purpose of journalizing payroll entries in the general journal.
1401.17.2	Journalize payroll transactions in the general journal.
1401.17.3	Apply appropriate debit and credit entries to record employee earnings, withholdings, and employer liabilities accurately.

Cash and Banking Procedures

1401.18	Complete check stubs and check.
1401.18.1	Calculate and accurately record payroll information on a check stub.
1401.18.2	Prepare and issue a physical or electronic check based on the information recorded on the check stub.

1401.19	Enter appropriate data on a deposit slip.
1401.19.1	Effectively handle financial transactions and understand the importance of accurate data entry in accounting and financial management contexts.
1401.20	Reconcile a bank statement.
1401.20.1	Compare transactions, adjust the check register or ledger for reconciling items, and ensure that both balances match.
1401.21	Demonstrate familiarity with online and electronic banking procedures.
1401.22	Demonstrate proficiency in conducting electronic banking transactions.
1401.23	Exhibit understanding of credit cards and/or debit cards.
1401.23.1	Compare and Contrast credit and debit cards in their relation to financial institutions.
1401.23.2	Explain how credit card balances appear as liabilities on the balance sheet until paid, impacting cash flow and financial health.
1401.23.3	Discuss how debit card transactions affect the cash balance and influence financial decisions.
1401.23.4	Demonstrate proficiency in recording and reconciling credit card and debit card transactions.
1401.24	Manage multiple bank accounts and transactions.
1401.24.1	Organize and track transactions across multiple bank accounts.
1401.24.2	Reconcile account balances, monitor transaction histories, and analyze bank statements to ensure financial stability and security.
1401.25	Reconcile and replenish petty cash funds.
1401.25.1	Accurately record petty cash transactions, including disbursements and replenishments, ensuring that the petty cash ledger reflects the actual fund balance.

Completion of Accounting Cycle

1401.26	Complete 8 or 10 column worksheets.
1401.26.1	Explain the role of 8 or 10 column worksheets in preparing financial statements and ensuring accuracy in accounting records.
1401.26.2	Understand the structure of a 8 or 10-column worksheet.
1401.26.3	Record adjustments in the appropriate columns of an 8 or 10 column worksheet
1401.26.4	Demonstrate ability to organize and summarize financial data effectively using 8 or 10 column worksheets.
1401.27	Prepare the financial statements from a completed worksheet.
1401.27.1	Identify the key components of financial statements. (e.g., income statement, balance sheet, and statement of owner's equity)
1401.27.2	Exhibit how to accurately transfer data from a completed worksheet to the appropriate financial statements.
1401.27.3	Generate complete financial statements (income statement, balance sheet, and statement of owner's equity) from a completed worksheet.
1401.28	Verify the financial statements against the worksheet for accuracy.
1401.28.1	Understand the process and importance of verifying financial statements against the completed worksheet to ensure accuracy and consistency in financial reporting.
1401.28.2	Compare figures in the financial statements (income statement, balance sheet, and statement of owner's equity) with the corresponding data in the worksheet
1401.28.3	Demonstrate how to ensure consistency and accuracy in the financial statements by cross-referencing totals and individual line items with the completed worksheet.
1401.29	Record and post adjusting and closing entries.
1401.29.1	Understand the purpose and importance of adjusting and closing entries in the accounting cycle.

1401.29.2	Explain how entries affect the accuracy of financial statements and the resetting of accounts for the new accounting period.
1401.29.3	Record adjusting entries in the general journal to account for items such as accrued expenses, accrued revenues, depreciation, and inventory adjustments.
1401.29.4	Describe the importance of ensuring that all temporary accounts are closed and their balances transferred to permanent accounts.
1401.29.5	Exhibit how to post adjusting and closing entries from the general journal to the general ledger
1401.29.6	Prepare accounts for the next accounting period.
1401.30	Locate and correct accounting errors.
1401.30.1	Identify common types of accounting errors. (e.g., transposition errors, omission errors, and posting errors)
1401.30.2	Understand the impact of accounting errors on financial statements.
1401.30.3	Apply appropriate methods to locate and correct accounting errors, including using trial balances, journal entries, and systematic error-checking techniques.
1401.30.4	Verify the accuracy of corrected entries and financial statements.
1401.30	Prepare post-closing trial balance from general ledger.
1401.30.1	Understand the purpose of a post-closing trial balance in the accounting cycle.
1401.30.2	Discuss the significance in verifying the accuracy of closing entries and preparing for the next accounting period.
1401.30.3	Distinguish between permanent (real) accounts and temporary (nominal) accounts in the general ledger.
1401.30.4	Explain the relationship between permanent accounts and their respective balances.
1401.30.5	Prepare a post-closing trial balance from the general ledger
1401.30.6	Demonstrate how to ensure total debits equal total credits to confirm that the ledger is in balance.

Identification and Application of Source Data

1401.31	Identify and locate appropriate business forms used in bookkeeping and/or accounting.
1401.31.1	Identify various types of business forms used in accounting, such as invoices, purchase orders, and payroll forms.
1401.32	Apply procedures for using electronic data for various bookkeeping and/or accounting procedures.
1401.32.1	Demonstrate proficiency in using electronic data entry methods for recording financial transactions.
1401.32.2	Generate and interpret reports from electronic accounting systems to analyze financial data.
1401.33	Interpret and identify information contained in source documents.
1401.33.1	Classify various types of source documents used in accounting.
1401.33.2	Interpret the information presented in source documents, including dates, amounts, descriptions, and account references, to understand the details of financial transactions.
1401.33.3	Use information from source documents to accurately record transactions in accounting journals or software

Security

1401.34	Exhibit familiarity with the internal controls for sensitive source documents.
1401.34.1	Identify sensitive source documents in accounting.
1401.34.2	Explain the purpose and importance of internal control procedures for handling sensitive source documents.
1401.35	Exhibit familiarity with the internal controls for e-commerce.

1401.35.1	Identify key internal controls specific to e-commerce transactions, such as authentication procedures, encryption protocols, and secure payment processing methods.
1401.35.2	Explain why internal controls are essential in e-commerce environments to mitigate risks.
1401.36	Exhibit familiarity with the internal controls for the protection of company assets and property.
1401.36.1	Identify various types of assets and property owned by a company, such as inventory, equipment, buildings, and intellectual property.
1401.36.2	Explain the purpose and importance of internal control procedures for protecting company assets and property.
1401.37	Exhibit familiarity with confidentiality and ethics.
1401.37.1	Understand the importance of confidentiality in accounting practices.
1401.37.2	Discuss ethical considerations in accounting.

Basic Accounting and Knowledge Skills

1401.38	Exhibit understanding of terminology relating to accounting.
1401.38.1	Define assets, liabilities, equity, revenue, expenses, gains, and losses in the context of accounting.
1401.38.2	Identifying assets, liabilities, equity, revenue, expenses, gains, and losses distinctive characteristics and understanding how they affect the financial position and performance of an entity.
1401.39	Exhibit understanding of careers in accounting.
1401.39.1	Describe various career opportunities available within the accounting profession, including roles, responsibilities, and potential career paths.
1401.39.2	Research certificate/degree requirements within the accounting profession.
1401.39.3	Explain career opportunities outside of the accounting profession.
1401.40	Exhibit understanding of regulatory bodies.
1401.40.1	Identify key regulatory bodies relevant to accounting, such as the Securities and Exchange Commission (SEC), Financial Accounting Standards Board (FASB), and Internal Revenue Service (IRS).
1401.40.2	Explain the roles and responsibilities of regulatory bodies in setting accounting standards, enforcing compliance with financial reporting regulations, and protecting investors and stakeholders.
1401.40.3	Discuss the impact of regulatory guidelines on financial reporting practices and ethical considerations in accounting.
1401.41	Demonstrate ability to use calculator, 10 key, and computer.
1401.41.1	Demonstrate proficiency in using a standard calculator for basic accounting calculations.
1401.41.2	Exhibit mastery in using a 10-key pad by touch, performing common accounting tasks.
1401.41.3	Utilize computer-based accounting software and spreadsheet applications to perform various accounting tasks.
1401.42	Identify various business entities.
1401.42.1	Identify and describe the characteristics of various business entities, including sole proprietorships, partnerships, corporations, and limited liability companies (LLCs).
1401.43	Determine classification of accounts and identify normal balances.
1401.43.1	Classify various types of accounts (assets, liabilities, equity, revenue, and expenses) used in accounting.
1401.43.2	Explain different types of accounts role in the accounting cycle.
1401.43.3	Explain the normal balances (debit or credit) for different types of accounts
1401.43.4	Apply the knowledge of account classifications and normal balances to record and analyze financial transactions accurately in the general ledger.
1401.44	Generate and interpret spreadsheets, charts, and graphs.
1401.44.1	Use spreadsheet software to create detailed accounting spreadsheets.
1401.44.2	Use templates in spreadsheet software to creating various accounting documents.

1401.44.3	Develop proficient skills in advanced spreadsheet functions.
1401.44.4	Generate various types of charts and graphs (e.g., bar charts, pie charts, line graphs) from financial data within spreadsheets.
1401.44.5	Display trends, comparisons, and other key financial metrics using spreadsheets.
1401.44.6	Analyze and interpret the information presented in spreadsheets, charts, and graphs.
1401.44.7	Explain how the visual representations of data can inform business decisions, highlight financial performance, and identify trends.

This advanced high school accounting course is designed to build upon foundational accounting principles and focus on specialized topics, including merchandise inventory, corporate accounting, partnership accounting, sole proprietorship accounting, managerial accounting, cost accounting, and income taxation. Students will gain hands-on experience with both perpetual and periodic inventory systems, corporate financial management, partnership formation and operation, sole proprietorship management, and the application of cost accounting in manufacturing. Additionally, students will develop practical skills in utilizing computer-based accounting software to manage and analyze financial data efficiently.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Merchandise Inventory

1403.1	Demonstrate knowledge of a merchandise inventory account using perpetual and periodic methods.
1403.1.1	Understand the differences between perpetual and periodic inventory systems
1403.1.2	Differentiate how each method tracks and values merchandise inventory.
1403.1.3	Develop perpetual inventory procedures, including recording inventory purchases, sales, and adjustments.
1403.2	Analyze effects on accounts by the purchase of goods.
1403.2.1	Understand how the purchase of goods affects accounts, including inventory, accounts payable, and cost of goods sold (COGS).
1403.2.2	Record purchase transactions in the general journal, reflecting changes in inventory valuation, liabilities, and expenses.
1403.2.3	Analyze financial statements to evaluate the impact of goods purchases on key accounting ratios, such as gross profit margin and inventory turnover.
1403.3	Calculate the cost of goods sold.
1403.3.1	Calculate the cost of goods sold using the periodic inventory method.
1403.4	Prepare to adjust entries based on physical inventory.
1403.4.1	Understand the importance of conducting physical inventory counts to verify the accuracy of inventory records.
1403.4.2	Demonstrate proficiency in recording adjusting entries for inventory adjustments, ensuring accurate financial reporting and compliance with accounting principles.
1403.5	Calculate for obsolete or a shrinkage of inventory.
1403.5.1	Identify obsolete inventory items and calculate the amount to be written off based on estimates of market value or disposal costs.
1403.5.2	Demonstrate proficiency in calculating shrinkage losses.

Business Accounting

1403.6	Demonstrate proficiency in understanding and applying principles of corporate accounting.
1403.6.1	Identify the methods for forming a corporation and complete the various steps of the accounting cycle for a corporation or for a not-for-profit business.
1403.6.2	Describe the purposes of the revenue, expense, and drawing accounts and illustrate the effects on capital/owner's or stockholder's equity.
1403.6.3	Describe the different levels of liability and taxation for Subchapter S Corporations and Limited Liability Corporations.

1403.6.4	Research consolidations for subsidiaries, intercompany transactions, and segment reporting in corporate financial statements.
1403.6.5	Determine stockholder's equity and earnings per share and prepare a statement of stockholders' equity for a corporation.
1403.6.6	Calculate and record dividends declared and paid.
1403.6.7	Describe the different classes of stock and explain the rights afforded each class of stock.
1403.6.8	Prepare journal entries for capital stock issuance, organization costs, stock subscriptions, and dividend declaration and payment to stockholders.
1403.6.9	Differentiate between stock splits and stock dividends and explain how each affect equity.
1403.6.10	Record issuance and retirement of common stock and preferred stock.
1403.7	Demonstrate proficiency in understanding and applying principles of partnership accounting.
1403.7.1	Explain the formation process of partnerships.
1403.7.2	Describe the roles and responsibilities of partners, including management rights, decision-making processes, and duties under partnership law.
1403.7.3	Create financial statements for partnerships.
1403.7.4	Record and analyze contributions of assets and services by partners, understanding the impact on partnership capital accounts
1403.7.5	Calculate and distribute partnership profits and losses using various methods, such as the income ratio, capital ratio, or a specific agreement basis.
1403.7.6	Prepare partnership financial statements, including the statement of partnership equity and the allocation of income statement items to partners.
1403.7.7	Interpret and analyze partnership financial statements to evaluate financial performance and liquidity.
1403.7.8	Explain the accounting treatment for changes in partnership ownership, retirement of partners, and liquidation of partnerships.
1403.7.9	Understand the basics of partnership taxation, including the allocation of partnership income and deductions to partners
1403.8	Demonstrate proficiency in understanding and applying principles of sole proprietorship accounting.
1403.8.1	Record and classify business transactions for a sole proprietorship using double-entry accounting principles, including assets, liabilities, owner's equity, revenue, and expenses
1403.8.2	Explain the relationship between the owner's equity accounts and the financial position of the business.
1403.8.3	Develop and implement basic budgeting techniques to monitor and control expenses and optimize financial resources.
1403.8.4	Understand the basics of tax reporting for sole proprietorships, including income tax obligations and deductions allowable for business expenses.
1403.8.5	Discuss the reporting requirements for Schedule C (Profit or Loss from Business) and self-employment tax considerations.

Managerial Accounting

1403.9	Compute financial ratios and analyze financial statements using horizontal analysis, vertical analysis, and commonly used financial ratios.
1403.9.1	Calculate and interpret commonly used financial ratios such as liquidity ratios (current ratio, acid-test ratio), profitability ratios (return on assets, return on equity), and leverage ratios (debt-to-equity ratio).
1403.9.2	Analyze how changes in independent variables (e.g., sales volume, price levels) impact dependent variables (e.g., net income, earnings per share).
1403.10	Analyze transactions and journalize entries for accounts receivable and accounts payable.
1403.10.1	Understand notes payable/receivable.

1403.10.2	Discuss methods for managing uncollectible accounts.
1403.10.3	Journalize purchases of merchandise on account, compute net purchases, post to ledger accounts, and reconcile subsidiary ledgers through a schedule of accounts payable.
1403.10.4	Record and journalize entries for writing off uncollectible accounts using the direct write-off and allowance methods.
1403.10.5	Prepare adjustments using aging of accounts receivable and percentage methods to estimate uncollectible accounts.
1403.11	Prepare budgets, analyze variances, and calculate cash flows to support financial planning and decision-making.
1403.11.1	Review revenues, expenditures, trends, and priorities to prepare a comprehensive budget.
1403.11.2	Create master and flexible budgets and describe their respective uses in financial planning and performance evaluation.
1403.11.3	Compare actual financial results with budgeted amounts through the preparation of performance reports.
1403.11.4	Use cost-volume-profit analysis and contribution margin analysis to assist in operational planning.
1403.11.5	Utilize spreadsheet software to perform budget analysis and variance calculations.
1403.11.6	Calculate and prepare cash flow statements, distinguishing cash flows from operating, investing, and financing activities.
1403.12	Apply cost accounting principles to calculate manufacturing costs, allocate overhead, and analyze cost behaviors in manufacturing businesses.
1403.12.1	Interpret and explain unique costs and accounts in the manufacturing process, such as direct materials, direct labor, and factory overhead.
1403.12.2	Calculate the cost of goods manufactured by determining direct materials, direct labor, and factory overhead costs.
1403.12.3	Use various allocation methods to allocate overhead and indirect costs to products.
1403.12.4	Differentiate between variable, fixed, and mixed costs and apply them in cost-volume-profit and cost-revenue analysis.
1403.12.5	Utilize appropriate software to maintain cost accounting records for manufacturing operations.
1403.13	Apply accounting principles in a departmentalized setting to manage transactions, prepare financial statements, and maintain payroll records.
1403.13.1	Define key terminology related to departmentalized accounting and its application in business operations.
1403.13.2	Journalize departmental transactions including purchases, cash payments, sales, and cash receipts using specialized journals.
1403.13.3	Create departmental statements of gross profit, financial statements, and end-of-period work for managerial analysis.
1403.13.4	Utilize appropriate software applications to manage and maintain departmentalized accounting records effectively.
1403.14	Depreciation and amortization methods.
1403.14.1	Understand depreciation and amortization.
1403.14.2	Explain asset allocation, useful life, salvage value, and the different methods used to allocate the cost of tangible assets and intangible assets over their useful lives.
1403.14.3	Apply depreciation and amortization techniques, including straight-line, declining balance, units of production, and the various methods used for intangible assets.
1403.14.4	analyzing depreciation and amortization technique effects on financial statements, tax liabilities, and asset management decisions to optimize resource allocation and financial performance.

1403.15	Cost behavior analysis.
1403.15.1	Explain the concept of cost behavior analysis, including fixed costs, variable costs, semi-variable costs, and step costs.
1403.15.2	Recognize how different cost elements behave in response to changes in activity levels.
1403.16	Cost-volume-profit analysis.
1403.16.1	Analyze cost-volume-profit (CVP) relationships, including the calculation of contribution margin, breakeven point, and margin of safety.
1403.16.2	Interpret how changes in sales volume, prices, and costs impact profitability and make informed business decisions.

Income Taxation

1403.17	Understand tax components, income sources, adjustments, deductions, tax credits, payments, and refunds.
1403.17.1	Understand various components of income taxes, including filing status, personal exemptions, dependents, and unique filing situations, ensuring awareness of key elements necessary for accurate tax filing.
1403.17.2	Analyze different sources of income subject to taxation, such as wages, interest, retirement income, unemployment compensation, and Social Security benefits, fostering an understanding of taxable income components and their reporting requirements.
1403.17.3	Evaluate adjustments to income and deductions, including standard deduction, tax computation, and credits for child and dependent care expenses, education, and child tax credits.
1403.17.4	Identify opportunities for reducing taxable income and maximizing tax benefits.
1403.17.5	Interpret tax credits, including earned income credit (EIC), and other taxes, comprehending their eligibility criteria, calculation methods, and impact on tax liabilities.
1403.17.6	Demonstrate informed decision-making in tax planning and compliance.
1403.17.7	Understand tax payment methods, including withholding and estimated tax payments, and analyze refund and tax owed calculations, ensuring competence in managing tax liabilities and understanding refund entitlements.
1403.17.8	Complete a tax return.

Computer Based Software

1403.18	Utilize a computer-based accounting system.
1403.18.1	Record various business transactions accurately, including sales, purchases, expenses, and payments, ensuring adherence to double-entry accounting principles.
1403.18.2	Utilize software to manage accounts receivable by generating invoices, recording customer payments, and preparing customer statements.
1403.18.3	Manage accounts payable by entering vendor bills, issuing payments, and reconciling vendor accounts to maintain accurate financial records.
1403.18.4	Generate and interpret financial reports using software, such as income statements, balance sheets, and cash flow statements, to assess the financial position of a business.
1403.18.5	Process payroll transactions efficiently in software, including setting up employee profiles, entering payroll data (hours worked, salaries, deductions), and generating payroll reports.
1403.18.6	Customize reports and forms in software to meet specific business needs, such as modifying invoice templates, purchase orders, and financial statements.
1403.18.7	Perform routine backup procedures in software to safeguard company data and practice restoring data from backups to ensure data integrity and security.

Project Lead The Way (PLTW) courses are developed to create a transformative learning environment and empower students to develop in-demand knowledge and skills necessary to thrive in an evolving world.

For more information, visit the [Project Lead The Way \(PLTW\)](#) website.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

This course introduces students to essential business technology skills through hands-on training in word processing, spreadsheet, presentation, and database applications. Students learn to create professional documents, manage data, and design impactful presentations using industry-relevant software tools. Emphasis is placed on formatting standards, data analysis, visual communication, and digital organization. Students also explore business management tools, time management strategies, and secure document handling practices. Through real-world projects and simulated workplace experiences, students develop academic, technical, and employability skills necessary for success in modern business environments. The course supports career readiness by integrating communication, critical thinking, and career exploration aligned with business and administrative services pathways.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Business Management Technical Skills

1411.1	Use planning tools to guide and manage an organization's business activities.
1411.1.1	Explore various planning tools used in business management, including software applications, and templates.

Administrative Services

1411.2	Apply planning/time management principles to accomplish workplace objectives (e.g., schedule meetings, maintain supplies, prioritize activities).
1411.2.1	Create project timelines, assign tasks, set milestones, and track progress in planning software.
1411.3	Establish and follow procedures to manage records and confidential material.
1411.3.1	Enhance document security by effectively utilizing password protection features in documents, understanding how to set, manage, and remove passwords to safeguard sensitive information and control access to documents appropriately.
1411.4	Select appropriate formats to prepare and send internal and external documents.
1411.4.1	Explore various document formats commonly used in business communication and understand when each format is most appropriate.
1411.4.2	Apply formatting guidelines and standards relevant to each document format, including font styles, sizes, margins, headings, and spacing, to ensure consistency, professionalism, and readability.
1411.4.3	Customize document templates provided by software applications or organizational resources.

Academic Foundations

1411.5	Apply reading skills in a business environment.
1411.5.1	Apply appropriate font styles, sizes, and formatting features to enhance readability.
1411.5.2	Use headings, bullet points, and numbering to organize content and improve comprehension.
1411.6	Apply writing skills in a business environment.
1411.6.1	Utilize word processing applications to apply professional formatting techniques, including font styles, sizes, alignments, and spacing, to create business documents such as reports, letters, and memos.
1411.6.2	Develop skills in organizing and structuring business documents effectively using features such as headings, bullet points, numbering, and tables of contents, enhancing readability and comprehension.
1411.6.3	Practice composing clear and concise emails.

1411.6.4	Practice proofreading and editing business documents.
1411.7	Apply mathematical skills in a business environment.
1411.7.1	Demonstrate basic arithmetic operations using formulas to perform calculations in spreadsheet software.
1411.7.2	Demonstrate mathematical concepts and operations using formulas and functions in spreadsheet software.
1411.7.3	Analyze numerical data sets in spreadsheet software.
1411.7.4	Calculate descriptive statistics.
1411.7.5	Create different types of graphs and plots in spreadsheet software (e.g., bar graphs, line graphs, pie charts, and scatter plots).
1411.7.6	Create mathematical models of real-world scenarios (e.g., population growth, investment growth, or projectile motion.)

Communications

1411.8	Locate, organize, and reference written information from reliable sources to communicate with coworkers and clients.
1411.8.1	Use descriptive file names and folder structures to facilitate navigation and search.
1411.9	Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences.
1411.9.1	Create and manage presentations utilizing various presentation software.
1411.9.2	Save and print presentations for alternative formats.
1411.9.3	Insert text, tables, charts, graphics, images, and other media into presentations.
1411.9.4	Apply transitions, animations, and timing.
1411.9.5	Understand accessibility and compatibility issues related to presentations and media.
1411.9.6	Limit text on slides and use visuals such as images, charts, and graphs to convey information
1411.9.7	Design visually appealing presentations that adhere to principles of design, including consistency, balance, contrast, and readability.
1411.9.8	Design visually appealing and informative presentations for business meetings, utilizing features such as slide layouts, themes, graphics, and animations.

Information Technology Applications

1411.10	Use software such as word processors and spreadsheets to perform common business applications.
1411.10.1	Demonstrate knowledge of using word processors to create documents.
1411.10.2	Demonstrate knowledge of using spreadsheet software to create worksheets and workbooks.
1411.10.3	Demonstrate knowledge of creating documents (e.g., templates, importing files, PDFs, file types).
1411.10.4	Demonstrate knowledge of navigating documents (e.g., find/replace, hyperlinks, bookmarks, etc.).
1411.10.5	Demonstrate knowledge of formatting documents (e.g., page setup, themes, styles, headers/footers, watermark, page numbers).
1411.10.6	Demonstrate knowledge of options and views (e.g., zoom, ribbon, window, show/hide, macros, shortcuts, etc.).
1411.10.7	Demonstrate printing and saving (print, sections, locations, passwords, print scaling, backward compatibility).
1411.10.8	Demonstrate knowledge of formatting text, paragraphs, and sections.
1411.10.9	Create and utilize tables (apply styles, filter records, sort information, and adjust rows & columns)
1411.10.10	Create lists.
1411.10.11	Apply references and create works cited or bibliographies.
1411.10.12	Insert building blocks.

1411.10.13	Create visual representations of information using built-in diagramming tools.
1411.10.14	Insert and apply effects to images.
1411.10.15	Create cells and cell ranges with data, formulas, and other information.
1411.10.16	Apply functions and formulas to perform calculations.
1411.11	Use software such as databases to track and maintain business information.
1411.11.1	Explore various types of database software and applications.
1411.11.2	Understand data organization, retrieval, storage, and security.
1411.11.3	Explore strategies for data entry and validation to ensure data integrity and reliability.
1411.11.4	Explore how databases are integrated with other software applications and systems to facilitate data exchange.
1411.11.5	Understand the need for databases to accommodate grown and business needs.
1411.11.6	Explain indexing, query optimization, and other performance techniques.
1411.12	Interpret and use tables and charts.
1411.12.1	Create charts and graphics utilizing data series.
1411.12.2	Apply formatting to charts (e.g., legends, parameters, layouts, styles, and position).

Employability and Career Development

1411.13	Demonstrate employability skills related to a career in business.
1411.13.1	Demonstrate effective written and verbal communication skills, including clarity, professionalism, and appropriate tone, in various business contexts such as emails, presentations, and documents.
1411.13.2	Demonstrate effective time management and organizational skills by prioritizing tasks, managing deadlines, and allocating resources efficiently to accomplish objectives in a timely and efficient manner.
1411.14	Pursue career development skills to advance in business careers.
1411.14.1	Demonstrate an understanding of business career opportunities.
1411.14.2	Explain employability skills necessary for success in various business careers.
1411.14.3	Demonstrate critical thinking, adaptability, time management when creating career related documents and presentations.
1411.14.4	Explore certification opportunities related to business careers.

The Business Law and Ethics course provides students with an understanding of legal principles and ethical considerations relevant to the business world. Students explore various aspects of business law, including contracts, torts, property rights, employment law, intellectual property, and business organizations. Additionally, students examine ethical theories, principles, and decision-making frameworks to navigate complex ethical dilemmas commonly encountered in business settings. Emphasizing critical thinking, analytical reasoning, and ethical awareness, this course equips students with the knowledge and skills necessary to make informed legal and ethical decisions in their future academic and professional endeavors.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Business Management Technical Skills

1417.1	Define and differentiate among various types of businesses (e.g., corporation, limited liability, partnership)
1417.1.1	Explore legal considerations associated with different types of businesses, including registration requirements, governance regulations, and liability protection.
1417.1.2	Understand the legal implications and obligations of each business structure.
1417.2	Demonstrate understanding of doing business in a global environment
1417.2.1	Explore legal and regulatory environment of global business, including international trade laws, intellectual property rights, and foreign investment regulations.

Administrative Services

1417.3	Establish and follow procedures to manage records and confidential material
1417.3.1	Establish effective procedures for managing records and confidential materials in a business context, ensuring compliance with legal requirements, safeguarding sensitive information, and promoting organizational integrity and security.
1417.4	Select appropriate formats to prepare and send internal and external documents
1417.4.1	Enhance communication efficiency and maintaining legal integrity in business correspondence.

Academic Foundations

1417.5	Apply reading skills in a business environment
1417.5.1	Apply reading skills tailored to a business environment, including comprehension, analysis, and interpretation of legal texts.
1417.6	Apply writing skills in a business environment
1417.6.1	Enhance writing skills specifically tailored to a business environment, encompassing clarity, precision, and professionalism in drafting various legal documents.
1417.7	Apply economic skills in a business environment
1417.7.1	Analyze the economic implications of legal decisions and regulations in a business context
1417.7.2	Evaluate business strategies through an economic lens, considering factors such as risk management, resource allocation, and profitability in light of legal constraints and market dynamics.

Systems

1417.8	Demonstrate understanding of the role of government and other regulatory bodies in business

1417.8.1	Understand of the role of government and regulatory bodies in business, including their functions, authority, and scope of regulation.
1417.8.2	Comprehend the legal framework within which businesses operate and the impact of regulations on business practices.
1417.8.3	Analyze the requirements and obligations imposed by government agencies and regulatory bodies on businesses (e.g., labor laws, environmental regulations, consumer protection laws, and industry-specific regulations).
1417.8.4	Assess legal risks and ensure regulatory compliance in business operations.

Ethics and Legal Responsibilities

1417.9	Apply business laws and regulations to business situations
1417.9.1	Understand the legal framework governing business activities.
1417.9.2	Compare and contrast contract law, tort law, employment law, intellectual property law, and regulatory compliance.
1417.9.3	Understand the elements of a contract, contract formation, interpretation, and enforcement.
1417.9.4	Understand the principles of intellectual property law, including patents, trademarks, copyrights, and trade secrets, and their protection in business activities.
1417.9.5	Understand real and personal property laws and their significance in business transactions.
1417.9.6	Explore the legal principles governing the ownership, transfer, and protection of real and personal property.
1417.9.7	Differentiate between these types of property and apply relevant legal concepts in business contexts.
1417.9.8	Identify relevant legal principles applicable to different business situations.
1417.9.9	Identifying legal issues within business contexts.
1417.9.10	Interpret statutes and case law.
1417.9.11	Assess legal risks and recommend compliance strategies.
1417.9.12	Navigate legal complexities and make informed business decisions within a legal framework
1417.9.13	Understand organizational influences in business ethics. (e.g., ethical implementations, organizational systems, business image, public perception)
1417.10	Exhibit ethical standards in conducting business negotiations and making business decisions
1417.10.1	Apply ethical considerations to business negotiations and decision-making processes
1417.10.2	Exhibit ethical standards in real-world business scenarios.
1417.11	Understand constitutional rights as they pertain to business law
1417.11.1	Explore the constitutional framework that governs business activities, including the Bill of Rights and other relevant amendments
1417.11.2	Comprehend the legal protections and limitations afforded to individuals and businesses in the United States
1417.11.3	Analyze constitutional challenges faced by businesses.
1417.11.4	Understand the limitations imposed by constitutional rights on business practices.
1417.11.5	Evaluate relevant legal precedents, Supreme Court decisions, and landmark cases interpreting constitutional rights in the context of business law.
1417.11.6	Engage in discussions and debates on contemporary issues related to constitutional rights in business law.
1417.11.7	Understand constitutional rights as they relate to different court systems, including criminal, civil, and business courts.
1417.12	Understand the distinct roles and functions of each court system in resolving legal disputes.
1417.12.1	Understand the structure and function of civil courts.

1417.12.2	Understand the structure and function of business courts.
1417.12.3	Identify specialized courts (e.g., bankruptcy courts, tax courts, and commercial courts).
1417.12.4	Analyze case studies and hypothetical scenarios involving legal disputes.
1417.12.5	Engage in discussions on contemporary issues related to constitutional rights and court systems.

Problem Solving, Critical Thinking, and Decision Making

1417.13	Use problem-solving and critical thinking skills to locate good sources of information about problems and determine appropriate methods for investigating causes
1417.13.1	Identify reliable sources of information regarding legal issues.
1417.14	Use problem-solving and critical thinking skills to determine root causes of problems and suggest solutions
1417.14.1	Investigative methods and assess the root causes of problems in business law contexts.

Employability and Career Development

1417.15	Pursue career development skills to advance in business careers
1417.15.1	Develop career development skills tailored to business law careers.
1417.15.2	Navigate the job market to pursue opportunities in the legal profession.

Project Lead The Way (PLTW) courses are developed to create a transformative learning environment and empower students to develop in-demand knowledge and skills necessary to thrive in an evolving world.

For more information, visit the [Project Lead The Way \(PLTW\)](#) website.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

The Business Computer Communications course is designed to equip students with the essential skills and knowledge needed to effectively communicate in a professional business environment using computer technologies. Through a combination of theoretical concepts, practical exercises, and real-world case studies, students will develop proficiency in various communication tools and techniques, enhancing their ability to communicate effectively with colleagues, clients, and stakeholders in today's digital workplace.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Business Management Technical Skills

1422.1	Use planning tools to guide and manage an organization's business activities.
1422.1.1	Collaborate and communicate effectively using planning tools, facilitating team coordination, sharing updates, and resolving issues in real-time to maintain alignment and momentum in business activities.
1422.2	Demonstrate understanding of doing business in a global environment.
1422.2.1	Communicate clearly, respectfully, and efficiently across cultural, linguistic, and geographical boundaries.
1422.2.2	Understand diverse perspectives, adapting communication styles to different audiences, and navigating cultural nuances to build trust, foster collaboration, and achieve shared goals.
1422.2.3	Utilize appropriate technology and communication channels to facilitate seamless communication and collaboration in a global context.
1422.2.4	Develop an understanding of time zones, including their geographical distribution, the concept of standard time, and the factors influencing time zone boundaries, enabling them to accurately interpret and apply time zone differences in global business contexts.

Administrative Services

1422.3	Apply planning/time management principles to accomplish workplace objectives (e.g., schedule meetings, maintain supplies, prioritize activities).
1422.3.1	Understand the importance of collaboration and communication in effective planning and time management, including sharing schedules, coordinating activities with team members, and communicating progress and updates to ensure alignment towards workplace objectives.
1422.4	Select appropriate formats to prepare and send internal and external documents.
1422.4.1	Demonstrate the ability to select appropriate formats for preparing and sending internal and external documents, considering factors such as audience, purpose, and content, to effectively convey information and maintain professionalism in business communication.
1422.5	Interact with employees and customers effectively and professionally.
1422.5.1	Effective communication in office settings, including verbal and non-verbal cues, active listening, and empathy.
1422.5.2	Explore greeting techniques, telephone etiquette, and email communication, to convey professionalism and competence in office interactions.
1422.5.3	Practice effective techniques for resolving customer inquiries and addressing concerns professionally, including active listening, problem-solving, and conflict resolution skills, to ensure customer satisfaction and loyalty.

Academic Foundations

1422.6	Apply reading skills in a business environment.
1422.6.1	Comprehend documents (technical manuals, contracts, financial reports, proposals, memos, instructions, procedures, guidelines, training materials, business plans, and standards).
1422.6.2	Understand content, context, and action items outlined in documents to react, implement, or respond.
1422.7	Apply writing skills in a business environment.
1422.7.1	Apply proper communication etiquette. (e.g., greetings, subject lines, signatures, formatting options, grammar, and spelling).
1422.7.2	Create business correspondence (e.g., emails, formal letters, agendas, minutes, policies, proposals, reports, brochures, press releases, presentations, etc.).
1422.7.3	Create professional branding documents (e.g., resumes, cover letters, profiles, and other professional materials).

Systems

1422.8	Demonstrate understanding of company hierarchies and roles within company structures.
1422.8.1	Analyze organizational charts to visualize company hierarchies and understand the relationships between different departments, teams, and positions, recognizing the flow of communication and decision-making within the organization.
1422.8.2	Understanding how information flows and responsibilities are delegated within organizations.
1422.8.3	Explain how departments interact and collaborate to achieve company goals.

Ethics and Legal Responsibilities

1422.9	Exhibit ethical standards in conducting business negotiations and making business decisions.
1422.9.1	Apply principles of fairness, honesty, and integrity, and navigating ethical dilemmas effectively to foster trust and achieve mutually beneficial outcomes in negotiation scenarios.

Communications

1422.10	Locate, organize, and reference written information from reliable sources to communicate with coworkers and clients.
1422.10.1	Share documents securely and set permissions to control access levels.
1422.10.2	Utilize commenting and track changes features to provide feedback and revisions.
1422.10.3	Communicate effectively with team members through chat, video conferencing, and file sharing.
1422.10.4	Distinguish between reliable and unreliable sources of written information.
1422.10.5	Develop effective search strategies to locate relevant information from a variety of sources.
1422.10.6	Evaluate source credibility, authority, and accuracy.
1422.10.7	Apply appropriate reference and citations adhering to standard citation styles (e.g., APA, MLA).
1422.10.8	Practice communicating written information effectively to coworkers and clients, using appropriate language, tone, and style to convey messages clearly and professionally.
1422.11	Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences.
1422.11.1	Modify presentations to create a visually appealing media to engage and inform audiences.
1422.11.2	Demonstrate effective communication skills and the ability to tailor presentations to the needs and preferences of diverse audiences.
1422.11.3	Deliver formal and informal presentations using appropriate media to engage stakeholders and audiences.

1422.11.4	Distinguish between different types of presentations such as informative, persuasive, instructional, and status updates.
1422.11.5	Understand audience demographics, interests, knowledge level, and communication preferences to engage and inform specific audiences.
1422.11.6	Develop engaging and informative content for presentations, selecting relevant information, organizing key points logically, and creating visually appealing slides or supporting materials.
1422.11.7	Practice effective delivery techniques, including vocal delivery, body language, eye contact, and pacing.
1422.11.8	Explore strategies for handling questions and feedback from the audience effectively, demonstrating confidence, clarity, and professionalism.
1422.12	Apply listening skills and interpret verbal and nonverbal behaviors to enhance communication with coworkers and clients.
1422.12.1	Understand the importance of active listening in effective communication, recognizing its role in building rapport, understanding others' perspectives, and resolving conflicts.
1422.12.2	Identify and interpret verbal cues (such as tone, pitch, and speed of speech).
1422.12.3	Identify and interpret non-verbal cues ((such as body language, facial expressions, and gestures).
1422.12.4	Explore techniques for minimizing distractions and maintaining focus during conversations, such as maintaining eye contact, eliminating interruptions, and practicing mindfulness.
1422.12.5	Practice asking open-ended questions, paraphrasing, and summarizing, to ensure accurate interpretation and avoid misunderstandings.
1422.12.6	Adapt communication style and message based on the cues they observe to enhance mutual understanding and rapport.
1422.12.7	Recognize the role of culture in shaping verbal and nonverbal communication styles, demonstrating cultural sensitivity and adapting their communication approach to accommodate diverse cultural norms and practices.
1422.12.8	Participate in real-world or simulated meetings, interviews, client interactions, and team collaborations.

Information Technology Applications

1422.13	Use software such as word processors and spreadsheets to perform common business applications.
1422.13.1	Create and customize professional document templates in word processing software, such as letterheads, proposals, and meeting agendas, to streamline document creation and maintain brand consistency in business communications.
1422.14	Use social media and mobile technology appropriately.
1422.14.1	Understand the various platforms and technologies available for communication, including social media platforms and mobile communication tools.
1422.14.2	Explore digital citizenship, including online etiquette, responsible use of technology, privacy settings, and digital footprint management.
1422.14.3	Learn strategies for building a professional online presence with creating a professional profile, networking with peers and professionals, and sharing relevant content related to their field of interest.
1422.14.4	Identify digital safety and security best practices.
1422.14.5	Develop digital literacy skills related to evaluating online information, identifying credible sources, and discerning between reliable and unreliable information.
1422.14.6	Understand ethical considerations related to online communication.
1422.15	Interpret and use tables and charts.
1422.15.1	Use charts and tables to share trends and patterns in data.
1422.15.2	Demonstrate using tables and charts to visually represent data, enhance clarity, support comparative analysis, highlight key findings, support presentations and reports, and facilitate collaboration.

1422.15.3	Utilize charts and tables to enhance clarity and comprehension.

Problem Solving, Critical Thinking, and Decision Making

1422.16	Use problem-solving and critical thinking skills to locate good sources of information about problems and determine appropriate methods for investigating causes.
1422.16.1	Evaluate quantitative and qualitative research methods, data analysis, surveys, interviews, and case studies.
1422.16.2	Develop research questions, design research plans, collect and analyze data, and draw evidence-based conclusions to inform decision-making and problem-solving.
1422.16.3	Create communication material to address root causes of business problems.
1422.17	Use problem-solving and critical thinking skills to determine root causes of problems and suggest solutions.
1422.17.1	Utilize data and evidence to support their analysis of business problems, employing quantitative and qualitative data analysis techniques to validate hypotheses and inform decision-making.
1422.17.2	Develop implementation plans for selected solutions to guide effective execution and monitor progress towards problem resolution.

Leadership and Teamwork

1422.18	Exhibit leadership practices to improve productivity and quality of the working environment.
1422.18.1	Develop effective communication skills necessary for leadership, including active listening, clear articulation of goals and expectations, and providing constructive feedback.
1422.19	Work effectively in a team environment to accomplish company goals and improve the quality of the working environment.
1422.19.1	Understand the principles of effective teamwork, including communication, collaboration, trust-building, and accountability, to contribute positively to team dynamics and achieve common goals.
1422.19.2	Develop effective communication skills necessary for working in a team environment.

Safety, Health, and Environmental

1422.20	Apply appropriate emergency procedures for business occupations.
1422.20.1	Create an emergency plan communication document demonstrating understanding of emergency protocols, evacuation routes, safety protocols, and communication channels.

Employability and Career Development

1422.21	Demonstrate employability skills related to a career in business.
1422.21.1	Demonstrate effective written and verbal communication skills, including clarity, professionalism, and appropriate tone, in various business contexts such as meetings and interviews.
1422.21.2	Demonstrate the ability to work collaboratively with peers and colleagues, contributing ideas, listening actively, and resolving conflicts constructively to achieve common goals and objectives.
1422.21.3	Demonstrate ethical decision-making skills by considering ethical implications and consequences in business scenarios.
1422.22	Pursue career development skills to advance in business careers.
1422.22.1	Demonstrate the ability to network effectively by building professional connections, seeking mentorship and guidance, and pursuing opportunities for career development and advancement in the business field.

This course is designed to develop student understanding and skills in such areas as journalistic principles in design and layout of print and Web publications including integration of text and graphics and use of sophisticated hardware and software to develop and create quality materials for business-related tasks. Students will analyze the information and the audience and combine appropriate text, graphics, and design to communicate the desired message effectively. Planning and design principles are used to analyze and organize information, set up a design structure and to select or create appropriate visuals. Instructional strategies may include computer/technology applications, teacher demonstrations, collaborative instruction, interdisciplinary and/or culminating projects, problem-solving and critical thinking activities, simulations, and project-based learning activities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FBLA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Design Techniques, Tools, Technical Plans, and Drawings

1429.1	Demonstrate knowledge of design techniques, tools, technical plans, and drawings
1429.1.2	Demonstrate knowledge of standard copyright rules.
1429.1.3	Comply with software licensing agreements associated with desktop publishing.
1429.1.4	Create designs, concepts and sample layouts based on knowledge of layout principles and esthetic design concepts.
1429.1.5	Position text and art elements from a variety of databases in a visually appealing way to design print or web pages, using knowledge of type styles and size and layout patterns.
1429.1.6	Determine size and arrangement of illustrative material, copy, and select style and size of type.
1429.1.7	Study layout or other design instructions to determine work to be done and sequence of operations.
1429.1.8	Select number of colors and determine color separations.
1429.1.9	Edit graphics and photos using pixel or bitmap editing, airbrushing, masking, or image retouching.
1429.1.10	Develop graphics and layouts for product illustrations, company logos and Internet websites.
1429.1.11	Enter data, such as coordinates of images and color specifications, into system to retouch and make color corrections.
1429.1.12	Mark up, paste and assemble final layouts to prepare layouts for printer.
1429.1.13	Draw and print charts, graphs, illustrations, and other artwork, using computer.
1429.2	Demonstrate proficiency in advanced operation of digital production printing systems.
1429.2.1	Use the system interface to adjust image tone reproduction quality.
1429.2.2	Use the system interface to modify page images through the functions of copy, mask, duplicate, delete, move, add, replace, rotate, and overlay images.
1429.2.3	Use the merge library function.
1429.2.4	Program and run a job with tab stock.
1429.2.5	Program and run a job with folded signatures.
1429.2.6	Program and set-up the various in-line finishing and binding options.

1429.2.7	Program and run productivity features including cover sheets, job separator sheets, and the use of saved job tickets.
1429.2.8	Program and run jobs on a digital color printing system.
1429.2.9	Evaluate and adjust color print quality.
1429.2.10	Apply troubleshooting and problem-solving strategies on digital printing systems.

Media Productions and Desktop Publishing Communications

1429.3	Media Productions and Desktop Publishing Communications
1429.3.1	Draw and print charts, graphs, illustrations, and other artwork, using computer.
1429.3.2	Identify the purpose, audience and audience needs for preparing image(s) and video(s).
1429.3.3	Confer with clients to discuss and determine layout design.
1429.3.4	Collaborate with graphic artists, editors, and writers to produce master copies according to design specifications.
1429.3.5	Review final layouts and suggest improvements as needed.
1429.3.6	Check preliminary and final proofs for errors and make necessary corrections.
1429.3.7	Prepare illustrations or rough sketches of material, discussing them with clients or supervisors and making necessary changes.
1429.3.8	Key information into computer equipment to create layouts for client or supervisor.

Applications

1429.4	Desktop Publishing Applications and Camera-Ready Photos
1429.4.1	Operate desktop publishing software and equipment to design, lay out and produce camera-ready copy.
1429.4.2	Enter text into computer keyboard and select the size and style of type, column width and appropriate spacing for printed materials.
1429.4.3	Convert various types of files for printing or for the Internet, using computer software.
1429.4.4	Transmit, deliver, or mail publication master to printer for production into film and plates.
1429.4.5	Enter digitized data into electronic prepress system computer memory, using scanner, camera, keyboard, or mouse.
1429.4.6	View monitors for visual representation of work in progress and for instructions and feedback throughout the process, making modifications, as necessary.
1429.4.7	Import text and art elements such as electronic clipart or electronic files from photographs that have been scanned or produced with a digital camera, using computer software.
1429.4.8	Prepare sample layouts for approval, using computer software.
1429.4.9	Use computer software to generate new images.
1429.4.10	Maintain archive of images, photos, or previous work products.
1429.4.11	Save a document in various file formats.

Typography and Layout

1429.5	Demonstrate knowledge of typography and layout
1429.5.1	Identify strategies and software used for font management in desktop publishing.
1429.5.2	Set-up and use font management software.
1429.5.3	Use the type scaling, kerning, tracking, and baseline shift typographic functions.
1429.5.4	Demonstrate the comparative typography weaknesses and strengths of word processing software and page layout software.

1429.5.5	Identify the differences between formatted and unformatted text files.
1429.5.6	Demonstrate the correct use of paragraph and character style definitions in page layout software applications.
1429.5.7	Set up column grids for electronic page layout according to job specifications.
1429.5.8	Set up/select appropriate pagination for a given job.
1429.5.9	Demonstrate the uses of footers and headers.
1429.5.10	Set text with appropriate margins, formatting, gutters, leading, headings, etc.
1429.5.11	Define and apply multiple master pages to a long document.
1429.5.12	Merge documents in part or in their entirety.
1429.5.13	Use paths for type and for image clipping.
1429.5.14	Modify and redefine page and document specifications.
1429.5.15	Apply section numbering for long documents.
1429.5.16	Prepare a document index page.
1429.5.17	Determine and set preferences for specific document production requirements.
1429.5.18	Scan reflection and transmission originals, to include following customer specifications for cropping, sizing, file formatting, and resolution.
1429.5.19	Set-up and use Optical Character Recognition (OCR) software to capture text pages and prepare a document for editing in a word processing application.

This course is designed to develop student understanding and skills in such areas as the elements of digital imaging and multimedia knowledge and skills necessary for a career in the business and marketing field. This course is recommended as an Elective in the Microsoft Computer Applications (MCAS) and Certified Internet Webmaster (CI) Programs of Study. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members in a CTSO. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and skill sets.

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Digital Safety & Current Copyright, Creative Commons, and Fair Use Laws

1431.1	Understand legal compliance with digital media.
1431.1.1	Define the various types of create commons licenses.
1431.1.2	Describe the purpose of copyright, creative commons, public domain, etc.
1431.1.3	Adhere to copyright and creative commons laws.
1431.1.4	Locate digital images and multimedia published under various copyright and creative commons licenses.
1431.1.5	Maintain digital safety, including personal and computer safety.

Digital Media Communication

1431.2	Understand how design plans meet needs and purpose.
1431.2.1	Identify the purpose, audience and audience needs for preparing image(s).
1431.2.2	Communicate with others (such as peers and clients) about design plans.
1431.2.3	Describe how the design plans meet the purpose, and target audience needs.
1431.2.4	Demonstrate competence using computer networks, internet, and online databases to facilitate collaborative or individual learning and communication.
1431.2.5	Demonstrate comprehension and communication skills.

Software Applications, Design Tools, and Techniques in Digital Imaging

1431.3	Explore project design, techniques, and file management.
1431.3.1	Utilize multiple platforms for creating and enhancing digital images.
1431.3.2	Apply layout and design principles.
1431.3.3	Create layouts for ease of readability and attractiveness.
1431.3.4	Take pictures using various features on a digital camera.
1431.3.5	Transfer images from a camera to computers or other electronic equipment.
1431.3.6	Utilize filters, tools, and features within digital imaging software application to enhance photographs.

1431.3.7	Produce images using layers and layer styles.
1431.3.8	Demonstrate application of typography.
1431.3.9	Import, export, organize and save images.
1431.3.10	Choose the correct file format for each project.
1431.3.11	Differentiate between common image file types: jpeg, gif, bmp, png, etc.
1431.3.12	Describe software specific image file types.
1431.3.13	Use guides and rulers.
1431.3.14	Incorporate color techniques, including gradient, grayscale, opacity, blending, etc.
1431.3.15	Design a digital imaging/multimedia project.
1431.3.16	Utilize paths to modify objects, shapes, and text.

Media Production

1431.4	Outlines professional graphic design and multimedia creations.
1431.4.1	Create graphics for business professional use: logos, letterheads, business cards, brochures, posters, billboards, cards, etc.
1431.4.2	Create basic designs, drawings, and illustrations for multimedia use in commercials, animations, advertisements, infographics, etc.
1431.4.3	Keep abreast of new imaging software and hardware technologies, and industry.
1431.4.4	Utilize multiple platforms for creating and enhancing digital multimedia projects.
1431.4.5	Apply layout and design principles for attractiveness and readability.
1431.4.6	Use digital video software to cut, edit, apply effects, add titles and transitions to video clips.
1431.4.7	Create animations utilizing frames and keyframes on a timeline.
1431.4.8	Create an animated walk cycle.
1431.4.9	Integrate original audio digital elements (voice/sound clips, music) into a project.
1431.4.10	Integrate audio digital elements (voice/sound clips, music) from the web into a project.
1431.4.11	Enhance a voice/sound clip with lip sync.
1431.4.12	Utilize tweening and symbols.
1431.4.13	Describe publication procedures.

Digital Media Fundamentals

1431.5	Describe characteristics of digital media relative to format, standards, encoding schemes, and origin.
1431.5.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases.
1431.5.2	Identify and differentiate the appropriate use of digital media formats based on standard industry practices.
1431.5.3	Identify and differentiate the appropriate use of encoding schemes based on project needs.
1431.5.4	Identify the difference between digital media source files and digital media delivery systems.
1431.6	Explore various forms of digital media delivery systems.
1431.6.1	Identify the differences between fixed digital media formats and digital media streaming.
1431.6.2	Identify the various forms of digital media content distribution.
1431.6.3	Describe the development of digital media technology as it pertains to digital signage.
1431.6.4	Describe the impact of mobile and Wi-Fi technologies on the digital media development industry.
1431.7	Demonstrate an understanding of handling equipment, recording video and audio, exporting files, and editing projects.

1431.7.1	Identify digital image file types and their appropriate uses.
1431.7.2	Compare and contrast the similarities and differences between Standard Definition and High-Definition recordings.
1431.7.3	Describe and apply the characteristics of digital video.
1431.7.4	Identify and describe the various application platforms used in digital video development.
1431.7.5	Create a video production that meets the industry standards of production.
1431.8	Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital audio.
1431.8.1	Identify and describe the fundamental aspects of sound theory.
1431.8.2	Compare and contrast the similarities and differences between various audio recordings
1431.8.3	Describe the characteristics of digital audio
1431.8.4	Identify and describe the various application platforms used in digital audio recording and editing.
1431.8.5	Enhance storytelling using sound effects.
1431.8.6	Capture and edit original audio to be utilized with in class video production projects.
1431.9	Create animation in digital media that enhances production.
1431.9.1	Describe the process of developing animations and identify the industry standard platforms used in their creation.
1431.9.2	Describe the similarities and differences as well as industry standard platforms used in the development of 2D and 3D graphics.
1431.9.3	Identify and describe the challenges in developing and deploying digital media content.
1431.9.4	Identify the components and characteristics of motion that make up an animation.
1431.9.5	Create animations within production.
1431.9.6	Produce storyboarding, production plans (GANTT CHARTS) and playable rough cuts.
1431.10	Perform safety skills while performing or recording on set.
1431.10.1	Perform proper care of equipment.
1431.10.2	Demonstrate appropriate use of equipment in an efficient manner.
1431.10.3	Demonstrate awareness of appropriate ergonomics.
1431.10.4	Demonstrate safe ways to create action on set.
1431.10.5	Apply ethical practices.
1431.11	Apply appropriate lighting for location and/or set productions.
1431.11.1	Determine appropriate lighting needs for production settings.
1431.11.2	Identify locations and studio lighting types, method of use and application.
1431.11.3	Use lighting equipment according to industry safety standards.
1431.12	Operate a video camera.
1431.12.1	Use current industry standard production video equipment.
1431.12.2	Operate camera in studio and location (field) production environments.
1431.12.3	Align camera for studio production.
1431.12.4	Demonstrate appropriate framing for both SDTV and HDTV.
1431.12.5	Operate (CCU) Camera Control Uni.
1431.13	Record, mix and edit audio resources.
1431.13.1	Identify and select microphones for production needs.
1431.13.2	Determine optimal microphone placement.
1431.13.3	Establish appropriate recording conditions.
1431.13.4	Set up audio recording equipment.
1431.13.5	Perform appropriate pre-production check of production equipment.
1431.13.6	Record location sound.

1431.13.7	Record studio live sound.
1431.13.8	Perform basic routine, preventative and repair maintenance on video equipment.
1431.13.9	Define the various recording formats and media.
1431.13.10	Define appropriate digital compression and signal (file) types.
1431.13.11	Perform sound edits and enhancements.

This course is designed to develop student understanding and skills in such areas as imaging, drawing, animation, and video software which will be used to create advanced projects. These projects will involve advanced tools and techniques of each discipline. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members in a CTSO. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advanced Multimedia Design: Design Techniques, Tools, Technical Plans, and Drawings

1432.1	Utilize various techniques to produce visual projects.
1432.1.1	Comply with software licensing agreements associated with multimedia presentations.
1432.1.2	Demonstrate knowledge of standard copyright rules for images and image use.
1432.1.3	Demonstrate application of image resolution, image size and image file format for web, video, and print.
1432.1.4	Create two-dimensional and three-dimensional images depicting objects in motion or illustrating a process, using computer animation or modeling programs.
1432.1.5	Design complex graphics and animation, using independent judgment, creativity, and computer equipment.
1432.1.6	Make objects or characters appear lifelike by manipulating light, color, texture, shadow, and transparency, or manipulating static images to give the illusion of motion.
1432.1.7	Work with selections and measurements.
1432.1.8	Apply layers and masks.
1432.1.9	Create storyboards that show the flow of the animation and map out key scenes and characters.
1432.1.10	Develop briefings, brochures, multimedia presentations, web pages, promotional products, technical illustrations, and computer artwork for use in products, technical manuals, literature, newsletters, and slide shows.
1432.1.11	Script, plan and create animated narrative sequences under tight deadlines, using computer software and hand drawing techniques.
1432.1.12	Produce an electronic portfolio.
1432.1.13	Produce print-ready digital files

Advanced Multimedia Communications: Audience, Audience Needs, and Media Production

1432.2	Understanding the audience's needs, and media production.
1432.2.1	Identify the purpose, audience and audience needs for preparing image(s).
1432.2.2	Participate in design and production of multimedia campaigns, handling budgeting and scheduling and assisting with such responsibilities as production coordination, background design and progress tracking.
1432.2.3	Communicate with others (such as peers and clients) about design plans.

1432.2.4	Prepare images for web, print and video.
1432.3	Shoot studio and/or location footage.
1432.3.1	Plan a shot to obtain required action/footage.
1432.3.2	Demonstrate appropriate shot sequences, transitions, and postproduction (edit) effects.
1432.3.3	Control camera movement to obtain required effects.
1432.3.4	Control lens, focal length, aperture, and exposure to obtain required effects.
1432.3.5	Set up camera and recording equipment sequence.
1432.4	Design and generate graphic elements.
1432.4.1	Determine the graphic requirements for a production.
1432.4.2	Operate graphic production software.
1432.4.3	Produce broadcast graphic elements for titling, credits, and graphic transitions.
1432.4.4	Determine the special effects need for a production.
1432.4.5	Set up and operate character generator equipment and software.
1432.4.6	Generate appropriate special effects and animated elements for a production.
1432.4.7	Demonstrate understanding of graphic image types, file formats, and technical requirements for a production.
1432.4.8	Use image editing (bit mapped) software.
1432.4.9	Edit graphics into the program or segment.
1432.4.10	Demonstrate an ability to use type, color, composition, and graphic elements for a specific production effect.
1432.4.11	Demonstrate an ability to use different aspect ratios as needed for SDTV and HDTV.
1432.4.12	Identify and describe the standard practices for retrieving digital media assets both on local and remote workstations/networks.
1432.4.13	Describe the standard practices for establishing digital asset security.
1432.4.14	Describe the purpose and function of metadata as it pertains to the management of digital assets.
1432.5	Configuring and operating equipment and software applications.
1432.5.1	Produce video files according to industry standard specifications using digital media development hardware and software applications.
1432.5.2	Identify and incorporate the appropriate use of digital video encoding based on industry standard practices.
1432.5.3	Identify the various tools and procedures utilized in the conversion of digital media file types.
1432.5.4	Demonstrate proficiency in the utilization of standard video production equipment.
1432.5.5	Demonstrate proficiency in the connectivity and configuration of digital video equipment.
1432.5.6	Identify and troubleshoot lighting issues as they pertain to recording digital video and describe common industry practices in the staging of light sources.
1432.6	Configuring and operating equipment and software applications used in the creation and delivery of digital audio.
1432.6.1	Produce audio files according to industry standard specifications using digital media development hardware and software applications.
1432.6.2	Demonstrate proficiency in the utilization of standard audio production equipment.
1432.6.3	Demonstrate proficiency in the connectivity and configuration of digital audio equipment.
1432.7	Apply industry standard workflow management methods.
1432.7.1	Describe the various media integration systems and their appropriate uses in the development of digital media.
1432.7.2	Identify and describe the importance of version control in digital asset management.

1432.7.3	Identify and describe the various forms of digital audio/video synchronization and the tools and techniques used to synchronize digital audio and video.
1432.7.4	Successfully operate digital audio/video devices simultaneously to produce HD quality media to synchronize assets for post-production.
1432.8	Apply industry standard asset management methods applicable to development of a digital media product.
1432.8.1	Identify and describe the standard practices for storing and archiving digital media assets.
1432.8.2	Successfully apply and enhance upon industry standard practices for storing and archiving digital media assets.
1432.8.3	Identify and describe the standard practices for retrieving digital media assets both on local and remote workstations/networks.
1432.8.4	Describe the standard practices for establishing digital asset security.
1432.8.5	Describe the purpose and function of metadata as it pertains to the management of digital assets.
1432.9	Explain the importance of calibration in digital media production and how it is accomplished.
1432.9.1	Identify the necessity and effects of calibration on various digital media systems.
1432.9.2	Identify standard practices in calibrating digital media production equipment.
1432.9.3	Use lighting for effect to control mood and impact production settings.
1432.9.4	Use studio lighting master control equipment.

This course introduces students to the principles of economics and the functioning of financial markets. Students will explore fundamental economic concepts such as supply and demand, market structures, fiscal and monetary policy, as well as the workings of financial markets including stocks, bonds, and derivatives. Students will develop a foundational understanding of economic principles and financial literacy.

***If this course is offered as dual credit, it must adhere to an established agreement between the secondary and postsecondary schools. If this course is offered without dual credit, the teacher of record must be properly endorsed as outlined in the WVDE Testing and Endorsement Manual.*

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Introduction to Economics

1436.1	Understand the basic principles of economics and their application in everyday life.
1436.1.1	Explain the concepts of scarcity, opportunity cost, and trade-offs.
1436.1.2	Understand the laws of supply and demand and their role in determining prices and quantities in markets.
1436.1.3	Analyze how changes in supply and demand affect market equilibrium.
1436.2	Explore macroeconomic concepts such as GDP, inflation, unemployment, and economic growth.
1436.2.1	Understand how GDP is calculated and its significance as a measure of economic output.
1436.2.2	Analyze the causes and consequences of inflation and unemployment.
1436.2.3	Examine the role of government policies such as fiscal and monetary policy in stabilizing the economy.

Market Structures and Competition

1436.3	Understand different types of market structures and their implications for pricing and competition.
1436.3.1	Differentiate between perfect competition, monopoly, monopolistic competition, and oligopoly.
1436.3.2	Analyze the advantages and disadvantages of each market structure.
1436.3.3	Understand the role of government in regulating markets to promote competition and consumer welfare.
1436.4	Explore the functioning of financial markets and various financial instruments.
1436.4.1	Understand the difference between stocks, bonds, and derivatives.
1436.4.2	Analyze how financial markets facilitate the allocation of capital and risk.
1436.4.3	Examine the role of financial intermediaries such as banks and investment firms.

Investing and Personal Finance

1436.5	Develop financial literacy and understand the basics of investing.
1436.5.1	Understand the importance of saving and budgeting.
1436.5.2	Understand different investment options and their risk-return profiles.
1436.5.3	Analyze the impact of economic events and policy decisions on personal finances.

Globalization and International Trade

1436.6	Explore the benefits and challenges of globalization and international trade.
1436.6.1	Understand the principles of comparative advantage and specialization.

1436.6.2	Analyze the impact of trade barriers such as tariffs and quotas.
1436.6.3	Examine the role of international organizations such as the World Trade Organization (WTO) in promoting free trade.

This course explores business operations, business concepts, key economic principles, business environments, and essential business functions. Emphasizing customer relations, economics, emotional intelligence, financial analysis, human resources management, information management, marketing, operations, professional development, and strategic management, students develop fundamental skills crucial for success. Ethical dilemmas and problem-solving scenarios are integrated throughout the course, challenging students to apply academic and critical-thinking skills in real-world contexts.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Business Management Technical Skills

1439.1	Define and differentiate among various types of businesses (e.g., corporation, limited liability, partnership)
1439.1.1	Explain the role of business in society.
1439.1.2	Differentiate various types of business (e.g., corporation, limited liability, partnership)
1439.1.3	Understand basic economic concepts, including supply and demand, market equilibrium, and resource allocation
1439.1.4	Explain the concept of private enterprise.
1439.1.5	Identify the impact of small business/entrepreneurship on market economies
1439.1.6	Analyze how businesses function.
1439.1.7	Differentiate among various business entities based on factors such as ownership, liability, taxation, and management structure
1439.2	Use planning tools to guide and manage an organization's business activities
1439.2.1	Explain organization structures.
1439.2.2	Explore the relationship between businesses and employee rights, including topics such as labor laws, workplace regulations, employee benefits, and organizational policies
1439.2.3	Differentiate various planning tools utilized in business contexts, such as Gantt charts, project management software, and strategic planning frameworks.
1439.2.4	Explain the significance of planning in guiding business activities. (e.g., allocating resources, scheduling tasks, and setting goals).
1439.2.5	Understand how organizations formulate long-term strategies to achieve competitive advantage and business growth (e.g., SWOT analysis, PESTLE analysis, and Porter's Five Forces).
1439.3	Apply marketing techniques to foster business growth
1439.3.1	Understand foundational marketing concepts, including the marketing mix (product, price, place, promotion), target market identification, and consumer behavior.
1439.3.2	Explore market research methodologies, such as surveys, focus groups, and data analysis, to understand how businesses gather insights about customer needs, preferences, and market trends
1439.3.3	Understand how businesses differentiate themselves and create value in the marketplace.
1439.3.4	Identify how businesses create and launch new products or services.
1439.3.5	Understand how businesses determine optimal pricing strategies to maximize profitability and market share
1439.3.6	Explore promotional techniques, including advertising, public relations, sales promotions, and digital marketing.

1439.3.7	Understand how businesses communicate with and influence target audiences
1439.3.8	Analyze marketing campaigns and case studies from various industries.
1439.3.9	Evaluate market campaigns effectiveness in achieving business objectives, reaching target markets, and generating ROI.
1439.3.10	Develop basic marketing plans for hypothetical business scenarios.
1439.4	Plan and evaluate the use of financial resources to effectively manage a business
1439.4.1	Analyze how different economies function and their impact on resource allocation, income distribution, and societal well-being
1439.4.2	Describe the functions of prices in markets.
1439.4.3	Understand the rights and responsibilities of employees within the business context.
1439.4.4	Understand the financial implications and tax advantages of each business entity.
1439.5	Demonstrate understanding of doing business in a global environment
1439.5.1	Understand how businesses operate in an interconnected global economy
1439.5.2	Explore global markets, including emerging economies, international trade agreements, and market entry strategies.
1439.5.3	Explore different international business models.
1439.5.4	Comprehend the complexities of global value chains and supply chain management
1439.5.5	Understand how businesses tailor their marketing efforts to diverse cultural and market contexts

Administrative Services

1439.6	Apply planning/time management principles to accomplish workplace objectives (e.g., schedule meetings, maintain supplies, prioritize activities)
1439.6.1	Apply planning and time management skills to accomplish workplace objectives

Academic Foundations

1439.7	Apply writing skills in a business environment
1439.7.1	Demonstrate proficiency in the research process within a business context
1439.8	Apply economic skills in a business environment
1439.8.1	Distinguish between economic goods and services.
1439.8.2	Explore and compare various economic systems, including capitalism, socialism, and mixed economies
1439.8.3	Apply economic analysis skills in a business environment (e.g., cost-benefit analysis, market trends, forecasting, and investment).
1439.8.4	Make informed business decisions based on economic reasoning and analysis.

Systems

1439.9	Demonstrate understanding of the role of government and other regulatory bodies in business
1439.9.1	Explore the various governmental and regulatory bodies that oversee business activities, including their functions, jurisdictions.
1439.9.2	Analyze the impact of government regulations and policies on businesses (e.g., market competition, consumer protection, industry standards, and corporate governance).
1439.9.3	Comprehend how regulatory frameworks shape business operations and decision-making.
1439.10	Demonstrate understanding of company hierarchies and roles within company structures
1439.10.1	Analyze the roles and responsibilities of different positions within company structures, including leadership roles, functional departments, and cross-functional teams.

Ethics and Legal Responsibilities

1439.11	Apply business laws and regulations to business situations
1439.11.1	Describe the nature of ethics.
1439.11.2	Explain reasons for ethical dilemmas.
1439.11.3	Recognize and respond to ethical dilemmas.
1439.12	Exhibit ethical standards in conducting business negotiations and making business decisions
1439.12.1	Advocate for fair and ethical treatment in the workplace.
1439.12.2	Understand the importance of ethical standards in conducting business negotiations and making business decisions.
1439.12.3	Recognize the ethical implications of their actions in business contexts.

Information Technology Applications

1439.13	Use social media and mobile technology appropriately
1439.13.1	Analyze various social media platforms and mobile technologies, examining their features, target demographics, and best practices for business engagement.
1439.13.2	Understand how to leverage these platforms effectively in marketing strategies.
1439.13.3	Create and implement social media marketing campaigns using appropriate mobile technologies.

Problem Solving, Critical Thinking, and Decision Making

1439.14	Use problem-solving and critical thinking skills to locate good sources of information about problems and determine appropriate methods for investigating causes
1439.14.1	Develop research skills to identify and evaluate reliable sources of information related to business and marketing problems
1439.15	Use problem-solving and critical thinking skills to determine root causes of problems and suggest solutions
1439.15.1	Apply critical thinking skills to analyze the root causes of business and marketing problems.

Leadership and Teamwork

1439.16	Exhibit leadership practices to improve productivity and quality of the working environment
1439.16.1	Understand leadership practices relevant to improving productivity and quality in the working environment
1439.16.2	Apply leadership skills in simulated workplace scenarios.
1439.17	Work effectively in a team environment to accomplish company goals and improve the quality of the working environment
1439.17.1	Engage in team-based problem solving.
1439.17.2	Analyze business and marketing challenges, brainstorm solutions, allocate tasks, and communicate effectively to accomplish company goals, fostering teamwork skills essential for improving the quality of the working environment.
1439.17.3	Participate in reflective discussions and assessments of team dynamics and performance

Safety, Health, and Environmental

1439.18	Identify and practice appropriate health and safety procedures for business occupations
1439.18.1	Identify potential safety, health, and environmental hazards in various business and marketing settings
1439.18.2	Develop an understanding of Occupational Safety and Health Administration (OSHA) regulations and guidelines.

1439.19	Apply appropriate emergency procedures for business occupations
1439.19.1	Develop risk mitigation strategies and protocols to address identified hazards

Employability and Career Development

1439.20	Demonstrate employability skills related to a career in business
1439.20.1	Investigate educational requirements and qualifications for different business careers, including degrees, certifications, and specialized training programs
1439.20.2	Identify and assess the skills and competencies required for success in various business careers, including analytical skills, communication abilities, leadership qualities, and technical proficiencies.
1439.21	Pursue career development skills to advance in business careers
1439.21.1	Network effectively within the business community.
1439.22	Explore business careers.
1439.22.1	Explore various career paths within the business context, including roles in management, marketing, finance, human resources, and entrepreneurship
1439.22.2	Identify potential career paths aligned with their interests and skills.

This course is designed to develop student understanding and skills in such areas as the elements of introductory keyboarding techniques necessary for a career in the business and marketing field.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Work Habits

1441.1	Work Habits
1441.1.1	Good work habits.
1441.1.2	Implement oral and written instructions in the completion of assigned tasks and work efficiently to meet deadlines.
1441.1.3	Display the attitudes and work habits necessary for good interpersonal and employee/employer relations in the workforce.
1441.1.4	Prepare and keep the area in and around the workstation organized by properly assembling supplies and information necessary to complete assigned tasks.
1441.1.5	Demonstrate desirable work ethics.

Operational Keyboarding Skills

1441.2	Operational Keyboarding Skills
1441.2.1	Operational keyboarding skills.
1441.2.2	Master operation of the alphabet, punctuation, number, and symbol keys by touch.
1441.2.3	Develop proofreading skills by visually and manually checking for errors utilizing computer proofreading tools. (i.e., spell check, grammar check and thesaurus).
1441.2.4	Increase keyboarding speed and accuracy.

Keyboarding Production Skills

1441.3	Keyboarding Production Skills
1441.3.1	Production keyboarding skills.
1441.3.2	Apply information processing concepts.
1441.3.3	Develop language arts skills such as using correct grammar, capitalization, punctuation, number expression and word usage through composition of business communications.
1441.3.4	Demonstrate production, formatting and editing skills in keyboarding. (i.e., Enumeration, outlines and formatting copy for short reports, memorandums, personal/business communications from arranged, rough-draft, handwritten, incomplete or unedited copy).
1441.3.5	Identify and correctly use proofreaders' marks.
1441.3.6	Maintain a minimum speed of 35 words per minute with 3 or fewer errors on a 3-minute timed writing.
1441.3.7	Prepare envelopes using USPS style and insert correctly folded letters.
1441.3.8	Key bound and unbound reports with and without special features. (i.e., endnotes, internal citations, title page and reference page).

Keyboarding**Course #: 1441****Allowable Teacher Endorsement:** 0400, 0419, 0500, 0519, 0560, 0561, 0600, 0603, 0605, 7721, 7970**Computer Skills**

1441.4	Computer Skills
1441.4.1	Basic computer skills.
1441.4.2	Identify hardware components.
1441.4.3	Demonstrate the proper care and use of hardware and software.
1441.4.4	Use application processing terminology.

This course provides a comprehensive overview of business administration, office management, leadership development, decision-making skills, and teamwork. Topics include administrative services, emphasizing office procedures, time management, and communication skills crucial for workplace efficiency. Through experiential learning activities, students gain practical insights into real-world business operations and challenges. The course aims to equip students with a thorough grasp of business fundamentals and practical skills necessary for success in various professional environments.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Business Management Technical Skills

1449.1	Use planning tools to guide and manage an organization's business activities.
1449.1.1	Create project timelines, assign tasks, set milestones, and track progress to effectively manage business activities.

Administrative Services

1449.2	Apply planning/time management principles to accomplish workplace objectives (e.g., schedule meetings, maintain supplies, prioritize activities).
1449.2.1	Understand fundamental principles of planning and time management in the workplace.
1449.2.2	Develop practical time management skills such as creating schedules, setting deadlines, and managing interruptions to optimize productivity and achieve workplace objectives efficiently.
1449.2.3	Demonstrate scheduling and organizing meetings effectively.
1449.2.4	Use time-blocking techniques to allocate specific time slots for different activities and tasks, ensuring a structured approach to managing time and maximizing productivity in the workplace.
1449.2.5	Explore and utilize various technology tools and software applications for planning and time management, including calendar apps, project management software, and task management tools.
1449.2.6	Develop skills in monitoring progress towards workplace objectives, tracking milestones, and evaluating performance against targets.
1449.3	Establish and follow procedures to manage records and confidential material.
1449.3.1	Comprehend the fundamental principles of record management, including the importance of organizing, storing, and maintaining records and confidential materials to ensure compliance with regulations and protect sensitive information.
1449.3.2	Identify different types of records and confidential materials commonly found in business settings, including electronic documents, paper files, financial records, personnel files, and sensitive client information.
1449.3.3	Develop skills in establishing record management procedures and protocols, including creating filing systems, implementing retention schedules, and defining access controls.
1449.3.4	Demonstrate organizing records and confidential materials systematically, including sorting, categorizing, labeling, and indexing to facilitate easy retrieval and ensure accuracy and completeness.
1449.3.5	Understand the importance of maintaining confidentiality and data security when handling sensitive information, including implementing safeguards such as password protection, encryption, and restricted access to prevent unauthorized disclosure or misuse.
1449.4	Select appropriate formats to prepare and send internal and external documents.

1449.4.1	Understand the importance of maintaining privacy and confidentiality when preparing internal and external documents.
1449.4.2	Explore distribution channels for internal and external documents.
1449.4.3	Adhere to organizational policies and procedures when preparing and sending internal and external documents.
1449.5	Interact with employees and customers effectively and professionally.
1449.5.1	Demonstrate greeting techniques, telephone etiquette, and email communication, to convey professionalism and competence in office interactions.
1449.5.2	Provide clear and concise instructions to employees and customers.
1449.5.3	Utilize technology tools such as customer relationship management (CRM) systems, email software, and telephone systems effectively to facilitate communication.

Systems

1449.6	Demonstrate understanding of company hierarchies and roles within company structures.
1449.6.1	Understand the concept of company hierarchies, including organizational structures, reporting relationships, and levels of authority, to grasp the framework within which businesses operate.
1449.6.2	Identify different roles within company structures.
1449.6.3	Describe common job titles and levels within company structures, such as managers, supervisors, specialists, and assistants.
1449.6.4	Identify different functional areas within organizations, such as finance, marketing, operations, and human resources.

Ethics and Legal Responsibilities

1449.7	Apply business laws and regulations to business situations.
1449.7.1	Analyze business situations.
1449.7.2	Demonstrate an understanding of compliance requirement to ensure ethical and lawful business practices.
1449.8	Exhibit ethical standards in conducting business negotiations and making business decisions.
1449.8.1	Demonstrating an understanding of ethical principles.

Problem Solving, Critical Thinking, and Decision Making

1449.9	Use problem-solving and critical thinking skills to locate good sources of information about problems and determine appropriate methods for investigating causes.
1449.9.1	Identify, define, and analyze business problems effectively.
1449.9.2	Analyze the causes and effects of business problems using critical thinking skills.
1449.10	Use problem-solving and critical thinking skills to determine root causes of problems and suggest solutions.
1449.10.1	Identify and define complex business problems.
1449.10.2	Apply critical thinking skills to analyze business problems, evaluating evidence, assumptions, and implications.
1449.10.3	Generate creative and innovative solutions to address root causes of business problems.
1449.10.4	Describe root cause analysis.

Leadership and Teamwork

1449.11	Exhibit leadership practices to improve productivity and quality of the working environment.

1449.11.1	Demonstrate leadership practices by modeling behaviors that promote productivity and quality in the working environment.
1449.11.2	Explore techniques for motivating and recognizing the contributions of team members, understanding the importance of morale, engagement, and appreciation in improving productivity and quality of work.
1449.11.3	Practice problem-solving and decision-making techniques applicable to leadership roles, including analyzing situations, evaluating options, and making informed decisions to address challenges and opportunities in the working environment.
1449.12	Work effectively in a team environment to accomplish company goals and improve the quality of the working environment.
1449.12.1	Identify individual roles and responsibilities within a team, understanding how their contributions contribute to the overall success of the team and company goals.
1449.12.2	Practice collaborative problem-solving techniques within a team setting, including brainstorming, analyzing alternatives, and reaching consensus to address challenges and achieve desired outcomes.
1449.12.3	Participate in setting team goals and developing action plans to accomplish company objectives, understanding the importance of setting SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals for success.

Safety, Health, and Environmental

1449.13	Identify and practice appropriate health and safety procedures for business occupations.
1449.13.1	Identify and practice appropriate health and safety procedures relevant to various business occupations.
1449.13.2	Demonstrate understanding of potential hazards, knowledge of preventive measures, and skills in implementing safety protocols to ensure a safe working environment.
1449.14	Apply appropriate emergency procedures for business occupations.
1449.14.1	Demonstrate an understanding of Occupational Safety and Health Administration (OSHA) regulations relevant to the business environment.

Employability and Career Development

1449.15	Demonstrate employability skills related to a career in business.
1449.15.1	Identifying strengths, areas for improvement, and lessons learned, and developing action plans for ongoing learning and skill development to advance their career in business.
1449.16	Pursue career development skills to advance in business careers.
1449.16.1	Explore potential career paths within company structures, including opportunities for advancement, lateral moves, and specialization within functional areas, to envision potential career trajectories and set personal development goals.

This course is designed to develop student understanding and skills in such areas as money management, budgeting, financial goal attainment, credit, insurance, investments, and consumer rights and responsibilities. This course features a variety of activities, assessments, and resource lists for instructional use.

Careers

1451.1	Careers
1451.1.1	Identify different available career pathways and their educational requirements.
1451.1.2	Analyze potential careers based on salary, stability, growth, training, and responsibilities (e.g., gig, business ownership, freelance, uber, delivery service, etc.)
1451.1.3	Investigate ways to finance postsecondary education, certificates, training, armed forces, and workplace skills.
1451.1.4	Examine and understand financial aid opportunities (e.g., FASFA, SAI, state and local scholarships or grants, etc.).
1451.1.5	Analyze the relationship between careers, education, pay, and unemployment.
1451.1.6	Discuss traditional and non-traditional roles in the workforce.
1451.1.7	Develop a resume showing skills, experiences, and education that can be used when applying for a job, scholarship, or college.
1451.1.8	Differentiate between hard and soft skills.
1451.1.9	Demonstrate interview skills and workplace expectations.
1451.1.10	Contextualize the minimum and median wage in your state.
1451.1.11	Explain the benefits of joining a professional organization and identify professional organizations that could help you grow in your career related to its costs.
1451.1.12	Discuss how state unemployment programs can help reduce economic hardship caused by job losses during a recession or pandemic.

Earning Incomes

1451.2	Earning Incomes
1451.2.1	Differentiate between sources of income (e.g., wage, salary, rents, entrepreneurship, disability, business profits, retirement, investments).
1451.2.2	Explain the difference between earned and unearned income.
1451.2.3	Complete the IRS employment forms.
1451.2.4	Read a pay stub and describe the different deductions.
1451.2.5	Differentiate between gross, net, and taxable income.
1451.2.6	Explain how using payday loans can cause a cycle of debt.
1451.2.7	Explain how some income is reported on an IRS form W-2 and some are reported on an IRS Form 1099

Banking

1451.3	Banking
1451.3.1	Research financial services provided by banking institutions.
1451.3.2	Explain the difference between a checking and a savings account.
1451.3.3	Prepare bank account documents (e.g., checks deposit/withdraw slips, endorsements, etc.).
1451.3.4	Reconcile a bank statement and maintain financial records.
1451.3.5	Demonstrate familiarity with online and electronic banking procedures (e.g., recurring payments, bill payments, transfers, bank statements, etc.).
1451.3.6	Discuss the costs and benefits of using alternative financial services relative to traditional banking.
1451.3.7	Exhibit understanding of credit and/or debit cards.

1451.3.8	Explain forms of financial exchange (cash, credit, debit, electronic fund transfer, foreign, etc.).
1451.3.9	Explain the time value of money.
1451.3.10	Compare the costs of cashing a check with various third parties, such as banks or credit unions, check cashing services and retail outlets.

Spending and Budgeting

1451.4	Spending and Budgeting
1451.4.1	Classify expenses into needs or wants (e.g., living expenses, transportation, food, hobbies, entertainment, etc.).
1451.4.2	Identify short-term and long-term financial goals.
1451.4.3	Evaluate price, quality, product information, and payment options.
1451.4.4	Understand the influences on spending and practices of a wise consumer who knows consumer rights and responsibilities (financial constraints, personal preferences, unique needs, peer pressure, warranties, specials, and advertising).
1451.4.5	Analyze the pros and cons of buying versus renting/leasing.
1451.4.6	Explain how having a system for financial record keeping can make it easier to make financial decisions.
1451.4.7	Describe basic budgeting strategies including the paying yourself first strategy.
1451.4.8	Evaluate the advantages of using budgeting tools such as spreadsheets or apps.
1451.4.9	Construct, utilize, and monitor a budget to allocate current income to necessary and desired spending including estimates for both fixed and variable expenses.
1451.4.10	Explain the method of adjusting a budget for unexpected expenses or emergencies.
1451.4.11	Identify specific steps one should take when researching charitable/non-profit organizations and the benefits of philanthropy.

Credit

1451.5	Credit
1451.5.1	Explain how a borrower's credit score can impact their cost of credit and their ability to obtain credit.
1451.5.2	Explain key components of the <i>Fair Credit Reporting Act</i> and how it impacts lenders and borrowers and identify the primary organizations that maintain and provide consumer credit reports.
1451.5.3	Explain how credit card grace periods, methods of interest calculation, payments, and fees affect borrowing.
1451.5.4	Give examples of unsecured and secured loans.
1451.5.5	Differentiate adjustable rate and fixed rate loans (e.g., balloon payments, mortgages, etc.).
1451.5.6	Identify and analyze examples of loans with various down payment scenarios, the effect on loans, and repayment motivation incentives.
1451.5.7	Calculate how much an auto loan will cost given special offers as well as standard factors such as down payment, APR, and term.
1451.5.8	Describe how failing to repay a loan can negatively impact a person's finances and life.
1451.5.9	Enumerate the components of a credit report, how long each data type is retained, what type of organizations can review credit reports (e.g., landlords, banks, employers, insurance, cell phone, etc.), and how one's credit score can impact a person's finances and life.
1451.5.10	Compare what happens if a borrower fails to make required payments on a secured loan, such as an auto loan or a home mortgage, versus failing to pay with a credit card account.
1451.5.11	Understand the importance of reviewing one's credit report and the steps to take to find and dispute errors.
1451.5.12	Create a plan for a person who is having difficulty repaying debt or increasing their credit score.

1451.5.13	Describe the purpose of bankruptcy laws.
1451.5.14	Investigate the effects of bankruptcy on assets, employment, and future access to credit.

Savings, Investing, and Risk

1451.6	Savings, Investing, and Risk
1451.6.1	Describe how saving and investing are different.
1451.6.2	Compare the features of regular savings accounts, money market accounts, and CDs.
1451.6.3	Select a preferred location for a savings account based on a comparison of interest rates and fees at different types of financial institutions.
1451.6.4	Explain how the savings strategy “pay yourself first” can help people achieve their saving goals.
1451.6.5	Recognize the impact of inflation on savings.
1451.6.6	Understand why it is important to maintain an emergency fund.
1451.6.7	Explain how external influences (e.g., peers, family, or social media) can impact personal savings decisions.
1451.6.8	Identify strategies to manage psychological and emotional obstacles of saving.
1451.6.9	Find the current rate paid on CDs at a bank and calculate the expected real rate after inflation.
1451.6.10	Explain why bonds are longer maturities generally earn a higher return than short-term bonds.
1451.6.11	Investigate the long-run average rates of returns on small company stocks, large company stocks, corporate bonds, and Treasury bonds.
1451.6.12	Explain why the expected rate of return on a value stock or mutual fund is likely to be lower than that of a growth stock or mutual fund.
1451.6.13	Describe the impact of inflation on prices over time.
1451.6.14	Predict what could happen to the price of the stock if new information is reported about the company or its products.
1451.6.15	Discuss the pros and cons of investing in a diversified mutual fund versus investing in a small number of individual stocks.
1451.6.16	Explain how target date retirement funds reallocate investments over time to meet their investment objectives.
1451.6.17	Compare tax rates paid on interest income versus short- and long-term capital gains.
1451.6.18	Describe the advantages of investing through a tax-deferred account such as an IRA or 401(k) versus a taxable account.
1451.6.19	Investigate the contribution limits and tax advantages of a traditional IRA versus a Roth IRA.
1451.6.20	Analyze the conditions under which it is appropriate for young adults to have life, health, and disability insurance to prevent risk, liabilities, and/or loss.
1451.6.21	Differentiate between types of insurance (e.g., homeowner’s, automobile, accidental, disability, and life).
1451.6.22	Explain different factors that impact insurance premiums, deductibles, and out-of-pocket costs.
1451.6.23	Research the funding structure for state-, federal-, and government-based insurance programs and whom they cover.
1451.6.24	Describe conditions under which individuals should and should not disclose their Social Security Number (SSN), account numbers, or other sensitive information.
1451.6.25	Provide examples of how online behavior, email and text message scams, telemarketers, and other methods make consumers vulnerable to privacy infringement, identity theft, and fraud and identity theft victim steps and strategies.
1451.6.26	Recommend strategies to reduce the risk of identity theft and financial fraud.

Taxes

1451.7	Taxes
1451.7.1	Explain where income taxes are collected from and how they provide revenue for public expenses.
1451.7.2	Identify which level(s) of government typically receive(s) the tax revenue for income taxes, payroll taxes, property taxes, and sales taxes.
1451.7.3	Read a pay stub and describe the different tax deductions and identify what types of income are taxed.
1451.7.4	Analyze how different IRS Forms affect tax reporting.
1451.7.5	Complete a 1040 Tax Form.

This course is designed to develop student understanding and skills in such areas as Web page design, including using Web page development software, creating page layouts, adding images and frames, creating elements and components, creating tables, managing files, publishing to the Internet, creating hyperlinks, organizing tasks, and using codes (markup languages). Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FBLA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Coding Procedures and Commands to Develop Webpages

1455.1	Use flowcharts, storyboards, wireframes, site maps, and color logs to plan web pages.
1455.1.1	Create a site map outlining page hierarchy and navigation flow.
1455.1.2	Develop wireframes to visualize page layouts and content placement.
1455.1.3	Use flowcharts to map user interactions and site functionalities.
1455.1.4	Craft storyboards to outline user journeys and interactions.
1455.1.5	Create a color log to maintain visual consistency and branding.
1455.2	Write, design, and edit web page content.
1455.2.1	Research content topics thoroughly.
1455.2.2	Write engaging and informative copy.
1455.2.3	Design visually appealing layouts.
1455.2.4	Optimize content for SEO.
1455.2.5	Edit and proofread meticulously.
1455.3	Utilize HTML to define the content of a web page.
1455.3.1	Structure content with HTML tags, use <header>, <nav>, <main>, and <footer> tags to define the structural elements
1455.3.2	Apply formatting to text using <h1> to <h6> for headings, <p> for paragraphs, for bold text, for italic text, and / for lists.
1455.3.3	Embed images into the web page using the tag with attributes like src for the image file path, alt for alternative text, and width/height for dimensions.
1455.3.4	Include hyperlinks to other web pages or resources using the <a> tag with the href attribute defining the URL and optional attributes like target to specify the link behavior.
1455.3.5	Incorporate multimedia content such as videos and audio using HTML5 elements like <video> and <audio>, specifying attributes for source files, controls, and fallback content.
1455.4	Utilize CSS to define the layout of a web page.
1455.4.1	Use CSS to define styles for HTML elements like setting font properties, margins, paddings, and colors.
1455.4.2	Define CSS classes and IDs to apply specific styles to selected elements.
1455.4.3	Utilize CSS selectors to target specific elements for styling.

1455.4.4	Use media queries in CSS to apply different styles based on the device's screen size or orientation.
1455.4.5	Maintain clean and manageable code by placing CSS rules in external style sheets.
1455.5	Utilize JavaScript to define the behavior of a web page.
1455.5.1	Use JavaScript to add event listeners to elements such as buttons or links to trigger actions when clicked.
1455.5.2	Use JavaScript to dynamically modify the content, structure, or style of HTML elements on the page.
1455.5.3	Use JavaScript to validate form input fields.
1455.5.4	Use JavaScript's fetch API to asynchronously retrieve data from a server and update the web page without refreshing.
1455.5.5	Use JavaScript libraries like jQuery or CSS animations to create interactive animations and effects.
1455.6	Code a fully functional website, including multiple web pages from a blank document.
1455.6.1	Define the basic structure with HTML including <!DOCTYPE html>, <html> tags, <head>, and <body>.
1455.6.2	Create a CSS file and link it to the HTML documents.
1455.6.3	Add interactivity with JavaScript.
1455.6.4	Create additional HTML documents for different sections or pages of the website.
1455.6.5	Test and debug.
1455.7	Insert text onto a web page.
1455.7.1	Write text directly within HTML elements, such as <p> for paragraphs, <h1>-<h6> for headings, and for inline text.
1455.7.2	Place text within appropriate HTML tags to structure the content and apply semantic meaning.
1455.7.3	Use JavaScript to insert or modify text content dynamically based on user interactions or data retrieval.
1455.7.4	Import text content from external files or databases using server-side scripting languages like PHP or through APIs.
1455.7.5	Use CMS platforms like WordPress, Joomla, or Drupal to easily add, edit, and manage text content through user-friendly interfaces.
1455.8	Insert hyperlinks to external and internal pages.
1455.8.1	Link to an external website using the <a> tag with the href attribute specifying the URL.
1455.8.2	Use relative URLs to link to other pages within the website.
1455.8.3	Use anchor tags with the href attribute pointing to the ID of the target section within the same page.
1455.8.4	Add the target="_blank" attribute to open the link in a new browser tab.
1455.8.5	Use descriptive anchor text to provide context and improve accessibility for screen readers.
1455.9	Demonstrate an understanding of semantic markup (e.g., header, footer, and navigation).
1455.9.1	Use the <header> tag to define the header section of the webpage, typically containing the website's logo, navigation menu, and other introductory elements.
1455.9.2	Use the <nav> tag to semantically mark up the navigation menu, which typically contains links to different sections of the website.
1455.9.3	Utilize the <main> tag to encapsulate the main content section of the webpage, which includes the primary information or articles.
1455.9.4	Use the <footer> tag to define the footer section of the webpage, typically containing copyright information, contact details, or additional navigation links.
1455.9.5	Use appropriate HTML5 semantic elements like <section>, <article>, <aside>, and <div> to structure the content of the webpage in a meaningful and hierarchical manner.
1455.10	Insert a data table.
1455.10.1	Use the <table> element to create the table structure and define rows and columns using <tr> (table row) and <td> (table data) elements.

1455.10.2	Use the <th> (table header) element to define headers for each column.
1455.10.3	Use the <td> (table data) element to insert data into each cell of the table.
1455.10.4	Use the rowspan and colspan attributes to merge cells and create more complex table structures.
1455.10.5	Use CSS to customize the appearance of the table, including borders, background colors, font styles, and alignment.
1455.11	Define properties of the data table using coding languages.
1455.11.1	Define table structure with HTML.
1455.11.2	Style table appearance with CSS.
1455.11.3	Add interactivity with JavaScript.
1455.11.4	Fetch and display data dynamically.
1455.11.5	Enhance accessibility with ARIA attributes.
1455.12	Add tooltips and alternate text onto images.
1455.12.1	Add tooltips using the title attribute
1455.12.2	Utilize CSS for custom tooltips.
1455.12.3	Provide alternate text for accessibility.
1455.12.4	Use ARIA attributes for improved accessibility.
1455.12.5	Use JavaScript for dynamic tooltips.
1455.13	Insert multimedia, including videos, sound clips, and animation, onto the web page.
1455.13.1	Embed a video using the <video> element.
1455.13.2	Add a sound clip with the <audio> element.
1455.13.3	Incorporate animation with CSS animations.
1455.13.4	Use GIFs for simple animations.
1455.13.5	Incorporate multimedia content from external sources.
1455.14	Insert bulleted and numbered lists.
1455.14.1	Create an unordered list using the element.
1455.14.2	Define a numbered list using the element.
1455.14.3	Add nested lists for sub-items.
1455.14.4	Customize list styles with CSS.
1455.14.5	Use semantic markup for accessibility.
1455.15	Differentiate between relative and absolute links.
1455.15.1	Define relative links.
1455.15.2	Implement absolute links.
1455.15.3	Use relative links for internal navigation.
1455.15.4	Employ absolute links for external resources.
1455.15.5	Consider context and purpose when choosing link types.
1455.16	Link web pages together to form a website.
1455.16.1	Define anchor tags (<a>) with href attributes.
1455.16.2	Specify the target web page.
1455.16.3	Include links in navigation menus.
1455.16.4	Ensure consistency in linking across pages.
1455.16.5	Test all links for functionality.
1455.17	Link the HTML page to JavaScript and CSS documents.
1455.17.1	Link to an external CSS file
1455.17.2	Embed CSS directly within the HTML document

1455.17.3	Link to an external JavaScript file
1455.17.4	Embed JavaScript directly within the HTML document
1455.17.5	Ensure proper file paths for linking
1455.18	Evaluate code to ensure that it is valid and properly structured.
1455.18.1	Use online validators or browser developer tools to check HTML code for errors.
1455.18.2	Review CSS code to ensure selectors, properties, and values are correctly formatted and applied.
1455.18.3	Utilize browser developer tools or linting tools to identify syntax errors, logical issues, and potential bugs in JavaScript code.
1455.18.4	Test cross-browser compatibility.
1455.18.5	Test the webpage on various devices and screen sizes to confirm responsiveness and use accessibility.
1455.19	Utilize web page development software programs to design web page content and features.
1455.19.1	Research web development software.
1455.19.2	Design web page layout.
1455.19.3	Incorporate multimedia content.
1455.19.4	Customize styling with CSS.
1455.19.5	Test and publish.
1455.20	Utilize web page development software programs to publish live web pages.
1455.20.1	Launch the chosen web development software program on your computer.
1455.20.2	Open the web page project you want to publish within the software.
1455.20.3	Use the software's built-in FTP (File Transfer Protocol) or publishing tools to connect to your web hosting server where you want to publish the live web pages.
1455.20.4	Select the files or entire project you want to publish and upload them to the server.
1455.20.5	Once the upload is complete, verify that the web pages are live by accessing them through a web browser using the appropriate URLs.
1455.21	Create and use interactive forms.
1455.21.1	Use HTML to create the form elements such as input fields, text areas, radio buttons, checkboxes, and buttons.
1455.21.2	Implement client-side validation using JavaScript to ensure that the user input meets specified criteria before submission.
1455.21.3	Use server-side scripting languages like PHP, Python, or Node.js to process form data and perform actions such as sending emails, storing data in a database, or generating responses.
1455.21.4	Add dynamic behavior to the form elements using JavaScript, such as showing or hiding sections based on user input, updating form fields dynamically, or displaying error messages.
1455.21.5	Thoroughly test the interactive form across different browsers and devices to ensure compatibility and usability.
1455.22	Define how data is represented using XML and JSON.
1455.22.1	Create XML documents using tags to represent hierarchical data structures with elements and attributes, providing a clear and human-readable format.
1455.22.2	Structure data in JSON (JavaScript Object Notation) using key-value pairs, arrays, and objects, offering a lightweight and easy-to-parse format.
1455.22.3	Use XML for representing structured documents with complex hierarchical relationships, such as configuration files, data interchange formats, and markup languages.
1455.22.4	Employ JSON for transmitting data between client and server in web applications, due to its lightweight nature and native compatibility with JavaScript.

1455.22.5	Consider factors such as readability, complexity, interoperability, and ease of parsing when selecting between XML and JSON for representing data in web development projects.

Backend Webpage Setup and Maintenance

1455.23	Run test routines and schedules to ensure that the website is supported on external interfaces and all browser and device types.
1455.23.1	Define test objectives, scenarios, and acceptance criteria for various aspects of the website, including functionality, usability, performance, and compatibility.
1455.23.2	Implement automated testing tools like Selenium, Puppeteer, or Cypress to run test routines efficiently and consistently across different browsers and devices.
1455.23.3	Perform manual testing to validate user interactions, navigation flows, and visual appearance of the website on different browsers and devices.
1455.23.4	Ensure compatibility by testing the website on popular web browsers (Chrome, Firefox, Safari, Edge, etc.) and various devices (desktops, laptops, tablets, smartphones) with different screen sizes and resolutions.
1455.23.5	Regularly schedule testing routines to validate the website's performance and functionality, including regression testing after updates or changes to the website's codebase.
1455.24	Review or update web page content or links in a timely manner, using appropriate tools.
1455.24.1	Conduct regular content audits.
1455.24.2	Employ CMS platforms like WordPress, Joomla, or Drupal to easily update and manage web page content and links through user-friendly interfaces.
1455.24.3	Utilize version control systems such as Git to track changes to web page content and links, facilitating collaboration and ensuring accountability.
1455.24.4	Use web analytics tools like Google Analytics to track user behavior and engagement, identifying pages with low traffic or high bounce rates that may require content or link updates.
1455.24.5	Actively solicit and respond to user feedback regarding web page content and links.
1455.25	Develop databases that support web applications and websites.
1455.25.1	Define database requirements.
1455.25.2	Select a suitable database management system (e.g., MySQL, PostgreSQL, MongoDB)
1455.25.3	Create a logical and efficient database schema that reflects the data model requirements, including tables, columns, primary and foreign keys, indexes, and constraints.
1455.25.4	Develop the data access layer of the web application or website to interact with the database.
1455.25.5	Conduct thorough testing to ensure data integrity, reliability, and performance under various usage scenarios.
1455.26	Utilize a server to host web pages on an internal LAN.
1455.26.1	Install and configure a web server software such as Apache, Nginx, or Microsoft IIS on a computer within the internal LAN network.
1455.26.2	Configure the server to listen on the internal LAN IP address and port, ensuring accessibility within the local network.
1455.26.3	Place the web page files (HTML, CSS, JavaScript, images, etc.) in the server's document root directory, typically located in a designated folder such as "htdocs" or "www".
1455.26.4	Verify that the hosted web pages are accessible within the internal LAN network by accessing them through web browsers on other devices connected to the same network.

1455.26.5	Implement security measures such as firewalls, access controls, and regular software updates to protect the server and hosted web pages from unauthorized access and potential security threats.
1455.27	Explore domain registrations.
1455.27.1	Use domain registration services or WHOIS lookup tools to check the availability of desired domain names.
1455.27.2	Select a reputable domain registrar that offers competitive pricing, reliable customer support, and additional services such as DNS management and domain privacy protection.
1455.27.3	Follow the registrar's instructions to register the chosen domain name, providing accurate contact information and completing the necessary payment process.
1455.27.4	Access the domain registrar's control panel to configure Domain Name System (DNS) settings, including domain forwarding, name servers, and DNS records such as A, CNAME, MX, and TXT records.
1455.27.5	Monitor domain expiration dates and renew domain registration promptly to prevent domain expiration and potential loss of ownership. Consider enabling auto-renewal options for convenience.
1455.28	Identify tools required for web publishing and backups, including content management tools.
1455.28.1	Explore web publishing tools such as WordPress, Joomla, Drupal, or static site generators like Jekyll or Hugo.
1455.28.2	Choose backup solutions such as plugins, server-side scripts, or cloud-based services to regularly back up website files, databases, and configurations to prevent data loss in case of unforeseen events.
1455.28.3	Implement version control systems like Git along with platforms such as GitHub, GitLab, or Bitbucket to track changes to website files.
1455.28.4	Identify content management tools such as headless CMS platforms like Contentful or traditional CMS systems like WordPress, Joomla, or Drupal.
1455.28.5	Implement monitoring and analytics tools like Google Analytics, Matomo, or server-side logging solutions.
1455.29	Describe basic website security concerns and techniques.
1455.29.1	Secure website traffic by encrypting data exchanged between the web server and the user's browser using HTTPS protocol, preventing eavesdropping and data tampering.
1455.29.2	Enforce password policies requiring users to create strong, unique passwords and regularly update them to prevent unauthorized access to the website's administrative areas and user accounts.
1455.29.3	Keep web server software, content management systems, plugins, and scripts up to date with the latest security patches and updates to address vulnerabilities and protect against exploitation by attackers.
1455.29.4	Configure network firewalls and intrusion detection systems (IDS) to monitor and filter incoming and outgoing traffic, blocking malicious requests, and detecting suspicious activities to prevent unauthorized access and data breaches.
1455.29.5	Regularly backup website files, databases, and configurations to secure storage locations, enabling quick recovery in case of data loss due to security incidents, hardware failures, or other unforeseen events.

Webpage Development Principals, Procedures, and Best Practices

1455.30	Comply with current copyright, creative commons, fair use, and patent laws.
1455.30.1	Understand copyright laws.
1455.30.2	Respect Creative Commons licenses.
1455.30.3	Apply fair use principles.
1455.30.4	Avoid patent infringement.

1455.30.5	Seek legal advice if unsure.
1455.31	Describe web page publishing best practices concerning layout, delivery of content, and functional behaviors of a web page.
1455.31.1	Implement responsive web design techniques to ensure optimal viewing experiences across various devices and screen sizes, utilizing fluid grids, flexible images, and media queries to adapt the layout dynamically.
1455.31.2	Optimize web page loading times by minimizing HTTP requests, compressing images and resources, leveraging browser caching, and prioritizing critical content delivery to enhance user experience and engagement.
1455.31.3	Design intuitive navigation menus and site structures with clear labels and hierarchical organization to help users easily locate information and navigate between different sections of the website.
1455.31.3	Maintain consistent branding elements, color schemes, typography, and visual styles across web pages to reinforce brand identity, establish trust, and provide a cohesive user experience.
1455.31.4	Implement interactive elements, such as buttons, forms, dropdown menus, and modal dialogs, with clear feedback and intuitive behavior to facilitate user interactions and guide users through desired actions or processes seamlessly.
1455.32	Make website development decisions based on analysis and interpretation of design specifications.
1455.32.1	Review design documents, wireframes, mockups, and user stories to understand project requirements, design preferences, and functional expectations for the website.
1455.32.2	Interpret design specifications to identify key elements, layout structures, color schemes, typography choices, and interactive components required to meet project objectives and user needs.
1455.32.3	Assess the technical feasibility of design specifications by considering factors such as browser compatibility, responsive design requirements, accessibility standards, and integration with existing systems or platforms.
1455.32.4	Make informed decisions regarding website development approaches, technologies, frameworks, and tools based on the analysis and interpretation of design specifications, aiming to achieve optimal functionality, usability, and visual appeal.
1455.32.5	Communicate with stakeholders, designers, developers, and project managers to clarify requirements, address concerns, and collaborate on implementing design specifications effectively throughout the website development process.
1455.33	Incorporate technical considerations into website design plans, such as budgets, equipment, performance requirements, or legal issues, including accessibility and privacy.
1455.33.1	Determine budgetary limitations for website development, considering costs associated with domain registration, hosting services, software licenses, development tools, and potential outsourcing of specialized tasks.
1455.33.2	Evaluate hardware and infrastructure requirements, including server capabilities, network bandwidth, storage capacity, and backup solutions, to ensure adequate resources are available for website hosting and maintenance.
1455.33.3	Identify performance objectives for the website, such as page load times, response times, and scalability requirements, to guide development decisions and optimize user experience across different devices and network conditions.
1455.33.4	Address legal and regulatory compliance requirements, including accessibility standards (e.g., WCAG), data privacy regulations (e.g., GDPR, CCPA), and intellectual property rights, to mitigate legal risks and ensure the website meets relevant legal obligations.

1455.33.5	Prioritize accessibility and privacy considerations in website design plans, incorporating features such as semantic markup, keyboard navigation, alt text for images, privacy policies, cookie consent mechanisms, and data encryption to enhance inclusivity and protect user data privacy.
1455.34	Differentiate between search engine optimization and search engine marketing techniques.
1455.34.1	Understand search engine optimization (SEO).
1455.34.2	Implement SEO techniques.
1455.34.3	Differentiate search engine marketing (SEM).
1455.34.4	Utilize SEM techniques.
1455.34.5	Integrate SEO and SEM strategies.

Aesthetics and Usability of the Web Page GUI

1455.35	Analyze user needs (client and audience end) to determine design specifications.
1455.35.1	Gather information about the target audience, including demographics, preferences, behavior patterns, and needs, through surveys, interviews, usability testing, and analytics tools.
1455.35.2	Create user personas representing typical audience segments based on research findings, highlighting their goals, pain points, motivations, and preferences to inform design decisions effectively.
1455.35.3	Collaborate with clients to understand their business objectives, branding guidelines, content priorities, functional requirements, and technical constraints, aligning design specifications with client expectations and project goals.
1455.35.4	Map out user journeys and interaction flows, identifying key touchpoints, entry points, exit points, and potential pain points to optimize the user experience and guide users toward desired actions or outcomes.
1455.35.5	Synthesize user research findings, client requirements, and user journey analysis into actionable design specifications, including layout preferences, content organization, visual elements, interactive features, and accessibility considerations to create user-centered web designs.
1455.36	Analyze, critique, and evaluate existing web pages for design principles, attractiveness, usability, and functionality.
1455.36.1	Assess existing web pages for adherence to design principles such as visual hierarchy, balance, alignment, contrast, and consistency, identifying strengths and weaknesses in layout and aesthetics.
1455.36.2	Critically evaluate the visual appeal of web pages, considering factors such as color schemes, typography choices, imagery quality, and overall aesthetics, and provide constructive feedback for improvement.
1455.36.3	Analyze the usability of web pages by evaluating navigation structures, information architecture, labeling clarity, accessibility features, and user interactions, identifying areas for enhancement to improve user experience.
1455.36.4	Test the functionality of web pages across different devices, browsers, and screen sizes, assessing interactive elements, form submissions, media playback, loading times, and error handling to ensure seamless functionality and responsiveness.
1455.36.5	Compile a comprehensive evaluation report highlighting design, attractiveness, usability, and functionality aspects of existing web pages, offering actionable recommendations and suggestions for enhancement based on best practices and user-centered design principles.
1455.37	Maintain an understanding of current web technologies or programming practices through continuing.
1455.37.1	Regularly read industry blogs, forums, and news websites to stay informed about the latest developments, trends, and best practices in web technologies and programming.

1455.37.2	Engage with online communities, discussion forums, and social media groups focused on web development and programming to exchange knowledge, share experiences, and learn from peers and experts.
1455.37.3	Participate in webinars, workshops, and online courses offered by industry professionals, organizations, and educational platforms to deepen your understanding of current web technologies and programming practices.
1455.37.4	Experiment with new tools, libraries, frameworks, and APIs to explore their capabilities, functionalities, and potential applications in web development projects, keeping abreast of emerging technologies and innovations.
1455.37.5	Dedicate time for continuous learning and skill development through self-study, tutorials, online courses, and hands-on projects to refine your expertise and stay competitive in the ever-evolving field of web development.
1455.38	Education, reading, or participation in professional conferences, workshops, or groups.
1455.38.1	Participate in industry conferences, seminars, and symposiums focused on web development, design, and technology to learn from experts, discover emerging trends, and network with peers.
1455.38.2	Join workshops, training programs, and online courses offered by reputable organizations, educational institutions, or professional associations to acquire new skills, deepen existing knowledge, and stay updated with current practices in web publishing.
1455.38.3	Stay informed by reading books, journals, magazines, and online publications dedicated to web development, UX design, and digital marketing to gain insights, learn new techniques, and broaden your understanding of industry trends and advancements.
1455.38.4	Participate in online forums, discussion groups, and social media communities focused on web publishing, programming languages, and digital design to exchange ideas, seek advice, and collaborate with fellow professionals in the field.
1455.38.5	Become a member of professional associations, user groups, or developer communities related to web publishing, such as the World Wide Web Consortium (W3C), Association for Computing Machinery (ACM), or Web Designers & Developers Association (WDDA), to access resources, attend events, and connect with industry peers for continued learning and professional development.

Evolution of the Internet and Web Sites

1455.39	Describe the history of the Internet.
1455.39.1	Discuss ARPANET and computers of the 1960s.
1455.39.2	Review TCP/IP and computer development in the 1970s.
1455.39.3	Review the commercialization and expansion for the 1980s and 1990s including the WWW.
1455.39.4	Discuss the dot-com boom.
1455.39.5	Discuss current advancements and trends.
1455.40	Identify the creator of the Internet.
1455.40.1	Identify the key individuals; researchers, scientists, and engineers.
1455.40.2	Discuss Tim Berners-Lee and his contribution to WWW
1455.40.3	Review modern scientists and entrepreneurs in the computer field.
1455.41	Explain the purpose of the Internet.
1455.41.1	Discuss global communication.
1455.41.2	Explore information dissemination.

1455.41.3	Review e-commerce and online transactions.
1455.41.4	Discuss collaboration and networking.
1455.41.5	List entertainment and recreation opportunities.
1455.42	Demonstrate how the Internet and Web Pages have evolved as technology (software and hardware) has advanced.
1455.42.1	Discuss evolution of web technologies.
1455.42.2	Explain enhanced user experience.
1455.42.3	Explore mobile responsiveness.
1455.42.4	Review cloud computing and scalability.
1455.42.5	Research internet of things (IoT) integration.

World Wide Web Consortium

1455.43	Describe the purpose of the World Wide Web Consortium.
1455.43.1	W3C aims to develop and maintain open standards for the World Wide Web, ensuring interoperability and compatibility across different web browsers, devices, and platforms.
1455.43.2	W3C creates and publishes technical specifications, guidelines, and best practices for web technologies, including HTML, CSS, JavaScript, accessibility standards (WCAG), and web security protocols, to promote consistency and innovation in web development.
1455.43.3	W3C provides a platform for industry stakeholders, including web developers, browser vendors, technology companies, academics, and government agencies, to collaborate and participate in the development of web standards through working groups, community groups, and public discussions.
1455.43.4	W3C prioritizes accessibility and inclusivity in web design and development, advocating for web content that is accessible to people with disabilities and diverse user needs, and promoting the adoption of accessibility standards and best practices.
1455.43.5	W3C advocates for an open and decentralized web ecosystem, promoting principles of web neutrality, privacy, security, and transparency, and addressing challenges related to digital rights, online privacy, and ethical considerations in web development and governance.
1455.44	Identify World Wide Web Consortium resources.
1455.44.1	Access the W3C website to browse and download technical specifications and standards documents related to web technologies such as HTML, CSS, SVG, WebRTC, and accessibility guidelines (WCAG).
1455.44.2	Explore the list of active working groups within the W3C to stay updated on ongoing standardization efforts and contribute to the development of future web standards in areas such as web platform, privacy, security, and accessibility.
1455.44.3	Join W3C community groups focused on specific topics or interests within the web development community to collaborate with peers, share insights, and contribute to discussions on emerging technologies, best practices, and use cases.
1455.44.4	Utilize W3C-provided test suites, validators, and conformance checkers to ensure compliance with web standards and identify issues related to HTML markup, CSS styling, accessibility, and web compatibility across different browsers and devices.
1455.44.5	Explore educational resources, tutorials, and guidelines provided by the W3C to learn about web standards, best practices, and techniques for designing accessible, interoperable, and future-proof web content and applications.

This course is designed to develop student knowledge and skills in programming and designing game and app ideas, paper prototyping, and other planning techniques. Using various design platforms, programming languages, drawing, and animation techniques, students create an interactive demonstration of the games and apps.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

General Information and Concepts

1456.1	Apply general design and programming concepts.
1456.1.1	Discuss design concepts such as scalability, availability, consistency, partitioning, caching, load balancing, microservices, message queues, and security.
1456.1.2	Investigate basic programming concepts such as variable, constant, conditional, etc.
1456.1.3	Discuss how functions communicate with programs and main programming through parameters, arguments, and return
1456.1.4	Explore the software development lifecycle (SDLC), which consists of planning, designing, implementing, testing, maintaining, deploying, and documenting.
1456.2	Identify various hardware platforms and runtime environments.
1456.2.1	Identify major hardware components and their functions.
1456.2.2	Identify the hardware associated with telecommunication functions.
1456.2.3	Identify the types of computer storage devices.
1456.2.4	Discuss runtime environments and how they affect program/application execution.
1456.3	Identify human aspects in information systems.
1456.3.1	Identify user interface (UI) and user experience (UX) design principles.
1456.3.2	Understand accessibility features to accommodate diverse user needs.
1456.3.3	Describe social interaction features for collaborative applications or multiplayer games.
1456.4	Identify general information technology (IT) definitions and terms.
1456.4.1	Define programming concepts such as variable, constant, conditional, loop, function, class, bug, and debugging.
1456.4.2	Discuss Integrated Development Environment (IDE).
1456.5	Adhere to best programming practices and methodologies.
1456.5.1	Explore software development methodologies (e.g., Agile, Waterfall, etc.).
1456.5.2	Discuss which software development. methodologies to use.
1456.5.3	Explain various coding best practices such as code indentation, meaningful naming, comments that add context, low coupling, and high cohesion, etc.
1456.6	Exhibit understanding of data hierarchy, access methods, and manipulation.
1456.6.1	Define data hierarchy and data types.
1456.6.2	Explore how various software/applications access data sets.

Analyze Programming Problems, Manage Projects, and Create Flowchart Solutions

1456.7	Analyze user requirements for a given outcome.
1456.7.1	Develop user personas to represent diverse needs.

1456.7.2	Analyze user behavior data for insights.
1456.7.3	Test prototypes iteratively with end-users.
1456.8	Determine input and output formats for a program.
1456.8.1	Choose appropriate data structures and file formats for program functionality.
1456.8.2	Specifying JSON or XML data formats for exchanging information between web applications.
1456.8.3	Creating graphical user interfaces (GUIs) with buttons and menus for user interaction in a game.
1456.8.4	Design input forms with text fields and dropdown menus for collecting user data in a mobile app.
1456.9	Determine the flow of data through networks.
1456.9.1	Describe client-server communication protocols for multiplayer game
1456.10	Identify and describe a data flow diagram.
1456.10.1	Describe data flow diagrams to visualize the movement of information within systems.
1456.10.2	Use data flow diagrams to map out the movement of game state data between client and server in an online multiplayer game.
1456.11	Identify and describe a process logic diagram.
1456.11.1	Utilize process logic diagrams to model and optimize workflows in software development.
1456.11.2	Describe process logic diagrams to illustrate sequential steps and decision points in system processes.
1456.11.3	Using a process logic diagram to visualize the game development pipeline, from concept ideation to release.
1456.12	Describe the system development cycle (i.e., code management, ongoing revisions).
1456.12.1	Understand code management and ongoing revisions for project success.
1456.12.2	Explain how using Git for code management increases productivity in software development projects
1456.12.3	Understand why CI/CD pipelines are employed for automated testing and deployment
1456.12.4	Understand how Iteratively updating game features based on player feedback works, and its benefits
1456.13	Describe steps and roles in the project management life cycle.
1456.13.1	Define project goals, objectives, and scope.
1456.13.2	Develop a detailed project plan, allocate resources, and establish timelines.
1456.13.3	Implement the project plan, carry out development tasks, and track progress.
1456.13.4	Monitor project progress, identify deviations from the plan, and take corrective actions.
1456.13.5	Finalize project deliverables, obtain stakeholder approval, and transition the project to the maintenance phase.
1456.14	Define key terminology related to computer programming.
1456.14.1	Define variables and data types.
1456.14.2	Explain control structures and flow control.
1456.14.3	Understand functions and methods.
1456.14.4	Explain OOP as a programming paradigm
1456.14.5	Explore algorithms and data structures.

Design-Program Solutions

1456.15	Determine where data is to be accessed or stored.
1456.15.1	Identify data access and storage requirements.
1456.15.2	Determine appropriate data storage solutions based on project needs.
1456.15.3	Select cloud storage for collaborative document editing in a productivity app.
1456.16	Design data storage and layout.
1456.16.1	Use JSON or XML file formats to store configuration data for a mobile application.
1456.16.2	Describe how relational database schema are used to store user profiles, posts, and comments.

1456.16.3	Explain why game makers use tile-based map data structure for a 2D game to organize terrain, objects, and characters.
1456.17	Apply principles of quality, efficient programming.
1456.17.1	Demonstrate proper use of various image file types, including .jpg., .png., .gif, etc.
1456.17.2	Create core application features including prototypes, user interface mechanics and purpose statements for new software applications.
1456.17.3	Create text.
1456.17.4	Create original images and animations for use in their own software applications.
1456.17.5	Create animations that enhance the design of the application.
1456.18	Explain the importance of a design view.
1456.18.1	Design and document all aspects of formal application design, using screenshots, sample menu layout, and other graphical devices.
1456.18.2	Describe the role of design view in visualizing system architectures and functionality
1456.18.3	Utilize wireframes and mockups to visualize user interface elements in application development.
1456.18.4	Create a UML diagram showing class relationships and system interactions in a coding project
1456.19	Apply implementation plan for a new system.
1456.19.1	Write an implementation plan for coding, applications, and game design projects
1456.20	Assess ongoing impact of existing systems.
1456.20.1	Describe how to implement updates based on assessments to enhance system effectiveness
1456.20.2	Describe how to analyze user engagement and bug reports post-update
1456.20.3	Describe how to conduct A/B testing to measure feature impact
1456.20.4	Describe how to Monitor performance and user feedback for ongoing evaluation.
1456.21	Determine appropriate data types and requirements.
1456.21.1	Evaluate the data needed for the application or game.
1456.21.2	Choose appropriate data types based on the nature of the data and its intended usage.
1456.21.3	Understand what determines account memory and storage limitations, as well as other performance considerations, when selecting data types
1456.21.4	Explain the importance of ensuring that selected data types are compatible with the platform, and external systems
1456.21.5	Consider data types such as numeric, string data, Boolean, date and time and custom data types.

Code Programs

1456.22	Determine the variables and data types for a program.
1456.22.1	Identify program variables and data types for coding, applications, and game design.
1456.22.2	Declare integer variables to store player statistics in a game.
1456.22.3	Employ Boolean data types to represent true/false conditions in application logic.
1456.22.4	Ensure consistency and compatibility of data types throughout the program code.
1456.23	Prepare and code routines using structured logic.
1456.23.1	Create a loop to iterate through an array and perform a specific action on each element.
1456.23.2	Break down complex tasks into smaller, reusable functions for easier management in an application.
1456.23.3	Implement modular programming techniques to improve code readability and maintainability.
1456.24	Distinguish and identify various programming languages.
1456.24.1	Compare and contrast programming languages commonly used in app development, including Java Script, Object-C, Ruby, Python, C++, C#, and Java.
1456.24.2	Identify patterns in software design elements.
1456.24.3	Identify several platforms used for software and application design

1456.25	Apply appropriate computer language syntax.
1456.25.1	Describe sequence commands, procedures, variables, methods, objects, and loops.
1456.25.2	Utilize language-specific rules and conventions to write efficient and readable code.
1456.25.3	Follow JavaScript syntax for defining functions and handling events in web applications.
1456.26	Create and identify unit testing requirements.
1456.26.1	Ensure thorough testing coverage to verify the functionality and reliability of each unit.
1456.26.2	Write test cases to validate the behavior of a function that calculates player movement in a game.
1456.26.3	Implement mock objects to isolate and test individual modules of a complex software system. Top of Form
1456.27	Document appropriate comments and programmer notes.
1456.27.1	Document code structure, logic, and algorithms for readability and maintainability.
1456.27.2	Provide explanations for complex or critical sections to aid understanding and future modifications.
1456.27.3	Document the implementation of game mechanics and player interactions in a game design project.

Test Programs

1456.28	Explain system testing requirements.
1456.28.1	Specify criteria for testing entire software systems or components.
1456.28.2	Understand the Importance of comprehensive testing coverage to validate functionality, performance, and reliability
1456.28.3	Describe what is meant by end-to-end testing to verify the integration and functionality of all modules in an application
1456.28.4	Perform stress testing to evaluate system performance under high loads in a multiplayer game.
1456.28.5	Test user interface elements, database interactions, and backend processes.
1456.29	Design and analyze test plan for use in program testing.
1456.29.1	Define test objectives, strategies, and criteria for evaluating program functionality.
1456.29.2	Conduct thorough analysis to ensure comprehensive test coverage and effective bug detection.
1456.29.3	Design a test plan to verify the functionality of login authentication in a web application.
1456.29.4	Develop a test plan for an application to assess compatibility across different devices and operating systems.
1456.30	Test programs and evaluate results for accuracy.
1456.30.1	Conduct basic technical alpha and beta tests.
1456.30.2	Conduct regular design reviews throughout the application development process.
1456.31	Correct programming errors discovered during testing.
1456.31.1	Debug and troubleshoot issues to ensure software functionality meets requirements.
1456.31.2	Implement solutions to resolve errors and optimize performance for seamless user experience.
1456.31.3	Address a programming error that leads to inconsistent AI behavior in a game.
1456.31.4	Resolving a software glitch that causes data loss during file operations in a productivity application.
1456.32	Identify appropriate debugging tools.
1456.32.1	Identify debugging tools used to pinpoint and resolve software issues efficiently
1456.32.2	Employ browser developer tools to debug JavaScript code in web applications.
1456.32.3	Identify game engine debugging features used to optimize performance in game development.
1456.33	Apply implementation plans for a new system.
1456.33.1	Review the specifications and user requirements such as functionality, features, and constraints.
1456.33.2	Develop a high-level architectural design for the system, outlining the components, modules, and their interactions.

1456.33.3	Breakdown tasks and assign responsibilities.
1456.33.4	Develop and integrate components.
1456.33.5	Conduct thorough testing of each component/module to identify and fix bugs, ensure functionality meets requirements, and optimize performance.

Maintain Programs

1456.34	Change existing programs when requirements change.
1456.34.1	Modify codebase to incorporate new features or functionality as per updated requirements.
1456.34.2	Implement additional character customization options in a role-playing game to meet player demands.
1456.34.3	Update an email client application to support new encryption protocols for enhanced security compliance.
1456.35	Correct existing program errors.
1456.35.1	Debug and troubleshoot issues to ensure software functionality aligns with requirements.
1456.35.2	Resolve a programming error that results in incorrect scoring calculations in a quiz application.
1456.35.3	Address a glitch causing texture rendering issues in a 3D game environment.
1456.36	Update documentation for exiting programs.
1456.36.1	Revise documentation to reflect changes in code, features, or functionality.
1456.36.2	Revise API documentation to include newly added endpoints and functionalities in a web service.
1456.36.3	Amending developer documentation to reflect changes in game mechanics and controls for a video game update.
1456.37	Provide user instructions on program modifications.
1456.37.1	Explain how to apply game patch updates to access new features and bug fixes in an online multiplayer game.

Complete User Documentation and Technical Writing

1456.38	Develop documentation narrative.
1456.38.1	Craft clear explanations of program functionalities, features, and usage.
1456.38.2	Write a narrative describing the purpose and functionality of each module in a software library.
1456.38.3	Develop a game design narrative outlining the storyline, characters, and gameplay mechanics of a role-playing game.
1456.39	Define data use and storage.
1456.39.1	Define database schemas for storing user profiles, transactions, and inventory data in an e-commerce application.
1456.39.2	Implement file storage solutions for media assets in a mobile application.
1456.39.3	Utilize binary file formats to store game level data, player progress, and settings in a game design project.
1456.40	Develop online help for users.
1456.40.1	Develop an online knowledge base with FAQs and troubleshooting guides for a web application.
1456.40.2	Create video tutorials demonstrating gameplay mechanics and controls for a mobile game.
1456.40.3	Design in-app help overlays and tooltips to guide users through features in a productivity application.

Ethics, Legal Compliance and Security

1456.41	Identify concepts of ethics and legal compliance.
1456.41.1	Incorporate considerations for privacy, security, and fairness into software design and implementation.

1456.41.2	Understand data privacy laws like GDPR and CCPA when designing user data handling mechanisms in an application.
1456.41.3	Implement security measures like encryption and access controls to protect user data in an application against unauthorized access.
1456.41.4	Adhere to copyright laws and licensing agreements when incorporating third-party assets or libraries into a game.
1456.42	Identify security concerns.
1456.42.1	Conduct security assessments to detect potential threats and weaknesses.
1456.42.2	Identify SQL injection vulnerabilities in a web application's database queries.
1456.42.3	Implement encryption protocols to secure communication between a mobile application and its backend servers.
1456.42.4	Conduct penetration testing to assess network security in a multiplayer game server.
1456.43	Identify appropriate safety procedures.
1456.43.1	Prioritize user and data safety by integrating appropriate safety measures into the design and implementation process.
1456.43.2	Implement error handling mechanisms to prevent system crashes and data loss in an application.
1456.43.3	Incorporate secure authentication methods to protect user accounts from unauthorized access in a mobile app.

This course is designed to develop student knowledge and skills in developing apps and games using more advanced coding and graphic design including both 2D and 3D elements. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Understanding Core Programming

1457.1	Understand computer storage and data types.
1457.1.1	Differentiate between integers and strings
1457.1.2	Create a database system using SQL.
1457.1.3	Build a text-based game with arrays.
1457.2	Understand computer decision structures.
1457.2.1	Learn how if statements work to control program flow.
1457.2.2	Create a game where different outcomes depend on user choices using if-else statements.
1457.2.3	Practice implementing decision structures in coding challenges.
1457.2.4	Design and develop projects integrating decision structures for practical application.
1457.2.5	Build a chatbot that responds differently based on user input using nested if statements.
1457.3	Identify the appropriate method for handling repetition.
1457.3.1	Understand the usage of loops like for and while loops for repetitive tasks.
1457.3.2	Practice applying different repetition methods in coding exercises.
1457.3.3	Implement a loop to print multiples of a number within a given range.
1457.3.4	Create projects that utilize appropriate repetition techniques for efficient coding.
1457.3.5	Develop a game using a loop to continuously update the game state until a win condition is met.
1457.4	Understand error handling.
1457.4.1	Learn how to use try-except blocks to gracefully manage potential errors.
1457.4.2	Develop a program that manages division by zero error using exception handling.
1457.4.3	Create a game with error handling mechanisms to manage unexpected user inputs and file access errors.

Understanding Object Oriented Programming

1457.5	Understanding Object Oriented Programming.
1457.5.1	Apply OOP principles in practical coding exercises to reinforce learning.
1457.5.2	Develop a game where each game element (e.g., player, enemies) is represented as an object with its own attributes and methods.
1457.5.3	Create complex projects that leverage OOP for modular and scalable design.
1457.5.4	Build a simulation app with classes representing various entities, such as animals, environments, and interactions, to simulate real-world scenarios effectively.
1457.6	Understand inheritance.
1457.6.1	Practice implementing inheritance in coding exercises to understand its role in code reuse.
1457.6.2	Create a hierarchy of classes for diverse types of vehicles, inheriting common properties and behaviors from a base class.

1457.6.3	Design projects that leverage inheritance for building flexible and maintainable code structures.
1457.6.4	Develop a game where several types of characters inherit attributes and methods from a base character class, allowing for easy expansion with new character types.
1457.7	Understand polymorphism.
1457.7.1	Explore how method overriding enables different classes to implement methods with the same name but different functionality in Python.
1457.7.2	Practice applying polymorphism in coding challenges to grasp its versatility.
1457.7.3	Create a program where multiple classes implement a common interface, allowing for interchangeable usage of objects.
1457.7.4	Develop a game where various game entities, such as characters and items, exhibit polymorphic behavior, enabling dynamic interactions and behaviors based on context.
1457.8	Understand encapsulation.
1457.8.1	Learn how to use access modifiers like private and public in Java to control access to class members.
1457.8.2	Apply encapsulation in coding exercises to reinforce understanding.
1457.8.3	Create a class representing a bank account with private variables for balance and methods for deposit and withdrawal.
1457.8.4	Design projects that prioritize encapsulation for secure and maintainable code.
1457.8.5	Develop a software engine where game objects encapsulate their data and behaviors, ensuring modularity and ease of maintenance

Understanding General Software Development

1457.9	Understand application life-cycle management.
1457.9.1	Understand the phases of Android app life-cycle, such as onCreate(), onStart(), onResume(), onPause(), onStop(), and onDestroy().
1457.9.2	Implement a simple game using Unity where you manage initialization, updates, and destruction of game objects.
1457.9.3	Develop a web application with Flask or an equivalent where you manage sessions, request handling, and resource cleanup efficiently to ensure optimal performance.
1457.10	Comprehend the phases and processes involved in the software development life cycle.
1457.10.1	Learn about planning, development, testing, and deployment stages.
1457.10.2	Develop a web application following agile methodology.
1457.10.3	Develop a plan for a game with defined stages like design, coding, testing, and release.
1457.11	Familiarize yourself with version control systems for collaborative software development.
1457.11.1	Learn the basics for tracking changes in code collaboratively.
1457.11.2	Practice version control in team projects.
1457.11.3	Develop a game collaboratively with Git.

Understanding Desktop Applications

1457.12	Understanding Desktop Applications.
1457.12.1	Learn the basics of building desktop apps using frameworks
1457.12.2	Explore desktop application development by creating simple projects.
1457.12.3	Build a music player app with advanced features using Electron framework in JavaScript.
1457.13	Understand Windows services.
1457.13.1	Learn about the architecture and functions of Windows services
1457.13.2	Create a simple Windows service using C# and install it on your local machine for testing and monitoring.

1457.14	Update documentation for existing programs.
1457.14.1	Revise code comments and README files in a Python project to reflect recent changes and additions.
1457.14.2	Update user manuals and API documentation for a web application after implementing new functionality.
1457.14.3	Understand the role of QA testers and developers to review and verify a mobile app
1457.15	Provide user instructions on program modifications.
1457.15.1	Develop a step-by-step guide explaining how to update settings in an app.
1457.15.2	Implement tooltips or inline help text in a game design software to guide users through customization options.
1457.15.3	Include a "Help" section within a coding app containing FAQs and video tutorials on making code modifications.

Understanding Web Applications

1457.16	Understanding Web Applications.
1457.16.1	Explore HTML, CSS, and JavaScript basics for building web interfaces.
1457.16.2	Develop a personal portfolio website using a frontend framework like React.js.
1457.16.3	Gain expertise in web application design by tackling more complex projects.
1457.18	Understand Microsoft ASP.NET Web application development.
1457.18.1	Explore the basics of ASP.NET MVC framework for building web applications.
1457.18.2	Create a simple blog application using ASP.NET Core to understand routing, controllers, and views.
1457.19	Understand Web hosting.
1457.19.1	Learn about diverse types of web hosting such as shared hosting, VPS hosting, and dedicated hosting.
1457.19.2	Deploy a static website using a service like Netlify or GitHub Pages.
1457.19.3	Understand cloud hosting environments on AWS or Azure and how they are used for dynamic web application with load balancing and auto-scaling features
1457.20	Understand Web services.
1457.20.1	Learn about RESTful APIs and SOAP protocols for data exchange over the web.
1457.20.2	Develop a simple RESTful API using Node.js and Express.js to retrieve and manipulate data from a database.
1457.20.3	Enhance a web service with JWT-based authentication for secure access to protected resources.

General Information and Concepts

1457.21	Apply general design and programming concepts.
1457.21.1	Implement the Model-View-Controller (MVC) architecture in a web application using frameworks like Django or Spring.
1457.21.2	Utilize design patterns and best practices to improve code readability and maintainability.
1457.21.3	Refactor code to improve algorithm efficiency and reduce resource consumption in an image processing application.
1457.22	Identify various hardware platforms and run-time environments.
1457.22.1	Learn about mobile platforms like iOS and Android, as well as desktop platforms like Windows, macOS, and Linux.
1457.22.2	Experiment with development environments tailored to specific platforms.
1457.22.3	Use Xcode for iOS app development and Android Studio for Android app development.
1457.22.4	Adapt coding practices and optimizations for different hardware and run-time environments.
1457.22.5	Optimize game graphics and performance for various gaming consoles.
1457.23	Identify human aspects in information systems.

1457.23.1	Explore user interface (UI) design guidelines to create intuitive and user-friendly interfaces.
1457.23.2	Conduct user research to understand user needs and preferences.
1457.23.3	Incorporate user-centered design principles into app and game development processes.
1457.23.4	Iteratively test prototypes with real users to gather insights and improve user experience.
1457.24	Identify general information technology (IT) definitions and terms.
1457.24.1	Familiarize yourself with terms like "algorithm," "database," and "server" to understand basic IT concepts.
1457.24.2	Learn terms such as "API," "cloud computing," and "cybersecurity" for web development or software engineering projects.
1457.24.3	Apply acquired IT knowledge in practical contexts to reinforce understanding.
1457.25	Adhere to best programming practices and methodologies.
1457.25.1	Stay updated on coding standards like Clean Code principles by reading books and participating in coding communities.
1457.25.2	Apply best practices in coding, such as modularization and code reuse, in project development.
1457.25.3	Employ agile methodologies to iteratively develop and deliver high-quality software.
1457.25.4	Organize development sprints and conduct regular retrospectives to improve team collaboration and product quality.
1457.26	Exhibit understanding of data hierarchy, access methods, and manipulation.
1457.26.1	Study hierarchical data structures like trees and graphs and understand how to access and manipulate them efficiently.
1457.26.2	Write algorithms to search, insert, and delete elements in various data structures like arrays, linked lists, and hash tables.
1457.26.3	Design a relational database schema for a social media platform, ensuring efficient data retrieval and manipulation for users and administrators.

This course is designed to develop student understanding and skills in such areas as the elements of digital imaging and multimedia knowledge and skills necessary for a career in the business and marketing field. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Instructors should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FBLA. All West Virginia instructors are responsible for classroom instruction that integrates learning skills, technology tools, and standards.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Internet Basics

1462.1	Describe the process of information exchange between web server and client.
1462.1.1	Client sends a request: The client (usually a web browser) sends a request to the web server for a specific resource.
1462.1.2	Web server receives the request: The web server receives the client's request and processes it.
1462.1.3	Server sends response: Once the requested resource is located or generated, the web server constructs an HTTP response containing the requested content.
1462.1.4	Client receives response: The client receives the HTTP response from the server. If the request was successful, the client parses the response and begins rendering the content.
1462.1.5	Once all requested resources have been received and rendered the connection is closed.
1462.1.6	In the case of a webpage, the client may parse the received content and identify additional resources needed to fully render the page, such as CSS stylesheets, JavaScript files, or images.
1462.2	Describe the use of web browsers, search engines, and various clients within a given context of use.
1462.2.1	Utilize web browsers to access and navigate virtual galleries, online exhibitions, and multimedia-rich websites showcasing digital images, videos, and interactive content.
1462.2.2	Employ search engines to find specific digital images, multimedia projects, or resources related to digital imaging techniques, artists, or multimedia software.
1462.2.3	Engage with various multimedia clients such as media players, image editing software, and 3D modeling tools to create, edit, and manipulate digital images, videos, and animations.
1462.2.4	Employ social media platforms, messaging apps, or cloud storage services to share digital images, multimedia projects, or virtual experiences with others.
1462.2.5	Collaborate with others on multimedia projects, sharing files and resources using collaborative tools, cloud storage platforms, or version control systems.
1462.3	Describe the function and components of a URL and how it relates to protocols, addresses, and ports.
1462.3.1	Use URLs to access multimedia resources such as digital images, videos, and interactive content hosted on web servers.
1462.3.2	Utilize URLs to navigate virtual environments, including online galleries, exhibitions, and multimedia presentations, to explore digital imaging and multimedia content.
1462.3.3	Share URLs to multimedia content via social media, messaging platforms, or email, enabling others to access and view digital images, videos, and multimedia projects.

1462.3.4	Embed URLs of multimedia content within web pages to integrate images, videos, and interactive elements, enhancing the multimedia experience for website visitors.
1462.3.5	Collaborate on multimedia projects by sharing URLs of shared resources, facilitating teamwork and resource sharing among collaborators working on digital imaging and multimedia projects.
1462.4	Identify and use graphics file formats common to the Internet.
1462.4.1	Differentiate between common image file types, such as jpeg, gif, bmp, png, etc.
1462.4.2	Choose the correct file format for each project.
1462.4.3	Describe software-specific image file types.
1462.4.4	Embed images in web pages.
1462.4.5	Share Images on Social Media
1462.4.6	Collaborate on Multimedia Projects
1462.5	Prepare digital images for use on the Web.
1462.5.1	Apply layout and design principles.
1462.5.2	Create layouts for ease, readability, and attractiveness.
1462.5.3	Demonstrate application of drawings and paintings.
1462.5.4	Produce images using layers and layer styles.
1462.5.5	Incorporate color techniques, including gradient, grayscale, opacity, blending, etc.
1462.5.6	Utilize paths to modify objects, shapes, and text.
1462.5.7	Design a digital imaging or multimedia project.

Website Planning & Design

1462.6	Describe web design and planning principles and different types of pages.
1462.6.1	Define objectives and understand the target audience.
1462.6.2	Plan layout and structure for effective organization.
1462.6.3	Create visually appealing designs aligned with brand identity.
1462.6.4	Ensure adaptability across devices and accessibility for all users.
1462.6.5	Iterate through testing to refine and optimize user experience.
1462.7	Explain various project management techniques for setting goals and performing needs assessment.
1462.7.1	Define project scope and objectives.
1462.7.2	Conduct stakeholder analysis.
1462.7.3	Perform needs assessment.
1462.7.4	Set SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals.
1462.7.5	Establish project timeline and milestones.
1462.8	Describe the principles behind usable navigation.
1462.8.1	Apply layout and design principles for simplicity, attractiveness, and readability.
1462.8.2	Make navigation elements easily accessible and clear.
1462.8.3	Label links and buttons descriptively for easy understanding.
1462.8.4	Keep navigation design consistent throughout the site.
1462.8.5	Ensure navigation works well across different screen sizes.
1462.9	Identify problems related to legacy browsers.
1462.9.1	Evaluate content for compatibility issues.
1462.9.2	Conduct testing to determine legacy browsers' discrepancies or missing functionality.
1462.9.3	Implement techniques to ensure basic functionality while enhancing features for modern ones.
1462.9.4	Develop strategies to handle unsupported features preventing critical errors.

1462.9.5	Inform users about limitations and encourage upgrading to modern ones for optimal viewing experience.
1462.10	Describe the mechanics behind mobile websites and how they differ from non-mobile sites.
1462.10.1	Develop mobile websites using responsive design techniques to ensure adaptability across various screen sizes and devices, including smartphones and tablets.
1462.10.2	Optimize user interface elements, such as buttons, menus, and navigation, for touch interaction on mobile devices, providing a seamless and intuitive browsing experience.
1462.10.3	Prioritize essential content and simplify navigation to accommodate smaller screens and shorter attention spans, ensuring that users can access key digital imaging and multimedia content efficiently.
1462.10.4	Optimize mobile websites for speed and performance by minimizing file sizes, reducing HTTP requests, and leveraging caching techniques to enhance loading times and responsiveness.
1462.10.5	Implement device detection mechanisms to identify mobile devices and dynamically adjust the layout, content, and functionality of the website to provide an optimized experience tailored to mobile users' needs.
1462.11	Describe the mechanics behind dynamic websites and how they differ from static sites.
1462.11.1	Develop dynamic websites using server-side scripting languages such as PHP, Python, or Ruby on Rails to generate content.
1462.11.2	Incorporate databases such as MySQL, PostgreSQL, or MongoDB to store and retrieve digital imaging and multimedia content.
1462.11.3	Utilize client-side scripting languages such as JavaScript to enhance interactivity and responsiveness.
1462.11.4	Integrate CMS platforms such as WordPress, Drupal, or Joomla to facilitate dynamic content creation, editing, and publishing.
1462.11.5	Incorporate interactive features such as user-generated content, comments, ratings, and social media integration.
1462.12	Design for accessibility (e.g., ADA-Section 508 and Web Content Accessibility (Guidelines)).
1462.12.1	Adhere to WCAG guidelines.
1462.12.2	Include descriptive alternative text (alt text) for images, videos, and other non-text content.
1462.12.3	Ensure that all functionality and interactive elements can be accessed and operated using a keyboard alone.
1462.12.4	Utilize semantic HTML markup to structure content and convey meaning effectively.
1462.12.5	Conduct thorough accessibility testing using tools such as screen readers, keyboard navigation, and automated testing tools.

Markup

1462.13	Demonstrate the ability to use HTML5 to create web pages.
1462.13.1	Create a webpage featuring a gallery of digital artworks with HTML5 tags for embedding images and videos, ensuring compatibility across different screen sizes.
1462.13.2	Design a homepage for a photography portfolio website, incorporating HTML5 image sliders to display a selection of high-resolution photographs with smooth transitions.
1462.13.3	Develop an educational website featuring interactive lessons on digital imaging techniques, embedding HTML5 video elements to demonstrate step-by-step tutorials alongside textual explanations.
1462.14	Demonstrate an understanding of semantic markup (e.g., header, footer, navigation).
1462.14.1	Implement semantic markup to define the structure of an online magazine, utilizing <section>, <article>, and <aside> tags to distinguish between main content, articles, and supplementary information.

1462.14.2	Enhance webpage accessibility and user experience by incorporating ARIA landmarks alongside semantic markup, providing navigation landmarks for screen readers and keyboard navigation.
1462.14.3	Design a restaurant website with a clear header containing the logo and navigation menu, a footer displaying contact information and social media links, and a navigation bar for easy access to different sections such as menu, reservations, and about us.
1462.15	Create and use interactive forms.
1462.15.1	Create a responsive contact form with HTML5 and CSS3 for user inquiries.
1462.15.2	Validate form inputs using JavaScript and HTML5 for data accuracy.
1462.15.3	Build interactive forms with dynamic features like conditional logic.
1462.16	Describe how to implement tabular data using table elements.
1462.16.1	Structure tabular data using HTML <table> elements to organize information into rows and columns for clarity and readability.
1462.16.2	Utilize <thead>, <tbody>, and <tfoot> elements to separate table headers, body content, and footer information, improving accessibility and semantic markup.
1462.16.3	Enhance table usability by incorporating attributes like rowspan and colspan to merge or span cells, providing a visually cohesive presentation of complex data.

Styling

1462.17	Describe how CSS is used and why.
1462.17.1	Apply CSS to set font styles, colors, and layout properties for text and images on a photography portfolio website, ensuring consistency and visual appeal.
1462.17.2	Implement media queries in CSS to adjust image sizes and text alignment for optimal viewing on desktops, tablets, and smartphones, enhancing accessibility and usability.
1462.17.3	Use CSS transitions and keyframe animations to create slideshow effects for showcasing images in an online gallery, providing an interactive and visually appealing experience for visitors.
1462.18	Design and implement layers and style navigation bars using CSS3.
1462.18.1	Implement a horizontal navigation bar with CSS3 styling, including hover effects, transitions, and dropdown menus for a photography website's portfolio categories.
1462.18.2	Ensure the navigation bar remains on top of other page elements by setting a higher z-index value, allowing users to access navigation links seamlessly regardless of page scrolling or content positioning.
1462.18.3	Apply CSS3 gradients and box shadows to create a modern and visually appealing navigation bar for an online multimedia platform, enhancing user engagement and brand identity.
1462.19	Implement a design and layout using style sheets.
1462.19.1	Design a responsive layout using CSS for cross-device compatibility.
1462.19.2	Customize typography, colors, and spacing for consistent branding.
1462.19.3	Add interactivity with CSS3 features like animations and transitions.
1462.20	Describe the use of CSS for formatting.
1462.20.1	Apply CSS properties to format text, images, and layout elements, ensuring consistent styling across web pages.
1462.20.2	Utilize CSS for responsive design, adjusting layout and styling based on screen size and device orientation for optimal viewing.
1462.20.3	Implement CSS frameworks like Bootstrap or Foundation for pre-defined styling and layout components, expediting the formatting process.

Scripting

1462.21	Describe the difference between a scripting language and a markup language.
1462.21.1	Differentiate between scripting and markup languages: scripting languages enable dynamic functionality, while markup languages structure and describe content.
1462.21.2	Understand that scripting languages execute code to perform actions or tasks, while markup languages define elements and their attributes to organize information.
1462.21.3	Recognize that scripting languages are executable code, capable of performing calculations, interacting with users, and manipulating data, while markup languages are static and primarily focused on content structure.
1462.22	Describe the difference between popular client-side and server-side programming languages.
1462.22.1	Distinguish between client-side and server-side programming languages: client-side languages run in the user's web browser, while server-side languages execute on the web server.
1462.22.2	Understand that client-side languages manipulate webpage content after it's been delivered to the user's browser, providing interactivity and responsiveness without requiring server interaction.
1462.22.3	Recognize that server-side languages handle tasks on the web server before delivering the finalized webpage to the user's browser, such as retrieving data from databases and generating dynamic content.
1462.23	Describe the use of third-party programming interfaces, including APIs.
1462.23.1	Integrate third-party APIs to enhance functionality, such as embedding Google Maps for location visualization in a photography portfolio.
1462.23.2	Streamline workflows by accessing specialized tools via third-party APIs, like incorporating Adobe Creative Cloud for advanced image editing within multimedia applications.
1462.23.3	Expand user engagement with features like social media sharing through third-party APIs, such as enabling Twitter sharing directly from a multimedia gallery.
1462.24	Describe basic JavaScript language used to manipulate elements on a webpage.
1462.24.1	Use JavaScript to select and manipulate HTML elements dynamically, enabling interactive user experiences on webpages.
1462.24.2	Employ JavaScript event handlers to trigger actions in response to user interactions like clicks or mouse movements.
1462.24.3	Utilize JavaScript to modify CSS styles dynamically, enabling visual changes to webpage elements based on user input or events.
1462.25	Describe how data is represented using XML and JSON.
1462.25.1	XML (eXtensible Markup Language) represents data using a hierarchical structure of nested elements with tags enclosing content.
1462.25.2	JSON (JavaScript Object Notation) represents data as key-value pairs enclosed in curly braces, allowing for easy parsing and manipulation in JavaScript.
1462.25.3	XML is more verbose and primarily used for representing documents with structured data, while JSON is more lightweight and commonly used for transmitting data between web servers and clients.

Multimedia Assets

1462.26	Identify and use graphics file formats common to the internet and differentiate between raster and vector images.
1462.26.1	Define dots per inch (DPI) and pixels per inch (PPI).
1462.26.2	Differentiate resolution as it pertains to image creation, resizing, rescaling, and reshaping.
1462.26.3	Differentiate between raster and vector images.

1462.26.4	Demonstrate when to use raster and vector images.
1462.26.5	Use guides and rulers to create vector images.
1462.26.6	Take pictures using various features on a digital camera.
1462.26.7	Explore compatibility and conversion of raster and vector images.
1462.26.8	Differentiate which image types are raster and vector.
1462.27	Describe how to use basic media editing tools to prepare digital images and video for use on the Web.
1462.27.1	Utilize multiple platforms for creating and enhancing digital images.
1462.27.2	Transfer images from a camera to a computer or other electronic equipment.
1462.27.3	Import, export, organize, and save images.
1462.27.4	Utilize filters, tools, and features within digital imaging software applications to enhance photographs.
1462.28	Describe how to use rich internet applications to add interactive media to a website.
1462.28.1	Integrate JavaScript frameworks like React or Angular to develop rich internet applications (RIAs) with interactive media components.
1462.28.2	Utilize HTML5 and CSS3 to design and style interactive media elements, such as image sliders, video players, and interactive maps.
1462.28.3	Incorporate JavaScript libraries like jQuery or D3.js to add dynamic and interactive visualizations to web content, enhancing user engagement and data presentation.
1462.29	Describe how to integrate embedded media into a website.
1462.29.1	Create animations utilizing frames and keyframes on a timeline.
1462.29.2	Utilize tweening and symbols.
1462.29.3	Create an animated walk cycle.
1462.29.4	Integrate original audio-digital elements (voice/sound clips, music) into a project.
1462.29.5	Enhance a voice/sound clip with lip sync.

Web Marketing & Business Management

1462.30	Explain the issues involved in copyrighting, trademarking, and licensing.
1462.30.1	Define the various types of Creative Commons licenses.
1462.30.2	Describe the purpose of copyright, Creative Commons, public domain, etc.
1462.30.3	Adhere to copyright and Creative Commons laws.
1462.30.4	Locate digital images and multimedia published under various copyright and Creative Commons licenses.
1462.30.5	Maintain digital safety, including personal and computer safety.
1462.31	Identify aspects of marketing related to social media.
1462.31.1	Develop engaging multimedia content tailored to target audiences on social media platforms to increase brand visibility and audience engagement.
1462.31.2	Utilize social media analytics tools to track and analyze user engagement metrics, such as likes, shares, and comments, to refine marketing strategies and optimize content performance.
1462.31.3	Foster community engagement and brand advocacy through interactive multimedia campaigns, encouraging user-generated content and leveraging influencer partnerships to amplify brand reach.
1462.32	Describe web-related mechanisms for audience development, including attracting/retaining an audience, and considerations for a global environment.
1462.32.1	Enhance website visibility and attract new audiences by optimizing content for search engines.
1462.32.2	Develop compelling multimedia content that resonates with the target audience's interests and needs.
1462.32.3	Ensure website speed, accessibility, and usability are optimized to provide a seamless and enjoyable user experience for audiences worldwide.

1462.32.4	Continuously monitor audience engagement metrics, feedback, and market trends to refine audience development strategies.
1462.33	Define e-commerce terms and concepts.
1462.33.1	Learn terms such as online store, shopping cart, payment gateway, inventory management and order fulfillment.
1462.33.2	Differentiate between B2C and B2B e-commerce.
1462.33.3	Discuss fulfillment methods.
1462.33.4	Understand cross-selling and upselling.
1462.34	Differentiate between search engine optimization and search engine marketing techniques.
1462.34.1	Understand search engine optimization (SEO) Techniques such as keyword research, on-page optimization and link building,
1462.34.2	Understand search engine marketing (SEM) Techniques such as pay-per-click, display advertising and remarketing.

Administration and Maintenance

1462.35	Describe the process of pre-launch and post-launch functionality testing (e.g., quality assurance).
1462.35.1	Utilize test planning, develop a comprehensive test plan outlining testing objectives, strategies, and timelines.
1462.35.2	Perform test execution, conduct various tests including functional testing, usability testing, compatibility testing, and performance testing to ensure the website or application functions as intended across different devices and browsers.
1462.35.3	Use bug tracking, identify, and document any issues or bugs encountered during testing, prioritizing them based on severity and impact on user experience.
1462.35.4	Perform User Acceptance Testing (UAT), Engage real users to test the website or application in a production environment, gathering feedback and addressing any remaining issues.
1462.35.5	Utilize performance monitoring, continuously monitor website or application performance, including load times, responsiveness, and server stability, to identify and resolve any performance issues.
1462.35.6	Make iterative improvements, implement feedback, and address any reported issues through regular updates and maintenance cycles, ensuring the website or application remains functional and optimized over time.
1462.36	Identify the tools required for web publishing, including content management tools.
1462.36.1	Use content creation tools such as Adobe Creative Cloud, Canva, and GIMP.
1462.36.2	Learn content management tools like WordPress, Drupal, and Joomla.
1462.37	Identify hosting resources and domain management.
1462.37.1	Research and select a hosting provider that offers reliable server resources, sufficient storage space, and bandwidth to accommodate multimedia content.
1462.37.2	Evaluate hosting plans based on factors such as server uptime, performance optimization features, and scalability to handle potential traffic spikes.
1462.37.3	Ensure the hosting provider implements robust security measures such as SSL certificates, regular backups, and malware scanning to protect multimedia assets and user data.
1462.37.4	Choose a unique and relevant domain name for the website or multimedia project, considering branding, SEO, and user memorability.
1462.37.5	Select a reputable domain registrar to register and manage domain names, ensuring domain ownership and management rights are secured.

1462.37.6	Keep track of domain registration expiration dates and renew domain registrations in a timely manner to prevent loss of ownership and ensure uninterrupted access to the website or multimedia project.
1462.37.7	Set up DNS records such as A records, CNAME records, and MX records to point the domain name to the hosting server, manage subdomains, and configure email services.
1462.37.8	Use domain management tools provided by the registrar or hosting provider to make DNS configuration changes, update DNS records, and troubleshoot DNS-related issues.
1462.37.9	Monitor DNS performance and resolve any DNS-related issues promptly to ensure optimal website accessibility and performance for visitors.
1462.38	Describe the concepts of backups, server log analysis, and benchmarks.
1462.38.1	Establish a backup routine to regularly duplicate and store multimedia files, databases, and website code to prevent data loss.
1462.38.2	Utilize log analysis tools such as Google Analytics, AWStats, or Loggly to parse and analyze server log data for insights into website performance, user behavior, and security threats.
1462.38.3	Utilize benchmarking tools like GTmetrix, Pingdom, or WebPageTest to assess website performance, identify bottlenecks, and optimize multimedia assets for faster loading times.
1462.39	Describe basic website security concerns and techniques.
1462.39.1	Enforce strong password policies for website users.
1462.39.2	Enable two-factor authentication for user accounts.
1462.39.3	Hash and encrypt passwords stored in the website database.
1462.39.4	Keep the website's CMS and plugins/modules/extensions up to date with the latest security patches and bug fixes.
1462.39.5	Enable automatic updates for CMS platforms and plugins.
1462.39.6	Periodically scan the website for vulnerabilities using security tools and plugins.
1462.39.7	Encrypt data using SSL or TLS.
1462.39.8	Enable HTTPS protocol for the website to establish a secure connection.
1462.39.9	Implement CSP headers to mitigate the risk of cross-site scripting (XSS) attacks.

This course explores the connection between e-commerce and financials, offering students an understanding of fundamental principles and practices and how they interact within the modern economy. Beginning with an exploration of e-commerce, topics include business models, digital payment systems, online marketing strategies, and legal and ethical considerations and their relation to finances and money markets. Through real-world examples and case studies, students analyze the impact of e-commerce growth on financial market performance and investment opportunities. Empowering students to navigate digital commerce and investment effectively in today's global landscape.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

E-Commerce

1464.1	Introduction to E-Commerce.
1464.1.1	Understand the concept of e-commerce and its significance in modern business.
1464.1.2	Differentiate types of e-commerce (B2C, B2B, C2C, etc.) and their characteristics.
1464.2	E-Commerce Infrastructure.
1464.2.1	Identify e-commerce technologies, including websites, online payment systems, and mobile applications.
1464.2.2	Understand the role of internet protocols, security measures, and encryption in e-commerce transactions.
1464.3	Digital Payment Systems.
1464.3.1	Evaluate different types of digital payment systems used in e-commerce, including credit cards, digital wallets, and cryptocurrencies.
1464.3.2	Understand revenue generation strategies, customer acquisition, and retention tactics in e-commerce.
1464.3.3	Assess the security features and regulatory compliance requirements of digital payment systems.
1464.4	E-Commerce Legal and Ethical Considerations.
1464.4.1	Identify legal and regulatory issues in e-commerce, including privacy laws, intellectual property rights, and consumer protection laws.
1464.4.2	Analyze ethical considerations in e-commerce, such as data privacy, cybersecurity, and fair business practices.
1464.5	E-Commerce Marketing and Promotion.
1464.5.1	Analyze various online marketing strategies used by e-commerce businesses, such as search engine optimization (SEO), social media marketing, and email marketing.
1464.5.2	Introduction to e-commerce analytics and metrics for measuring marketing performance and customer engagement.

Financial Transactions

1464.6	Introduction to Financial Markets.
1464.6.1	Understand the role and functions of financial markets in the economy.
1464.6.2	Explain different types of financial markets, including money markets, capital markets, and derivatives markets.
1464.7	Financial Instruments.

1464.7.1	Analyze financial instruments traded in financial markets, including stocks, bonds, commodities, and derivatives.
1464.7.2	Analyze the functions and roles of financial agents in facilitating e-commerce transactions and financial market operations.
1464.7.3	Understand the characteristics, valuation, and risks associated with different financial instruments.
1464.8	Investment Opportunities in E-Commerce.
1464.8.1	Differentiate key participants in financial markets, including investors, issuers, brokers, dealers, and regulators.
1464.8.2	Evaluate investment opportunities in e-commerce companies, including initial public offerings (IPOs), venture capital investments, and mergers and acquisitions.
1464.8.3	Analyze financial statements and key performance indicators to assess the financial health and growth potential of e-commerce businesses.
1464.8.4	Understand the role of stock exchanges, clearinghouses, and settlement systems in financial market operations.
1464.9	Risk Management in E-Commerce.
1464.9.1	Identify potential risks and challenges in e-commerce operations, including cybersecurity threats, supply chain disruptions, and regulatory compliance issues.
1464.9.2	Develop risk management strategies to mitigate and address these risks in e-commerce businesses.
1464.10	Financial Analysis and Reporting.
1464.10.1	Describe regulatory frameworks governing financial markets, including securities regulations, exchange regulations, and anti-money laundering laws.
1464.10.2	Understand the role of regulatory agencies, such as the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC).
1464.11	Globalization and Cross-Border E-Commerce.
1464.11.1	Explore the opportunities and challenges of cross-border e-commerce transactions, including currency exchange, international trade regulations, and cultural differences.
1464.11.2	Evaluate strategies for expanding e-commerce businesses into global markets and managing international operations.
1464.12	Application of Finance in E-Commerce.
1464.12.1	Develop a comprehensive business plan for an e-commerce venture.
1464.12.2	Formulate a market analysis.
1464.12.3	Create financial projections.
1464.12.4	Develop risk management strategies.

Financial Transactions in E-Commerce

1464.13	Understanding Financial Transactions in E-Commerce.
1464.13.1	Analyze how financial transactions are conducted in e-commerce platforms, including the role of payment gateways, credit card processors, and digital wallets.
1464.13.2	Evaluate the impact of e-commerce on traditional payment systems and banking services, exploring emerging trends such as mobile payments and cryptocurrencies.
1464.14	Economic Implications of E-Commerce Growth.
1464.14.1	Describe the economic impact of e-commerce growth on financial markets, including changes in consumer behavior, market competition, and business models.
1464.14.2	Analyze how e-commerce companies access capital through financial markets, such as initial public offerings (IPOs), debt financing, and venture capital investments.
1464.15	Financial Market Performance and E-Commerce Trends.

1464.15.1	Investigate the relationship between financial market performance and e-commerce trends, identifying correlations between e-commerce sales data and stock market indices.
1464.15.2	Explain the influence of e-commerce companies on financial market volatility, including the effects of earnings reports, product launches, and market competition.
1464.16	Investment Opportunities in E-Commerce Companies.
1464.16.1	Evaluate investment opportunities in e-commerce companies traded in financial markets, analyzing factors such as revenue growth, profitability, and competitive positioning.
1464.16.2	Compare and contrast investment strategies for e-commerce stocks, bonds, and derivatives, considering risk factors, return expectations, and portfolio diversification.
1464.17	Regulatory Challenges in E-Commerce and Financial Markets.
1464.17.1	Identify regulatory challenges in e-commerce and financial markets, including consumer protection laws, securities regulations, and tax policies.
1464.17.2	Assess the impact of regulatory changes on e-commerce business models and financial market stability, considering implications for investor confidence and market liquidity.
1464.18	Globalization and Cross-Border E-Commerce Transactions.
1464.18.1	Analyze the role of financial markets in facilitating cross-border e-commerce transactions, including currency exchange, international payment systems, and trade financing.
1464.18.2	Evaluate the impact of globalization on e-commerce market expansion and financial market integration, identifying opportunities and challenges for businesses and investors.

This course is designed to develop student knowledge and skills in programming and designing game and app ideas paper prototyping and other planning techniques. Using various design platforms, programming languages, drawing and animation techniques, students create an interactive demonstration of the games and apps.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Analyze Programming Problems and Flowcharts Solutions

1465.1	Analyze user requirements for a given outcome.
1465.1.1	Analyze user requirements to determine primary objectives, such as enhancing player immersion.
1465.1.2	Evaluate the hardware capabilities of target devices to determine the level of graphical fidelity and processing power.
1465.1.3	Prioritize features such as multiplayer support, customizable avatars, or a robust crafting system.
1465.1.4	Create prototype levels or gameplay mechanics to gather feedback from alpha testers and iterate on features based on their suggestions and usability testing results.
1465.1.5	Implement in-game feedback forms, community forums, or analytics tools to gather player data and sentiment, allowing for adjustments to be made throughout the development process.
1465.2	Determine input and output formats for a program.
1465.2.1	Research and identify compatible input devices for the target platform, considering options such as keyboards, game controllers, and motion-sensing peripherals.
1465.2.2	Map specific actions such as movement, interaction, and combat controls to intuitive buttons or keys, considering ergonomic principles and player expectations.
1465.2.3	Design input parsers that can adjust to recognize inputs from, allowing players to customize controls according to their preferences.
1465.2.4	Optimize output formats to ensure compatibility with various display resolutions and aspect ratios.
1465.2.5	Incorporate visual indicators, auditory cues, and haptic feedback to provide informative and immersive feedback.
1465.3	Determine the flow of data through network.
1465.3.1	Analyze the game's networking needs and determine whether a client-server, peer-to-peer, or hybrid architecture best suits the gameplay experience.
1465.3.2	Specify the protocols for data transmission, including TCP (Transmission Control Protocol) or UDP (User Datagram Protocol).
1465.3.3	Develop efficient serialization methods to package and transmit game data across the network.
1465.3.4	Implement bandwidth management techniques to regulate data flow and prevent network congestion.
1465.3.5	Implement client-side prediction and server reconciliation algorithms to predict and reconcile discrepancies.
1465.4	Identify and describe a data flow diagram.
1464.4.1	Identify the key components of the game system, such as player input, game logic, rendering engine, and network communication modules.

1465.4.2	Determine the sources of input data, such as user interactions, server updates, or external APIs, and the destinations where data is processed or displayed, such as game state variables, visual elements, or network packets.
1465.4.3	Depict how player input triggers actions in the game logic, which in turn updates the game state and renders visuals on the screen.
1465.4.4	Describe the processes involved in transforming data as it moves through the system, such as input validation, state updates, or rendering calculations.
1465.4.5	Illustrate how player progress is saved to a database upon completion of in-game achievements and synchronized across multiple devices via cloud storage APIs.
1465.5	Identify and describe a process logic diagram.
1465.5.1	Identify the sequential steps involved in executing a specific game process or mechanic.
1465.5.2	Identify decision points within the process where different outcomes or actions may occur based on specific conditions or player inputs.
1465.5.3	Illustrate how player input triggers movement calculations, collision detection, and animation playback in a character movement process.
1465.5.4	Describe how the process handles exceptional conditions or errors, such as invalid inputs, unexpected events, or system failures.
1465.5.5	Identify the inputs required to initiate the process, such as user commands, game events, or external triggers.
1465.5.6	Document the outputs produced as a result of the process execution.
1465.6	Describe the system development cycle (i.e., code management, ongoing revisions).
1465.6.1	Employ Git for code management, enabling collaboration and tracking changes efficiently.
1465.6.2	Conduct regular code reviews.
1465.6.3	Employ iterative development with continuous testing to refine game features incrementally.
1465.6.4	Prioritize tasks and track revisions using tools like Jira or Trello.
1465.6.5	Keep concise documentation to track changes, updates, and feature implementations.

Design Program Solutions

1465.7	Determine where data is to be accessed/stored.
1465.7.1	Determine the specific areas within the game where data needs to be accessed or stored, such as player profiles, level progress, or in-game assets.
1465.7.2	Implement data caching mechanisms to improve performance and reduce latency for frequently accessed data.
1465.7.3	Identify and secure sensitive data such as player credentials, payment information, or personal details to comply with privacy regulations and protect player privacy.
1465.7.4	Evaluate different storage solutions based on data requirements, scalability, and performance considerations.
1465.7.5	Optimize data access patterns to minimize latency and improve overall system performance.
1465.8	Design data storage and layout.
1465.8.1	Design data structures to represent game entities, such as players, enemies, items, and environmental elements.
1465.8.2	Select appropriate storage formats for game data, considering factors like performance, scalability, and ease of access.

1465.8.3	Optimize data layout to minimize memory fragmentation and improve cache coherence for efficient data access.
1465.8.4	Implement persistence mechanisms to save and load game data between sessions, ensuring player progress is retained.
1465.8.5	Implement data serialization techniques to convert in-memory data structures into a format suitable for storage or transmission.
1465.9	Apply principles of quality, efficient programming.
1465.9.1	Separate rendering, input handling, and game logic into distinct modules for debugging and updates.
1465.9.2	Employ spatial partitioning techniques like quad trees or spatial hashing for efficient collision detection in large game worlds.
1465.9.3	Manage game resources efficiently to minimize load times and memory usage.
1465.9.4	Use profiling tools to identify hotspots in rendering or physics calculations and apply optimization techniques.
1465.9.5	Use assertions and logging to catch runtime errors and provide informative error messages.
1465.10	Explain the importance of a design review.
1465.10.1	Conduct design reviews for the identification of potential flaws or inconsistencies in game mechanics, storylines, or user interfaces.
1465.10.2	Use a design review to identify instances where character animations clash with the intended tone of a scene or where audio cues fail to match visual feedback.
1465.10.3	Solicit feedback from team members or external stakeholders to enhance user experience.
1465.10.4	Mitigate risks associated with game development by identifying potential issues early in the process.
1465.11	Apply implementation plans for a new system.
1465.11.1	Conceptualize design of new system, outlining its core mechanics, features, and integration points within the existing game framework.
1465.11.2	Develop prototypes to validate the feasibility and functionality of the system.
1465.11.3	Implement the system iteratively, focusing on incremental development and continuous improvement based on feedback and testing results.
1465.11.4	Ensure seamless integration of the new system with existing game components.
1465.11.5	Conduct testing and quality assurance to identify any bugs, glitches, or balancing issues within the new system.
1465.12	Assess ongoing impact of existing systems.
1465.12.1	Use in-game surveys, community forums, and social media channels to collect feedback.
1465.12.2	Monitor metrics like average session length, player churn rate, and completion rates for specific game modes or levels to identify areas for improvement.
1465.12.3	Implement A/B testing methodologies to compare the effectiveness of different variations or iterations of existing game systems.
1465.12.4	Regularly release updates and patches to address issues, improve gameplay balance, and introduce new features.
1465.12.5	Assess the long-term impact of existing game systems on player retention, monetization, and overall player satisfaction.

Code Programs

1465.13	Determine the variables and data types for a program.
1465.13.1	Determine the variables necessary for representing game state and player interactions, such as player health, score, position, and inventory contents.
1465.13.2	Choose appropriate data types to represent different types of game data, considering factors such as precision, memory usage, and range of values.
1465.13.3	Define enumerations for representing sets of related constants or options, simplifying code readability and maintenance.
1465.13.4	Use structs or classes to encapsulate related data fields and behaviors, promoting modularity and code organization.
1465.13.5	Implement dynamic data structures such as arrays, lists, or dictionaries to store and manipulate collections of game data dynamically.
1465.14	Prepare and code routines using structured logic.
1465.14.1	Clearly define the objectives and functionalities of the routines to be coded, specifying their inputs, outputs, and expected behavior.
1465.14.2	Decompose routines into smaller, logically structured steps or operations, ensuring clarity and ease of implementation.
1465.14.3	Utilize control structures such as loops, conditionals, and branching statements to manage the flow of execution within routines.
1465.14.4	Encapsulate reusable functionality within functions or methods to promote code reusability and modularity.
1465.14.5	Thoroughly test and debug routines to ensure they function as intended and handle edge cases effectively.
1465.15	Identify various programming languages.
1465.15.1	Conduct research to identify various programming languages commonly used in virtual game design.
1465.15.2	Compare and contrast C++, C#, Java, JavaScript, and Python.
1465.15.3	Evaluate the features and capabilities of different programming languages.
1465.15.4	Select the programming language based on the specific requirements, constraints, and goals.
1465.16	Apply appropriate computer language syntax.
1464.16.1	Identify and utilize language features appropriate for specific requirements and constraints.
1465.16.2	Adhere to the syntax conventions and coding standards of the chosen programming language to ensure consistency and readability across the codebase.
1465.16.3	Implement control structures such as loops, conditionals, and branching statements to manage program flow and logic effectively.
1465.16.4	Utilize appropriate data structures and algorithms to optimize performance and memory usage.
1465.16.5	Implement error handling mechanisms to handle runtime errors and exceptions.
1465.17	Explain unit testing requirements.
1465.17.1	Determine which components of the game codebase are suitable for unit testing.
1465.17.2	Define test scenarios and expected outcomes for each unit test.
1465.17.3	Create mock objects or stubs to simulate external dependencies and isolate the unit under test.
1465.17.4	Write test cases using a testing framework appropriate for the chosen programming language or development environment.
1465.17.5	Automate unit testing processes to streamline testing workflows and ensure consistent and reliable test execution.
1465.18	Document appropriate comments and programmer notes.

1465.18.1	Clarify intricate code sections with comments, providing insight into their purpose and implementation details.
1465.18.2	Document functions, methods, and classes concisely, outlining their inputs, outputs, and intended behavior.
1465.18.3	Highlight areas for future optimization or enhancement with brief notes, guiding ongoing development efforts.
1465.18.4	Alert developers to potential bugs or edge cases with comments, prompting further investigation or attention.
1465.18.5	Attribute contributions, acknowledge external resources, and reference documentation with comments, ensuring transparency and facilitating collaboration.

Test Programs

1465.19	Explain system testing requirements.
1465.19.1	Create test cases to ensure that player movement controls function accurately in virtual environments, including walking, running, jumping, and crouching.
1465.19.2	Conduct integration tests to verify seamless interaction between in-game inventory systems and player actions, ensuring items are properly stored, retrieved, and utilized.
1465.19.3	Assess the virtual game's performance under various conditions, such as heavy graphical rendering or multiple concurrent player interactions, to ensure smooth gameplay without lag or frame rate issues.
1465.19.4	Validate the virtual game's compatibility across different platforms (PC, consoles, mobile devices) and operating systems (Windows, macOS, iOS, Android) to guarantee a consistent experience for all players.
1465.19.5	Identify and mitigate potential vulnerabilities such as unauthorized access, cheating, or data breaches within the virtual game's network infrastructure and communication protocols.
1465.20	Design and analyze test plan for use in program testing.
1465.20.1	Clearly outline the objectives of the test plan, specifying which aspects of the virtual game will be tested.
1465.20.2	Develop scenarios for testing player interactions, AI behaviors, level transitions, and graphical fidelity across different devices.
1465.20.3	Ensure comprehensive coverage by testing core gameplay features, UI elements, network functionality, and error handling mechanisms.
1465.20.4	Assign resources for automated testing scripts, manual playtesting sessions, hardware configurations, and debugging tools.
1465.20.5	Establish criteria for evaluating test results, including pass/fail thresholds for performance metrics, bug severity levels, and adherence to design specifications.
1465.21	Test programs and evaluate results for accuracy.
1465.21.1	Run test cases to verify the accuracy of collision detection algorithms, ensuring that objects interact realistically within the game environment.
1465.21.2	Test player actions such as shooting, jumping, or casting spells to confirm they behave as intended, with accurate hit detection and appropriate effects.
1465.21.3	Evaluate the behavior of non-player characters (NPCs) to ensure they respond appropriately to in-game stimuli, such as enemy attacks or changing environmental conditions.
1465.21.4	Measure frame rates, loading times, and memory usage to assess the game's performance across different hardware configurations and under varying levels of player activity.
1465.21.5	Examine bug reports and player feedback to identify discrepancies between expected and observed behavior, ensuring that any issues affecting game accuracy are addressed promptly.

1465.22	Correct programming errors discovered during testing.
1465.22.1	Analyze crash reports to pinpoint the root cause of a game freeze, such as memory allocation errors or null pointer exceptions.
1465.22.2	Update collision detection algorithms to resolve issues causing players to clip through walls or objects in the game environment.
1465.22.3	Refactor rendering code to optimize GPU usage and improve frame rates on lower-end hardware configurations.
1465.22.4	Modify enemy AI routines to fix instances where NPCs become stuck in loops or fail to respond to player actions correctly.
1465.22.5	Re-run affected test cases and conduct regression testing to ensure that programming errors have been successfully addressed without introducing new issues.
1465.23	Identify appropriate debugging tools.
1465.23.1	Choose a debugger like Visual Studio Debugger or Unity Debugger for real-time inspection of variables, breakpoints, and call stacks during game development.
1465.23.2	Employ performance profiling tools such as Intel Graphics Performance Analyzers or Unity Profiler to identify bottlenecks and optimize resource usage.
1465.23.3	Implement error reporting systems like Sentry or Bugsnag to capture and log runtime errors, exceptions, and crashes for analysis and resolution.
1465.23.4	Integrate console command systems within the game engine, allowing developers to execute debugging commands and inspect internal game state during runtime.
1465.23.5	Enable remote debugging capabilities using tools like Chrome DevTools Remote Debugging or Visual Studio Remote Debugger for debugging game code running on remote devices or platforms.

Maintain Programs

1465.24	Change existing programs when requirements change.
1465.24.1	Assess updated design documents or user stories to understand changes in gameplay mechanics, level designs, or feature specifications.
1465.24.2	Determine which game systems, scripts, or assets need modification to accommodate the new requirements, such as adjusting enemy behavior patterns or adding new player abilities.
1465.25.3	Update existing codebase by modifying scripts, classes, or functions to align with the revised requirements, ensuring proper functionality and compatibility with other game elements.
1465.25.4	Incorporate revised art assets, animations, or audio files into the game project to reflect changes in character designs, environment layouts, or sound effects.
1465.25.5	Perform regression testing to validate that the changes have not introduced new bugs or regressions, ensuring the continued stability and integrity of the game.
1465.25	Correct existing program errors.
1465.25.1	Analyze crash logs or error messages to pinpoint the source of a bug, such as a null reference exception in a player interaction script.
1465.25.2	Step through code using a debugger to identify logical errors, like incorrect conditions in an AI decision-making algorithm causing unexpected behavior.
1465.25.3	Correct syntax errors such as missing semicolons or typos in variable names that lead to compilation errors or runtime exceptions.
1465.25.4	Refactor inefficient code segments, like nested loops or redundant calculations, to improve overall performance and reduce lag in gameplay.

1465.24.5	Verify that the corrected code resolves the error by retesting the affected functionality and confirming that the issue no longer occurs.
1465.26	Update documentation for existing programs.
1465.26.1	Assess the current documentation, including code comments, README files, and design documents, to identify areas requiring updates.
1465.26.2	Add comments or update existing documentation to reflect recent code modifications, explaining the purpose, functionality, and usage of updated code segments.
1465.26.3	Revise user guides or tutorials to incorporate new features, mechanics, or controls introduced in the latest version of the game.
1465.26.4	Provide rationale and context for design decisions made during the development process, explaining the reasoning behind certain game mechanics or level layouts.
1465.26.5	Maintain a list of known bugs, glitches, or limitations in the game, along with any workarounds or plans for future fixes, to assist players and developers alike.
1465.27	Provide user instructions on program modifications.
1465.27.1	Include detailed release notes with each game update, outlining the changes, improvements, and new features introduced, along with instructions on how to access or utilize
1465.27.2	Integrate in-game tutorials or tooltips that guide players through new mechanics, controls, or features added in recent updates, ensuring a seamless learning experience.
1465.27.3	Publish patch notes on official forums or social media platforms, highlighting the specific changes and fixes implemented in the latest game patch and providing instructions on applying the update.
1465.27.4	Create video guides or walkthroughs demonstrating how to leverage new gameplay strategies, optimize character builds, or utilize updated tools or abilities introduced in the game.
1465.27.5	Maintain an updated online knowledge base or documentation hub, containing articles, FAQs, and troubleshooting guides that address common questions and provide step-by-step instructions for performing program modifications or troubleshooting issues.

Complete User Documentation and Technical Writing

1465.28	Develop documentation narrative.
1465.28.1	Determine the scope of the documentation narrative, specifying whether it will cover gameplay mechanics, story elements, character backgrounds, or technical aspects of the game.
1465.28.2	Craft a narrative that sets the stage for the game's world, introducing key characters, factions, or events that drive the storyline and shape player interactions.
1465.28.3	Describe the core gameplay mechanics, including controls, objectives, progression systems, and strategic elements, to help players understand how to navigate and engage with the game world.
1465.28.4	Dive into the lore and worldbuilding aspects of the game, elucidating the history, cultures, mythologies, and environments that enrich the player's immersive experience.
1465.28.5	Offer technical insights into game development processes, engine mechanics, optimization techniques, or modding capabilities, catering to players interested in the game's behind-the-scenes workings.
1465.29	Define data use and storage.
1465.29.1	Identify various types of data generated or utilized by the game, such as player profiles, game progress, in-game items, or user preferences.
1465.29.2	Determine where the data originates from, whether it's generated locally on the player's device, retrieved from external servers, or obtained through user interactions within the game.

1465.29.3	Define the lifecycle of game data, including how and when data is created, accessed, updated, and eventually deleted or archived based on gameplay events or player actions.
1465.29.4	Implement storage solutions such as local databases, cloud storage services, or distributed file systems to securely store and manage game data, ensuring scalability and reliability.
1465.29.5	Enforce encryption, access controls, and data validation mechanisms to protect sensitive player data from unauthorized access, manipulation, or data breaches.
1465.30	Develop online help for users.
1465.30.1	Conduct user surveys or analyze player feedback to identify common pain points, frequently asked questions, and areas where players may require assistance.
1465.30.2	Compile a list of frequently asked questions (FAQs) covering topics such as gameplay mechanics, controls, troubleshooting, and technical support, with clear and concise answers.
1465.30.3	Develop video tutorials or walkthroughs demonstrating gameplay mechanics, tips, and strategies, providing visual guidance to players on how to overcome challenges or master game features.
1465.30.4	Design interactive guides or tooltips within the game interface that offer contextual help and hints, providing assistance to players without disrupting their gameplay experience.
1465.30.5	Establish online community forums or discussion boards where players can seek help, share strategies, and interact with fellow gamers and developers to address their queries and concerns.

General Information and Concepts

1465.31	Apply general design and programming concepts.
1465.31.1	Implement object-oriented design principles such as encapsulation, inheritance, and polymorphism to create modular and reusable code components, enhancing maintainability and scalability.
1465.31.2	Incorporate design patterns like the observer pattern for event handling or the singleton pattern for managing global game state, streamlining development, and improving code organization.
1465.31.3	Employ performance optimization techniques such as algorithmic efficiency improvements, resource pooling, or asynchronous processing to ensure smooth gameplay and optimal resource utilization.
1465.31.4	Adhere to coding standards and best practices such as consistent naming conventions, code indentation, and documentation, promoting readability, collaboration, and code maintainability.
1465.31.5	Implement robust error handling mechanisms, including exception handling, input validation, and logging, to gracefully handle unexpected situations and provide informative feedback to players and developers.
1465.32	Identify various hardware platforms and run-time environments.
1465.32.1	Investigate the specifications and capabilities of different hardware platforms, including PCs, consoles (e.g., PlayStation, Xbox), mobile devices (e.g., iOS, Android), and virtual reality (VR) headsets (e.g., Oculus Rift, HTC Vive).
1465.32.2	Evaluate the performance and compatibility requirements of the game engine and assets with respect to target hardware platforms, considering factors such as CPU, GPU, RAM, and storage capacity.
1465.32.3	Conduct cross-platform testing to ensure the game functions seamlessly across various hardware platforms and run-time environments, addressing differences in input devices, screen resolutions, and performance capabilities.
1465.32.4	Optimize game assets, rendering techniques, and gameplay mechanics to achieve smooth performance and consistent frame rates across different hardware configurations, prioritizing scalability, and optimization.

1465.32.5	Implement device-specific optimizations and features, such as touch controls for mobile devices, motion controls for consoles, or VR support for compatible headsets, to enhance the user experience on each platform.
1465.33	Identify human aspects in information systems.
1465.33.1	Study player behavior patterns, preferences, and feedback to understand how users interact with the game, guiding design decisions and feature implementations.
1465.33.2	Design intuitive user interfaces (UI) with clear navigation, consistent layout, and accessible controls to enhance user experience and usability for players of all skill levels.
1465.33.3	Ensure that the game accommodates accessibility needs such as customizable controls, text size options, colorblind-friendly visuals, and support for alternative input devices.
1465.33.4	Integrate social features such as multiplayer modes, leaderboards, achievements, and in-game chat systems to foster social interaction and community engagement among players.
1465.33.5	Implement personalized content recommendations, dynamic difficulty adjustment, and adaptive gameplay systems to tailor the gaming experience to individual player preferences and skill levels.
1465.34	Identify general information technology (IT) definitions and terms.
1465.34.1	Define game engine.
1465.34.2	Explain rendering.
1465.34.3	Describe artificial intelligence.
1465.34.4	Outline multiplayer networking.
1465.34.5	Examine asset pipeline.
1465.34.6	Give examples of algorithm, database, encryption, cloud computing and cybersecurity.
1465.35	Adhere to best programming practices and methodologies.
1465.35.1	Adhere to established coding standards such as consistent naming conventions, indentation styles, and code organization principles, ensuring readability and maintainability of the codebase.
1465.35.2	Utilize version control systems like Git or Subversion to track changes, collaborate with team members, and maintain a history of code revisions, facilitating teamwork and code management.
1465.35.3	Apply design patterns such as the singleton pattern for managing global game state or the observer pattern for event handling, improving code structure, reusability, and scalability.
1465.35.4	Conduct regular code reviews with team members to identify potential issues, provide constructive feedback, and ensure adherence to coding standards and best practices.
1465.35.5	Adopt test-driven development practices by writing unit tests before implementing new features or refactoring existing code, ensuring code correctness, reliability, and maintainability.
1465.36	Exhibit understanding of data hierarchy, access methods, and manipulation.
1465.36.1	Identify the hierarchical structure of game data, such as levels containing scenes, scenes containing objects, and objects containing components, enabling efficient organization and management of game assets.
1465.36.2	Choose appropriate data access methods, such as arrays, lists, dictionaries, or databases, based on the type and complexity of data being manipulated, optimizing performance and memory usage.
1465.36.3	Write code to manipulate game data, such as updating player attributes, spawning enemies, or modifying level layouts, using appropriate algorithms and data structures to achieve desired gameplay effects.
1465.36.4	Optimize data storage and retrieval by employing efficient data compression techniques, caching mechanisms, or spatial partitioning algorithms to minimize memory usage and loading times in virtual game environments.
1465.36.5	Manage data dependencies and relationships by establishing clear references and associations between game objects, ensuring consistent behavior and synchronization across different parts of the game world.

1465.37	Describe the process of information exchange between web server and client.
1465.37.1	Describe client request examples.
1465.37.2	Explain server processing such as authentication, matchmaking or retrieving game data.
1465.37.3	Outline data transmission, JSON, or XML.
1465.37.4	Describe client rendering.
1465.37.5	Explain asynchronous communication.
1465.38	Describe the use of web browsers, search engines, and various clients within a given context of use.
1465.38.1	Explain how players use web browsers to research game reviews, walkthroughs, and updates, accessing official websites or gaming forums for insights and strategies.
1465.38.2	Discuss how to utilize search engines to find fan-made mods, community forums, and YouTube tutorials, enriching their gaming experience with user-generated content.
1465.38.3	Research how developers integrate web APIs into game clients for features like matchmaking, leaderboards, and microtransactions, enhancing gameplay and player engagement.
1465.38.4	Examine how players engage with the gaming community via social media clients, Discord servers, and messaging apps, discussing game news, sharing experiences, and organizing multiplayer sessions.
1465.38.5	Use VR clients to dive into immersive virtual worlds, experiencing gameplay with heightened realism and interactivity through VR headsets and controllers.
1465.39	Describe the function and components of a URL and how it relates to protocols, addresses, and ports.
1465.39.1	Indicates the method used to retrieve the resource, such as HTTP (Hypertext Transfer Protocol), HTTPS (HTTP Secure), FTP (File Transfer Protocol), etc. The protocol defines the rules for communication between the client (e.g., web browser) and the server hosting the resource.
1465.39.2	Identifies the specific server where the resource is located. It could be a human-readable domain name or an IP address representing the server's location on the internet.
1465.39.3	Differentiate between different services running on the same server.
1465.39.4	Provide a hierarchy of directories leading to the desired file or resource.
1465.39.5	Understand query or optional parameters.

Website Planning and Design

1465.40	Describe web design and planning principles and different types of pages.
1465.40.1	Outline web design principles emphasizing user experience (UX) and accessibility, ensuring intuitive navigation and inclusivity.
1465.40.2	Develop wireframes and mockups for homepage, product/service pages, and contact form, adhering to design consistency and branding guidelines.
1465.40.3	Conduct usability testing on landing pages, collecting feedback to refine layout and content for optimal engagement and conversion rates.
1465.40.4	Implement responsive design techniques across informational, transactional, and multimedia pages, ensuring seamless user experience across devices.
1465.40.5	Create error pages (e.g., 404) with clear messaging and navigation options, guiding users back to relevant content and maintaining site usability.
1465.41	Explain various project management techniques for setting goals and performing needs assessment.
1465.41.1	Conduct player surveys and market research to define project objectives, setting SMART goals for game design and development.
1465.41.2	Host focus groups with gaming enthusiasts to identify gameplay requirements and preferences, informing needs assessment for feature prioritization.

1465.41.3	Utilize storyboarding and concept art workshops to visualize game mechanics and aesthetics, aligning project goals with creative direction.
1465.41.4	Implement Agile sprint planning sessions for iterative goal setting, adapting to player feedback and technical constraints during development cycles.
1465.41.5	Analyze competitor games and industry trends through market analysis, refining project goals to capitalize on emerging opportunities and address player needs.
1465.42	Describe the principles behind usable navigation.
1465.42.1	Design intuitive menu structures with clear categories and labels, ensuring easy navigation between game modes, settings, and other key features.
1465.42.2	Implement consistent navigation patterns across screens and interfaces, minimizing cognitive load and enabling players to predict interactions.
1465.42.3	Utilize visual hierarchy techniques, such as size, color, and position, to emphasize important navigation elements like buttons and menu options.
1465.42.4	Incorporate contextual cues, such as tooltips and animations, to provide guidance and feedback during navigation, reducing user uncertainty.
1465.42.5	Conduct usability testing to gather player feedback on navigation effectiveness, iteratively refining interface layouts and navigation flows based on user behavior and preferences.
1465.43	Identify problems related to legacy browsers.
1465.43.1	Conduct compatibility testing across legacy browser versions to identify rendering inconsistencies and functionality limitations.
1465.43.2	Implement graceful degradation techniques, such as fallback mechanisms and polyfills, to ensure basic gameplay functionality on older browsers.
1465.43.3	Monitor performance metrics on legacy browsers to pinpoint resource-intensive features causing slowdowns or crashes.
1465.43.4	Analyze user feedback and support tickets to address common issues reported by players using legacy browsers, prioritizing bug fixes and optimizations accordingly.
1465.43.5	Consider phased deprecation of support for legacy browsers in future updates, communicating transition plans to players and providing guidance on recommended browser alternatives for optimal gaming experiences.
1465.44	Describe the mechanics behind mobile websites and how they differ from non-mobile sites.
1465.44.1	Optimize viewport and layout scaling to accommodate various screen sizes and resolutions, ensuring seamless user experience across mobile devices.
1465.44.2	Prioritize touch-friendly navigation elements, such as larger buttons and simplified menus, to facilitate intuitive interaction on touchscreens.
1465.44.3	Utilize responsive design frameworks like Bootstrap or Flexbox to dynamically adjust content layout and arrangement based on device orientation and screen dimensions.
1465.43.4	Minimize resource loading times by optimizing assets and leveraging browser caching techniques, mitigating performance bottlenecks inherent to mobile networks and devices.
1465.43.5	Conduct thorough cross-browser and cross-device testing to identify compatibility issues and usability concerns unique to mobile environments, iterating on design and functionality improvements for enhanced mobile website performance.
1465.45	Describe the mechanics behind dynamic websites and how they differ from static sites.
1465.45.1	Implement server-side scripting languages like PHP or Python to generate dynamic content based on user interactions and database queries, enabling real-time updates and personalized experiences.

1465.45.2	Utilize client-side scripting with JavaScript frameworks like React or Angular to enhance interactivity and responsiveness, enabling dynamic content manipulation without full page reloads.
1465.45.3	Integrate APIs for external data retrieval and integration, enabling dynamic content updates based on live feeds, user input, or third-party services.
1465.45.4	Implement session management techniques to track user interactions and preferences dynamically, providing personalized content and maintaining state across multiple sessions.
1465.45.5	Employ caching strategies and content delivery networks (CDNs) to optimize performance and scalability of dynamic websites, balancing server load and reducing latency for improved user experiences.
1465.46	Design for accessibility (e.g., ADA-Section 508 and Web Content Accessibility Guidelines).
1465.46.1	Conduct accessibility audits using tools like WAVE or Axe to identify barriers to access within the game interface, prioritizing fixes based on WCAG guidelines.
1465.46.2	Implement keyboard navigation and focus management to ensure all game features are operable without a mouse, adhering to WCAG standards for accessibility.
1465.46.3	Provide alternative text descriptions for all non-text content, such as images and icons, enabling screen readers to convey information to visually impaired players in compliance with ADA-Section 508.
1465.46.4	Design high-contrast color schemes and customizable color options to accommodate players with visual impairments, enhancing readability and usability for all users.
1465.46.5	Test game interfaces with assistive technologies such as screen readers and voice commands to verify compatibility and optimize accessibility features for seamless gameplay experiences.

Markup

1465.47	Demonstrate the ability to use HTML5 to create web pages.
1465.47.1	Develop game landing pages with HTML5, showcasing trailers, gameplay previews, and download links to attract players.
1465.47.2	Design interactive tutorials using HTML5 markup and canvas elements to teach game mechanics and controls directly within the browser.
1465.47.3	Create responsive web interfaces for in-game stores and community hubs, allowing players to purchase items and engage with fellow gamers across different devices.
1465.47.4	Implement HTML5 audio and video elements to enhance immersive storytelling and gameplay experiences, integrating ambient soundscapes and cutscene animations.
1465.47.5	Utilize HTML5 forms and input elements to capture player feedback, conduct surveys, and facilitate bug reporting, gathering valuable insights for game improvement and community engagement.
1465.48	Demonstrate an understanding of semantic markup (e.g., header, footer, navigation).
1465.48.1	Structure game websites with semantic HTML5 elements such as <header>, <footer>, and <nav> to enhance accessibility and search engine optimization.
1465.48.2	Implement responsive design principles, utilizing semantic markup to create adaptable layouts for game menus, HUDs, and interactive components across various screen sizes.
1465.48.3	Enhance user navigation within game interfaces by utilizing <nav> elements to clearly delineate primary and secondary navigation menus.
1465.48.4	Improve screen reader compatibility by employing semantic markup for key sections like <main> and <aside>, ensuring all players can access and understand game content.
1465.48.5	Optimize code maintainability and readability by utilizing semantic HTML5 elements consistently throughout game development, facilitating collaboration and future updates.
1465.49	Create and use interactive forms.

1465.49.1	Develop registration forms for player accounts, incorporating interactive input fields for username, email, and password creation, with real-time validation feedback.
1465.49.2	Implement in-game surveys using interactive forms to gather player feedback on gameplay mechanics, storylines, and user experience preferences.
1465.49.3	Design customizable character creation forms with interactive sliders, dropdown menus, and color pickers to allow players to personalize their avatars.
1465.49.4	Utilize interactive payment forms for in-game purchases, integrating secure payment gateways and feedback mechanisms to ensure smooth transactions.
1465.49.5	Create support ticket submission forms within the game interface, enabling players to report bugs, request assistance, or provide feedback directly to the development team.
1465.50	Describe how to implement tabular data using table elements.
1465.50.1	Structure game leaderboards using HTML table elements, organizing player names, scores, and rankings for easy comparison and readability.
1465.50.2	Display in-game inventory data, such as item names, quantities, and descriptions, within HTML tables to provide players with a clear overview of their possessions.
1465.50.3	Implement quest or mission logs using tables to present objectives, progress status, and rewards in a structured format for players to track their accomplishments.
1465.50.4	Create interactive character stat sheets with HTML tables, showcasing attributes like strength, agility, and intelligence alongside corresponding values and modifiers.
1465.50.5	Design achievement or trophy lists using table elements, detailing unlocked milestones, completion status, and associated rewards to motivate players and encourage engagement.

Styling

1465.51	Describe how CSS is used and why.
1465.51.1	Style game interfaces with CSS to enhance visual appeal, including color schemes, fonts, and layout aesthetics, creating immersive gaming experiences.
1465.51.2	Apply CSS animations and transitions to add dynamic movement and effects to game elements, increasing engagement and feedback responsiveness.
1465.51.3	Utilize CSS flexbox and grid layouts to create responsive designs that adapt seamlessly to various screen sizes and resolutions, ensuring consistent gameplay experiences across devices.
1465.51.4	Implement CSS frameworks like Bootstrap or Foundation to streamline styling and layout development, saving time and effort in designing complex game interfaces.
1465.51.5	Employ CSS media queries to optimize game UI for different viewing conditions, adjusting styles based on factors like device orientation, screen resolution, and user preferences.
1465.52	Design and implement layers and style navigation bars using CSS3.
1465.52.1	Create a navigation bar structure using HTML, including <nav> and elements for list items representing menu options.
1465.52.2	Apply CSS3 styles to the navigation bar, including background colors, borders, and padding to enhance visual appeal and readability.
1465.52.3	Use CSS3 flexbox or grid layout to organize navigation items horizontally or vertically, ensuring flexibility and responsiveness across different screen sizes.
1465.52.4	Implement hover effects and transitions using CSS3 properties like :hover and transition, providing visual feedback to users when interacting with navigation items.

1465.52.5	Utilize CSS3 pseudo-elements (::before and ::after) to add decorative elements or icons to navigation items, enhancing aesthetics and usability.
1465.53	Implement a design and layout using style sheets.
1465.53.1	Define a consistent color palette and typography scheme in CSS to maintain visual coherence across game interfaces, enhancing brand identity and user experience.
1465.53.2	Utilize CSS grid or flexbox layout techniques to structure game menus, HUD elements, and interactive components, ensuring efficient use of screen space and responsive design.
1465.53.3	Apply CSS rules for positioning, margins, and padding to arrange game elements precisely within the layout, optimizing readability and usability.
1465.53.4	Implement CSS transitions and animations to add dynamic movement and feedback effects to game elements, enhancing engagement and immersion.
1465.53.5	Utilize media queries in CSS to adapt game layouts and styles based on device characteristics such as screen size, resolution, and orientation, ensuring compatibility and usability across various platforms and devices.
1465.54	Describe the use of CSS for formatting.
1465.54.1	Styling Text: CSS allows developers to specify various properties to format text, such as font-family, font-size, font-weight, color, text-align, text-decoration, and line-height.
1465.54.2	CSS enables the customization of background colors, images, and gradients for elements.
1465.54.3	CSS provides mechanisms for positioning elements within the layout. Developers can use properties like position, top, bottom, left, and right to precisely control the placement of game elements on the screen.
1465.54.4	CSS offers layout techniques such as floats, flexbox, and grid, which enable developers to structure and organize game elements in desired arrangements.
1465.54.5	CSS supports animations and transitions, allowing developers to add dynamic movement and visual effects to game elements.

This course is designed to develop student knowledge and skills in developing apps and games using more advanced coding and graphic design including both 2D and 3D elements. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Understanding Core Programming

1466.1	Understand computer storage and data types.
1466.1.1	Research various storage options and their impact on game performance.
1466.1.2	Implement efficient data structures to optimize memory usage in game development.
1466.1.3	Familiarize with different data types (integers, floats, strings) for effective coding in game design.
1466.1.4	Experiment with serialization techniques for saving and loading game data.
1466.1.5	Stay updated on advancements in storage technologies to enhance virtual game design capabilities.
1466.2	Understand computer decision structures.
1466.2.1	Study the fundamentals of decision structures such as if statements, switch statements, and loops in programming languages.
1466.2.2	Practice implementing decision structures in virtual game scenarios to control gameplay mechanics.
1466.2.3	Analyze existing game codebases to understand how decision structures are utilized for game logic.
1466.2.4	Experiment with nested decision structures to create complex decision-making processes within virtual game environments.
1466.2.5	Stay informed about best practices and emerging trends in utilizing decision structures for efficient and scalable game design.
1466.3	Identify the appropriate method for handling repetition.
1466.3.1	Learn about iteration methods like loops in programming.
1466.3.2	Apply suitable iteration methods in game development.
1466.3.3	Explore how repetition is managed in existing game projects.
1466.3.4	Experiment with different loop types to handle various repetition needs.
1466.3.5	Keep updated on effective repetition handling techniques in game design.
1466.4	Understand error handling.
1466.4.1	Study error handling concepts like try-catch blocks and exception handling.
1466.4.2	Implement robust error handling mechanisms in virtual game code.
1466.4.3	Analyze existing game projects to see how error handling is integrated.
1466.4.4	Experiment with different error handling strategies to anticipate and address potential issues.
1466.4.5	Stay informed about the latest trends and best practices in error handling for game development.

Understanding Object Oriented Programming

1466.5	Understanding Object Oriented Programming.

1466.5.1	Learn core Object-Oriented Programming (OOP) principles like encapsulation, inheritance, and polymorphism.
1466.5.2	Apply OOP concepts in structuring game code for modularity and reusability.
1466.5.3	Analyze how OOP is utilized in existing game frameworks or engines.
1466.5.4	Experiment with designing and implementing game objects using OOP techniques.
1466.5.5	Stay updated on advanced OOP patterns and practices tailored for virtual game design.
1466.6	Understand inheritance.
1466.6.1	Examine how inheritance fosters code organization and reuse in game development.
1466.6.2	Review real-world game examples to grasp how inheritance is implemented.
1466.6.3	Experiment with creating derived classes to inherit attributes and behaviors.
1466.6.4	Stay informed about inheritance best practices and its impact on virtual game design.
1466.6.5	Streamline code development by promoting code reuse, enhancing maintainability, and facilitating easier extension and modification of game features.
1466.7	Understand polymorphism.
1466.7.1	Understand how polymorphism allows objects of different classes to be treated as objects of a common superclass.
1466.7.2	Analyze how polymorphism enables flexibility and extensibility in game design.
1466.7.3	Experiment with implementing polymorphic behavior in virtual game systems.
1466.7.4	Investigate how polymorphism facilitates dynamic method invocation based on object types during runtime.
1466.7.5	Practice designing and implementing polymorphic interactions between game entities to enhance gameplay dynamics and variety.
1466.8	Understand encapsulation.
1466.8.1	Learn the concept of encapsulation and its role in data hiding and protection.
1466.8.2	Understand how encapsulation promotes modular and secure code design in game development.
1466.8.3	Analyze how encapsulation is implemented in existing game architectures to ensure data integrity.
1466.8.4	Experiment with encapsulating game data and behaviors within classes to restrict access and enforce proper usage.
1466.8.5	Stay informed about encapsulation best practices and its importance in maintaining scalable and maintainable virtual game projects.

Understanding General Software Development

1466.9	Understand application life-cycle management.
1466.9.1	Study the application life-cycle stages in game development, including initialization, update, and termination.
1466.9.2	Understand how each life-cycle stage impacts game performance and user experience.
1466.9.3	Analyze existing game frameworks to grasp their approaches to life-cycle management.
1466.9.4	Experiment with managing resources and memory effectively throughout the application life-cycle.
1466.9.5	Stay updated on industry standards and emerging practices in application life-cycle management for virtual game design.
1466.10	Comprehend the phases and processes involved in the software development life cycle.
1466.10.1	Study the phases of the software development life cycle (SDLC), including planning, design, implementation, testing, and deployment.
1466.10.2	Understand the iterative nature of the SDLC and how it applies to virtual game design projects.

1466.10.3	Analyze the processes and methodologies commonly used in each phase of the SDLC for game development.
1466.10.4	Experiment with adapting SDLC principles to fit the unique requirements and constraints of virtual game projects.
1466.10.5	Stay informed about evolving trends and best practices in SDLC methodologies for efficient and successful game development.
1466.11	Familiarize yourself with version control systems for collaborative software development.
1466.11.1	Learn the basics of version control systems (VCS) such as Git and SVN.
1466.11.2	Understand how VCS facilitates collaboration and tracks changes in game development projects.
1466.11.3	Explore common VCS workflows and branching strategies tailored for game design teams.
1466.11.4	Experiment with using VCS tools to manage game assets, code, and project configurations efficiently.
1466.11.5	Stay updated on VCS best practices and integration techniques to streamline collaborative virtual game development.

Understanding Web Applications

1466.12	Understand web applications.
1466.12.1	Study the fundamentals of web development technologies such as HTML, CSS, and JavaScript.
1466.12.2	Explore frameworks and libraries like React, Angular, or Vue.js commonly used in web application development.
1466.12.3	Analyze how web applications can be utilized for virtual game distribution, multiplayer functionality, or community engagement.
1466.12.4	Experiment with creating simple web-based games to understand the unique challenges and opportunities of web game development.
1466.12.5	Stay informed about emerging trends and advancements in web technologies relevant to virtual game design.
1466.13	Understand Microsoft ASP.NET web application development.
1466.13.1	Learn the basics of Microsoft ASP.NET framework for web application development.
1466.13.2	Explore ASP.NET features such as MVC architecture, Razor syntax, and Entity Framework.
1466.13.3	Analyze how ASP.NET can be leveraged for building virtual game platforms, community hubs, or multiplayer servers.
1466.13.4	Experiment with creating small-scale ASP.NET projects to grasp its functionality and workflow.
1466.13.5	Stay updated on ASP.NET advancements and best practices tailored for virtual game development.
1466.14	Understand web hosting.
1466.14.1	Learn about different web hosting options such as shared hosting, VPS, and cloud hosting.
1466.14.2	Understand the factors affecting web hosting performance and reliability for virtual game deployment.
1466.14.3	Analyze hosting providers and their features tailored for hosting virtual game assets, databases, and backend services.
1466.14.4	Experiment with deploying small-scale virtual game projects on various web hosting platforms.
1466.14.5	Stay informed about security measures and scalability options in web hosting for virtual game design.
1466.15	Understand web services.
1466.15.1	Study the concept of web services and their role in virtual game development.
1466.15.2	Explore different types of web services like RESTful APIs and SOAP for exchanging data between game clients and servers.

1466.15.3	Analyze existing game projects to understand how web services are integrated for features such as user authentication, leaderboards, and in-game purchases.
1466.15.4	Experiment with creating and consuming simple web services to familiarize yourself with their implementation in virtual game design.
1466.15.5	Stay updated on web service standards and protocols relevant to virtual game development.

Understanding Desktop Applications

1466.16	Understand desktop applications.
1466.16.1	Learn about desktop application development frameworks such as Electron, WPF, or WinForms.
1466.16.2	Understand the differences between desktop and web applications in terms of deployment, performance, and user experience.
1466.16.3	Analyze how desktop applications can enhance virtual game experiences through features like offline gameplay, local storage, and advanced graphics.
1466.16.4	Experiment with creating small-scale desktop game prototypes to understand desktop-specific design considerations.
1466.16.5	Stay updated on desktop application development trends and best practices relevant to virtual game design.
1466.17	Understand Windows services.
1466.17.1	Study the fundamentals of Windows services and their role in background task execution.
1466.17.2	Explore how Windows services can enhance virtual game functionality through tasks like automatic updates or server synchronization.
1466.17.3	Analyze existing game architectures to understand how Windows services are integrated for tasks such as data processing or maintenance.
1466.17.4	Experiment with creating and deploying simple Windows services to familiarize yourself with their implementation in virtual game design.
1466.17.5	Stay updated on Windows service development practices and security considerations relevant to virtual game deployment.
1466.18	Update documentation for existing programs.
1466.18.1	Review existing program documentation to identify outdated or missing information.
1466.18.2	Update documentation to reflect any changes or additions made to the program since its last documentation.
1466.18.3	Ensure documentation is clear, concise, and easily understandable for both developers and end-users.
1466.18.4	Include details on program features, functionality, usage instructions, and any known issues or troubleshooting tips.
1466.18.5	Collaborate with team members to verify the accuracy and completeness of the updated documentation before finalizing it.
1466.19	Provide user instructions on program modifications.
1466.19.1	Clearly outline the steps required to modify the program, including prerequisites and potential risks.
1466.19.2	Provide detailed instructions on how to access and edit relevant code or configuration files.
1466.19.3	Highlight specific areas of the program that may need modification and explain their functions.
1466.19.4	Offer guidance on testing procedures to ensure the modified program behaves as expected.
1466.19.5	Encourage users to document their modifications for future reference and collaboration.

General Information and Concepts

1466.20	Apply general design and programming concepts.
1466.20.1	Identify key design and programming concepts applicable to the virtual game project.
1466.20.2	Evaluate how each concept can enhance game functionality, performance, and user experience.
1466.20.3	Integrate design patterns and programming principles such as SOLID and DRY into the game codebase.
1466.20.4	Adapt concepts like modularity, encapsulation, and abstraction to ensure scalable and maintainable game development.
1466.20.5	Continuously iterate and refine the application of design and programming concepts based on project requirements and feedback.
1466.21	Identify various hardware platforms and run-time environments.
1466.21.1	Research different hardware platforms, including consoles, PCs, mobile devices, and VR headsets.
1466.21.2	Explore the specifications and capabilities of each platform, considering factors like processing power, memory, and input methods.
1466.21.3	Identify the run-time environments compatible with each hardware platform, such as operating systems and software frameworks.
1466.21.4	Evaluate the performance implications and constraints of running virtual games on various hardware platforms.
1466.21.5	Consider platform-specific optimization techniques and features to ensure optimal gameplay experiences across different devices.
1466.22	Identify human aspects in information systems.
1466.22.1	Recognize the human factors influencing virtual game interaction, such as cognitive abilities, preferences, and emotions.
1466.22.2	Analyze user behavior and expectations in virtual game environments to inform design decisions.
1466.22.3	Identify accessibility considerations for diverse player demographics, including those with disabilities.
1466.22.4	Consider the social and cultural aspects impacting player engagement and community dynamics within virtual games.
1466.22.5	Collaborate with psychologists or user experience researchers to gain insights into human-computer interaction for improved game design.
1466.23	Identify general information technology (IT) definitions and terms.
1466.23.1	Understand common IT terms such as algorithm, game engine, rendering, network, encryption etc.
1466.23.2	Understand the meaning of acronyms such as UI, TCP/IP, API, AES, VR, AR, AI, etc.
1466.24	Adhere to best programming practices and methodologies.
1466.24.1	Prioritize the player experience by designing virtual game elements, interfaces, and mechanics with the user's preferences, needs, and abilities in mind.
1466.24.2	Ensure smooth gameplay and immersive experiences by optimizing game performance across various platforms and devices.
1466.24.3	Strive for balanced and engaging gameplay by carefully designing game mechanics, levels, and challenges.
1466.24.4	Make virtual games accessible to a diverse audience by incorporating inclusive design principles.
1466.24.5	Foster ongoing improvement and longevity of virtual games by releasing updates, patches, and expansions.
1466.24.6	Gather player feedback, monitor analytics, and adapt gameplay elements based on evolving trends and player preferences to keep the game fresh and engaging.
1466.25	Exhibit understanding of data hierarchy, access methods, and manipulation.
1466.25.1	Organize data efficiently for game assets and player information.

1466.25.2	Optimize data access using indexing and caching techniques.
1466.25.3	Dynamically adjust game elements based on player interactions.
1466.25.4	Ensure data integrity with validation and error handling.
1466.25.5	Adapt data management strategies to evolving game needs.

Scripting

1466.26	Describe the difference between a scripting language and a markup language
1466.26.1	Define the roles and functionalities of scripting languages and markup languages in virtual game design.
1466.26.2	Highlight the dynamic nature of scripting languages, which facilitate game logic, interactions, and behavior scripting.
1466.26.3	Explain the static nature of markup languages, primarily used for structuring and presenting content within the game, such as text, graphics, and user interfaces.
1466.26.4	Provide examples of scripting languages commonly used in game development, such as Lua or JavaScript, for implementing game mechanics and AI behaviors.
1466.26.5	Illustrate markup languages like HTML or XML, utilized for defining the structure and layout of game interfaces, menus, and in-game text.
1466.27	Describe the difference between popular client-side and server-side programming languages.
1466.27.1	Differentiate between client-side and server-side programming languages in virtual game design.
1466.27.2	Use client-side languages, like JavaScript, to manage interactions within the player's browser or game client.
1466.27.3	Use server-side languages, like Python or PHP, to handle game logic and data processing on the game server.
1466.27.4	Understand the distinct roles each type of language plays in creating dynamic virtual game environments.
1466.28	Describe the use of third-party programming interfaces, including APIs.
1466.28.1	Identify relevant third-party APIs for virtual game design.
1466.28.2	Integrate APIs to enhance game features like graphics or networking.
1466.28.3	Assess API compatibility and suitability for game requirements.
1466.28.4	Implement APIs securely and efficiently into game development.
1466.28.5	Use APIs for geolocation, weather forecasts, or real-time communication.
1466.28.6	Facilitate cross-platform compatibility by abstracting underlying complexities.
1466.29	Describe basic JavaScript language used to manipulate elements on a webpage.
1466.29.1	Understand the fundamental syntax and structure of JavaScript, including variables, functions, and control flow statements.
1466.29.2	Use JavaScript's Document Object Model (DOM) to access and modify HTML elements.
1466.29.3	Implement event listeners and handlers in JavaScript to detect user interactions.
1466.29.4	Utilize JavaScript libraries and frameworks, such as jQuery or React, to simplify DOM manipulation tasks and enhance productivity.
1466.29.5	Test and debug JavaScript code effectively using browser developer tools and debugging techniques.
1466.30	Describe how data is represented using XML and JSON.
1466.30.1	Understand XML (eXtensible Markup Language) as a structured markup language used to represent hierarchical data in a human-readable format.
1466.30.2	Recognize JSON (JavaScript Object Notation) as a lightweight data interchange format commonly used for transmitting data between a server and web applications.
1466.30.3	Describe XML's hierarchical structure, consisting of nested elements with opening and closing tags, allowing for flexible data organization and definition of custom data structures.

1466.30.4	Explain JSON's syntax, based on key-value pairs enclosed in curly braces, enabling compact and easy-to-parse data representation suitable for real-time communication and data interchange.
1466.30.5	Compare and contrast the characteristics of XML and JSON, considering factors such as readability, verbosity, and suitability.

Multimedia Assets

1466.31	Identify and use graphics file formats common to the internet and differentiate between raster and vector images.
1466.31.1	Identify common graphics file formats for internet use, including JPEG, PNG, GIF, SVG, and WebP, considering factors such as image quality, compression, and browser compatibility.
1466.31.2	Understand raster images as pixel-based graphics, where each pixel contains color information, suitable for photographs and complex visual content in virtual game design.
1466.31.3	Differentiate vector images as scalable graphics defined by mathematical equations, enabling sharp and crisp rendering at any size without loss of quality, ideal for icons, logos, and user interface elements.
1466.31.4	Utilize raster image formats like JPEG and PNG for detailed visual assets, textures, and backgrounds in virtual game environments, balancing quality, and file size considerations.
1466.31.5	Employ vector image formats such as SVG for scalable graphics and animations in virtual game interfaces, ensuring sharp and adaptable visuals across various screen resolutions and devices.
1466.32	Describe how to use basic media editing tools to prepare digital images and video for use on the Web.
1466.32.1	Familiarize yourself with basic media editing tools such as Adobe Photoshop, GIMP, or Canva to prepare digital images and videos for web use.
1466.32.2	Use cropping and resizing tools to adjust image dimensions and aspect ratios, optimizing them for various web layouts and screen sizes.
1466.32.3	Apply color correction and enhancement techniques to improve image quality and visual appeal, ensuring vibrant and engaging visuals.
1466.32.4	Utilize compression algorithms and settings to reduce file sizes without significant loss of quality, optimizing load times and performance.
1466.32.5	Export images and videos in web-friendly formats such as JPEG, PNG, GIF, or MP4, adhering to recommended resolutions, frame rates, and compression settings for seamless integration.
1466.33	Describe how to use rich internet applications to add interactive media to a website.
1466.33.1	Explore and select suitable rich internet application (RIA) frameworks such as React, Angular, or Vue.js to enhance website interactivity and user engagement.
1466.33.2	Integrate multimedia elements like videos, animations, and audio files into web pages using HTML5 tags and JavaScript APIs, ensuring cross-browser compatibility and optimal performance.
1466.33.3	Implement interactive features such as drag-and-drop interfaces, animated transitions, and real-time updates using RIA frameworks and libraries.
1466.33.4	Leverage AJAX (Asynchronous JavaScript and XML) techniques to enable seamless data exchange between the web server and client-side scripts.
1466.33.5	Test and optimize rich internet applications for responsiveness, accessibility, and performance across different devices and screen sizes.
1466.34	Describe how to integrate embedded media into a website.
1466.34.1	Identify suitable embedded media types, such as videos, audio clips, or interactive elements, to enhance the website's content and user experience.
1466.34.2	Utilize HTML tags like <video>, <audio>, or <iframe> to embed media directly into web pages, ensuring seamless integration and playback compatibility across different browsers and devices.

1466.34.3	Customize embedded media settings, including playback controls, autoplay behavior, and responsive sizing, to optimize the viewing experience and align with the website's design aesthetics.
1466.34.4	Leverage third-party media hosting platforms like YouTube, Vimeo, or SoundCloud to embed externally hosted content into the website.
1466.34.5	Test embedded media functionality across various browsers and devices, ensuring proper rendering, playback, and performance

Web Marketing & Business Management

1466.35	Explain the issues involved in copyrighting, trademarking, and licensing.
1466.35.1	Determining rightful ownership of intellectual property (IP).
1466.35.2	Ensuring the IP is original and not infringing on existing copyrights or trademarks.
1466.35.3	Ensuring proper registration of copyrights and trademarks with relevant authorities.
1466.35.4	Identifying and addressing potential infringement issues.
1466.35.5	Negotiating and drafting licensing agreements that clearly define terms, conditions, and restrictions.
1466.35.6	Understanding the concept of fair use and other exceptions to copyright and trademark laws.
1466.36	Identify aspects of marketing related to social media.
1466.36.1	Develop engaging and relevant content for social media platforms to attract and retain audience interest.
1466.36.2	Develop community engagement opportunities for stakeholders and players.
1466.36.3	Utilize social media analytics tools to track key performance metrics such as engagement rate, reach, click-through rate, and conversion rate.
1466.36.4	Implement targeted social media advertising campaigns to reach specific demographics, increase brand visibility, and drive traffic to the website or landing pages.
1466.37	Describe web-related mechanisms for audience development, including attracting/retaining an audience, and considerations for a global environment.
1466.37.1	Use Search Engine Optimization (SEO) techniques and social media engagement to attract and retain an audience.
1466.37.2	Implement email marketing for ongoing communication and retention of existing players.
1466.37.3	Analyze user data to tailor marketing strategies and game content effectively.
1466.37.4	Consider cultural and linguistic differences when expanding the audience globally, ensuring localization and inclusivity in design.
1466.37.5	Continuously adapt strategies to maintain audience interest and engagement.
1466.38	Define e-commerce terms and concepts.
1466.38.1	Define e-commerce as online buying and selling, covering transactions, payment methods, and digital storefronts.
1466.38.2	Explain key e-commerce concepts such as B2B (business-to-business), B2C (business-to-consumer), and C2C (consumer-to-consumer) models.
1466.38.3	Outline common e-commerce payment methods and gateways, including credit/debit cards, digital wallets, and cryptocurrency.
1466.38.4	Describe e-commerce platforms and marketplaces used in virtual game design, such as Shopify, WooCommerce, or Steam, detailing their functionalities for product listings, sales management, and customer interactions.
1466.38.5	Discuss emerging e-commerce trends and innovations relevant to virtual game design, such as augmented reality (AR) shopping experiences, subscription services, and gamified purchasing incentives.
1466.39	Differentiate between search engine optimization and search engine marketing techniques.

1466.39.1	Define Search Engine Optimization (SEO) as the process of optimizing website content and structure to improve organic search engine rankings and visibility.
1466.39.2	Explain that SEO techniques focus on optimizing factors like keywords, meta tags, site speed, and mobile responsiveness to attract organic traffic from search engine results pages (SERPs).
1466.39.3	Define Search Engine Marketing (SEM) as a digital marketing strategy involving paid advertisements displayed on search engine results pages.
1466.39.4	Highlight that SEM techniques include pay-per-click (PPC) advertising, keyword bidding, and ad targeting to drive immediate traffic to a website or landing page.
1466.39.5	Differentiate between SEO's organic, long-term approach to improve search visibility and SEM's paid, immediate strategy to drive targeted traffic through advertisements.

Administration & Maintenance

1466.40	Describe the process of pre-launch and post-launch functionality testing (e.g., quality assurance).
1466.40.1	Thoroughly test game features pre-launch to detect and resolve bugs and usability issues.
1466.40.2	Utilize various testing methods to ensure smooth functionality across platforms and devices.
1466.40.3	Employ automated testing tools to streamline bug detection and maintain performance consistency.
1466.40.4	Gather feedback from beta testers to refine gameplay mechanics and interfaces.
1466.40.5	Continuously monitor and address post-launch issues to maintain a high-quality gaming experience.
1466.41	Identify the tools required for web publishing, including content management tools.
1466.41.1	Select a web hosting service: Choose a reliable hosting provider like Bluehost or SiteGround.
1466.41.2	Register a domain name: Use domain registrars such as GoDaddy or Namecheap to register a unique website address (e.g., www.mygame.com).
1466.41.3	Use a content management system (CMS): Employ platforms like WordPress or Joomla to easily create, manage, and update website content without extensive coding knowledge.
1466.41.4	Customize website design: Utilize web development tools like Adobe Dreamweaver or Sublime Text to customize website layouts, styles, and functionality according to the game's branding and requirements.
1466.41.5	Implement analytics tools: Integrate tools such as Google Analytics or Hotjar to track website traffic, user behavior, and engagement metrics, enabling data-driven decision-making for website optimization and marketing strategies.
1466.42	Identify hosting resources and domain management.
1466.42.1	Select a web hosting provider: Choose a reliable hosting service such as Amazon Web Services (AWS), DigitalOcean, or Bluehost
1466.42.2	Purchase a domain name: Use domain registrars like GoDaddy, Namecheap, or Google Domains to register a unique website address (e.g., www.mygame.com).
1466.42.3	Configure DNS settings: Access domain management tools provided by the registrar to configure DNS (Domain Name System) settings, including name servers, DNS records, and domain forwarding.
1466.42.4	Set up hosting environment: Utilize hosting control panels like cPanel, Plesk, or AWS Management Console to create hosting accounts, manage server configurations, and deploy website files.
1466.42.5	Manage SSL certificates: Implement SSL certificates through hosting providers or third-party services like Let's Encrypt to secure website connections with HTTPS encryption, ensuring data privacy and trustworthiness.
1466.43	Describe the concepts of backups, server log analysis, and benchmarks.
1466.43.1	Create automated backup schedules for game data and server configurations to prevent data loss and facilitate quick recovery.

1466.43.2	Perform server log analysis: Utilize log analysis tools to review server logs regularly, identifying trends, anomalies, and potential security issues to optimize server performance and enhance security measures.
1466.43.3	Set benchmarks for performance: Define performance benchmarks such as server response time, network latency, and database query speed to measure and evaluate server performance, identifying areas for improvement and optimization.
1466.43.4	Monitor resource utilization: Use server monitoring tools to track resource utilization metrics such as CPU usage, memory consumption, and disk space usage, ensuring efficient resource allocation and preventing performance bottlenecks.
1466.43.5	Implement redundancy and failover measures: Configure redundant server infrastructure and failover mechanisms to ensure high availability and resilience against hardware failures or unexpected downtime, maintaining uninterrupted gameplay for players.
1466.44	Describe basic website security concerns and techniques.
1466.44.1	Implement SSL/TLS encryption: Secure website connections with HTTPS encryption using SSL/TLS certificates to protect data transmission and prevent interception or tampering by malicious actors.
1466.44.2	Update software regularly: Keep website software, including CMS platforms, plugins, and scripts, up-to-date with the latest security patches and updates to address vulnerabilities and mitigate potential security risks.
1466.44.3	Use strong authentication measures: Enforce strong password policies, implement two-factor authentication (2FA), and limit login attempts to prevent unauthorized access to website accounts and administrative panels.
1466.44.4	Employ web application firewalls (WAF): Deploy WAF solutions to monitor and filter HTTP traffic, detecting and blocking malicious requests, SQL injections, cross-site scripting (XSS), and other common web-based attacks.
1466.44.5	Regularly backup website data: Implement automated backup procedures to create regular backups of website files, databases, and configurations, enabling quick recovery in case of data loss, corruption, or ransomware attacks.

This course is tailored to cultivate students' comprehension and skills crucial for becoming financially literate consumers. It focuses on exploring careers in finance, emphasizing skill development essential for success in those careers. Students engage in problem-solving techniques and hands-on activities to gain a practical understanding of the course concepts. Real-world learning opportunities and instruction are integral, with competencies spanning taxes, cash and banking procedures, consumer shopping, 10-Key Calculator usage, and spreadsheet skills. The goal is to equip students with practical knowledge and abilities necessary for navigating financial responsibilities and pursuing careers in the dynamic field of finance.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Payroll Preparation

1470.1	Calculate employee earnings, including salary, hourly, overtime, and commission.
1470.1.1	Differentiate between salary and hourly wages.
1470.1.2	Calculate gross earnings for salaried and hourly employees.
1470.1.3	Compute overtime pay for hourly employees.
1470.1.4	Understand the legal requirements and regulations governing overtime pay.
1470.1.5	Calculate earnings for commission-based employees.
1470.1.6	Discuss various commission structures (e.g., percentage of sales, tiered commissions) to sales data.
1470.1.7	Analyze how commission incentives can influence employee performance and business outcomes.
1470.2	Record information found on W-4 forms in employee data section.
1470.2.1	Identify and interpret the key sections of a W-4 form.
1470.2.2	Analyze how different entries on a W-4 form affect an employee's tax withholdings and net pay.
1470.2.3	Discuss the implications of incorrect or outdated W-4 information on both the employee's paycheck and the employer's payroll responsibilities.
1470.3	Calculate appropriate employee payroll taxes.
1470.3.1	Differentiate between various types of payroll taxes, including federal income tax, Social Security tax, Medicare tax, and state income tax.
1470.3.2	Explain the difference between earned and unearned income.
1470.3.3	Calculate federal and state payroll taxes for employees using provided tax tables and withholding information from W-4 forms.
1470.3.4	Compare tax forms and their purpose.
1470.3.5	Discuss taxes and the tax cycle.
1470.3.6	Demonstrate an understanding of the employer's responsibilities in payroll tax withholding, reporting, and remittance, including calculating the employer's portion of Social Security and Medicare taxes.
1470.3.7	Discuss the implications of payroll tax compliance on business operations.
1470.4	Determine appropriate deposit dates and documentation and prepare federal tax forms.
1470.4.1	Identify which level(s) of government typically receive(s) the tax revenue for income taxes, payroll taxes, property taxes, and sales taxes.
1470.4.2	Differentiate between federal tax forms (e.g. W-2, 1099, 1040, etc.).

Cash and Banking Procedures

1470.5	Complete check stubs and checks.
1470.5.1	Explain the components of a check stub and a check, including the payee information, date, amount, memo, signature line, deductions, and net pay.
1470.5.2	Complete check stubs by recording gross pay, deductions (such as taxes, benefits, and other withholdings), and net pay.
1470.5.3	Demonstrate the ability to correctly write checks by filling in all necessary information.
1470.5.4	Enumerate the benefits of direct deposit for their paychecks.
1470.5.5	Discuss third parties checking transactions, such as a bank or credit union, check-cashing services and retail outlets.
1470.5.6	Describe sources of income (wages/salaries, interest, rent, dividends, transfer payments, gift funds, inheritances, etc.).
1470.6	Enter appropriate data on a deposit slip.
1470.6.1	Differentiate depositing and withdrawing.
1470.6.2	Explain the components of a deposit slip, including account number, date, cash and check amounts, total deposit amount, and depositor's signature.
1470.6.3	Develop the ability to accurately enter relevant information on a deposit slip, including account numbers, check amounts, and other required details.
1470.6.4	Acquire proficiency in handling different forms of currency and coins, including the accurate counting and recording of each denomination on the deposit slip.
1470.6.5	Ensure compliance with the specific requirements of the bank or financial institution regarding the format and information provided on the deposit slip.
1470.6.6	Develop effective record-keeping practices.
1470.6.7	Discuss the importance of maintaining the security and confidentiality of the information on the deposit slip, minimizing the risk of unauthorized access or misuse.
1470.6.8	Stay abreast of technological advancements that may impact deposit slip processes, adapting to new tools or systems introduced by financial institutions.
1470.7	Reconcile a bank statement.
1470.7.1	Explain the key components of a bank statement, including the beginning and ending balance, deposits, withdrawals, fees, and interest earned.
1470.7.2	Gain a thorough understanding of a bank statement, including its components, terminology, and the importance of reconciling it regularly.
1470.7.3	Perform a bank reconciliation by comparing the bank statement with the company's cash account records.
1470.7.4	Investigate and resolve discrepancies between the bank statement and the company's cash account records.
1470.7.5	Recognize and analyze bank charges and interest on the bank statement.
1470.7.6	Develop skills to manage and monitor cash flow effectively through the reconciliation process.
1470.8	Demonstrate familiarity with online and electronic banking procedures.
1470.8.1	Explain online and electronic banking, including account access, balance inquiries, fund transfers, bill payments, and electronic statements.
1470.8.2	Understand the security measures used to protect online transactions.
1470.8.3	Discuss navigating online banking platforms.

1470.8.4	Explain how to perform basic functions such as checking balances, viewing transaction histories, and setting up alerts, ensuring familiarity with the user interface and available tools.
1470.8.5	Discuss transferring funds between accounts, scheduling bill payments, and setting up automatic payments.
1470.8.6	Compare and contrast various peer to peer payment apps.
1470.8.7	List the advantages of online and mobile banking versus traditional banking.
1470.8.8	Explain how to bank safely online.
1470.8.9	Explore the pros and cons of a cashless society.
1470.8.10	Discuss using reconciliation software or tools, streamlining the reconciliation process, and minimizing manual errors.
1470.9	Exhibit understanding of credit cards and/or debit cards.
1470.9.1	Explain the key differences between credit cards and debit cards.
1470.9.2	Discuss linked accounts, transactions, potential fees, interest rates.
1470.9.3	Discuss credit scores and financial management.
1470.9.4	Demonstrate knowledge of how to responsibly use credit and debit cards.
1470.9.5	Understand billing cycles, minimum payments, interest accrual, and the consequences of late payments.
1470.9.6	Explain how to reconcile card statements with personal budgets to maintain financial health and avoid debt accumulation.
1470.9.7	Create a plan for a person who is having difficulty repaying debt.
1470.9.8	Identify the primary organizations that maintain and provide consumer credit reports.
1470.9.9	Enumerate the components of a credit report and how long each data type is retained.
1470.9.10	Explain key components of the Fair Credit Reporting Act and how it impacts lenders and borrowers.
1470.9.11	Summarize the rules contained in the Equal Credit Opportunity Act.
1470.10	Manage multiple bank accounts and transactions.
1470.10.1	Explain the difference between a checking and savings account.
1470.10.2	Compare different savings vehicles such as a savings account, CD, and money market account.
1470.10.3	Identify various rules of thumb and strategies to save money.
1470.10.4	Investigate account management services that financial institutions provide.
1470.10.5	Compare the features and costs of personal checking accounts offered by different financial institutions.
1470.10.6	Compare the features and costs of online and mobile bill payment services offered by different institutions.
1470.10.7	Give examples of unsecured and secured loans.
1470.11	Reconcile and replenish petty cash funds.
1470.11.1	Explain the purpose of petty cash funds in a business.
1470.11.2	Identify typical uses for petty cash.
1470.11.3	Describe the process for setting up and managing a petty cash system, including the roles and responsibilities of the petty cash custodian.
1470.11.4	Discuss replenishing petty cash funds by preparing a petty cash replenishment request, including compiling receipts, completing necessary forms, and obtaining approval.
1470.12	Understand how personal finance relates to the consumer.
1470.12.1	Explain forms of financial exchange (cash, credit, debit, electronic funds transfer, etc.).
1470.12.2	Identify types of currency (e.g., coins, paper money, banknotes, etc.).

1470.12.3	Develop a personal budget.
1470.12.4	Explain how the saving strategy “pay yourself first” can help people achieve their saving goals.
1470.12.5	Explain how having a system for financial record-keeping can make it easier to make financial decisions.
1470.12.6	Describe how saving and investing are different.
1470.12.7	Explain how external influences (e.g. peers, family, or social media) can impact personal savings decisions.
1470.12.8	Identify strategies to manage psychological and emotional obstacles to saving.
1470.12.9	Select a preferred location for a savings account based on comparison of interest rates and fees at different types of financial institutions.
1470.12.10	Describe how failing to repay a loan can negatively impact a person’s finances and life.
1470.12.11	Demonstrate how to use comparison shopping skills to buy and finance a car.
1470.12.12	Calculate how much an auto loan will cost given special offers as well as standard factors such as down payment, APR, and term.

Merchandise Inventory

1470.13	Analyze effects on accounts by the purchase of goods.
1470.13.1	Understand what comparison shopping is, how it can help consumers, and when it makes sense to comparison shop.
1470.13.2	Discuss different factors to consider when comparison shopping beyond things like price and quality, such as environmental impact.
1470.13.3	Examine consumer roles and decisions.
1470.13.4	Explain how social media and influencers can impact a consumer’s spending decisions.

Security

1470.14	Exhibit familiarity with the internal controls for sensitive source documents.
1470.14.1	Identify different types of identity theft, how they can occur, and the impact they can have on someone’s life.
1470.14.2	Discuss the nature of risk control (internal and external).
1470.15	Exhibit familiarity with the internal controls for e-commerce.
1470.15.1	Discuss the nature of enterprise risk management.
1470.15.2	Evaluate various online marketplace options.
1470.16	Exhibit familiarity with internal controls for the protection of company assets and property.
1470.16.1	Define internal controls and explain their importance in safeguarding company assets and property.
1470.16.2	Understand the role of internal controls in preventing fraud and errors.
1470.16.3	Describe various types of internal controls, such as physical controls (locks, security cameras), procedural controls (segregation of duties, authorization processes), and administrative controls (policies, employee training).
1470.17	Exhibit familiarity with confidentiality and ethics.
1470.17.1	Examine ethical considerations in entrepreneurship and make ethical decisions.
1470.17.2	Understand the importance of ethical considerations in accounting careers, recognizing the role of professional codes of conduct and ethical guidelines in maintaining integrity within the profession.
1470.17.3	Discuss the ethical considerations related to implementing and maintaining effective internal controls.

Basic Accounting Knowledge and Skills

1470.18	Exhibit understanding of terminology relating to accounting.
1470.18.1	Explain key accounting terms and concepts.
1470.18.2	Apply accounting terminology in context by analyzing financial statements, journal entries, and transactions, and correctly using terms.
1470.19	Exhibit understanding of careers in accounting.
1470.19.1	Develop an understanding of various careers within the field of accounting.
1470.19.2	Explore roles such as auditor, tax accountant, forensic accountant, financial analyst, and management accountant.
1470.19.3	Gain insight into specialized areas within accounting, including public accounting, corporate accounting, governmental accounting, and nonprofit accounting.
1470.19.4	Acquire knowledge about professional qualifications and certifications in accounting, such as Certified Public Accountant (CPA), Certified Management Accountant (CMA), and Chartered Financial Analyst (CFA).
1470.19.5	Develop a plan for a career path that aligns with industry standards.
1470.19.6	Cultivate networking skills to establish connections with professionals in the accounting field.
1470.19.7	Stay informed about trends and demands in the job market for accounting professionals.
1470.19.8	Identify strategies for career advancement within the accounting profession, including continuing education, gaining specialized skills, and pursuing leadership roles.
1470.19.9	Recognize how different careers can be connected by similar skill sets.
1470.20	Exhibit understanding of regulatory bodies.
1470.20.1	Describe key regulatory bodies in finance and accounting, such as the Securities and Exchange Commission (SEC), the Financial Accounting Standards Board (FASB), and the Internal Revenue Service (IRS).
1470.20.2	Explain regulatory bodies in finance and accounting roles is setting standards and regulations.
1470.20.3	Analyze the implications of regulatory compliance on businesses and investors.
1470.21	Demonstrate ability to use calculator, 10-key, and computer.
1470.21.1	Develop the ability to enter numerical data accurately and swiftly into a 10-key calculator, minimizing errors and promoting efficient data input.
1470.21.2	Demonstrate proficiency in managing decimal points, ensuring correct placement and appropriate use in numerical entries for accurate calculations.
1470.21.3	Attain mastery in performing fundamental mathematical operations (addition, subtraction, multiplication, and division) using the 10-key calculator, executing calculations with speed and precision.
1470.21.4	Acquire the skills to handle complex calculations, including the use of parentheses and understanding the order of operations, to accurately solve intricate mathematical problems.
1470.21.5	Understand and effectively use memory functions (M+, M-, MR, MC) to store and retrieve values during calculations, optimizing workflow and reducing the need for redundant data entry.
1470.21.6	Develop problem-solving skills by using the 10-key calculator to solve practical mathematical problems encountered in professional settings, such as accounting, finance, or data analysis.
1470.21.7	Apply 10-key calculator skills to financial tasks, such as calculating interest, percentages, discounts, and tax amounts, demonstrating practical proficiency in financial calculations.
1470.21.8	Cultivate a habit of auditing and verifying calculations, ensuring accuracy in results, and minimizing the risk of errors in critical numerical data.
1470.22	Identify various business entities.

1470.22.1	Define various types of business entities, including sole proprietorships, partnerships, corporations (both C corporations and S corporations), and limited liability companies (LLCs).
1470.22.2	Identify the legal and tax implications associated with different business entities.
1470.22.3	Discuss liability protection, taxation methods (e.g., pass-through taxation vs. double taxation), ownership structure, and regulatory requirements.
1470.22.4	Analyze factors influencing the selection of a business entity.
1470.23	Determine classification of accounts and identify normal balances
1470.23.1	Classify accounts into categories such as assets, liabilities, equity, revenue, and expenses.
1470.23.2	Identify the normal balance (debit or credit) for each type of account.
1470.23.3	Demonstrate understanding by applying the rules of debit and credit to classify transactions and account balances correctly.
1470.24	Generate and interpret spreadsheets, charts, and graphs
1470.24.1	Create and manage worksheets and workbooks.
1470.24.2	Create tables, charts, and objects.
1470.24.3	Perform operations with formulas and functions.
1470.24.4	Manage data cells and ranges
1470.24.5	Apply custom data formats and layouts.
1470.24.6	Create formulas.
1470.24.7	Develop proficiency in accurately entering financial data into spreadsheets, ensuring proper organization and structure for efficient data management.
1470.24.8	Acquire a strong understanding of financial formulas and functions in spreadsheet software, enabling the creation of dynamic and automated calculations for financial analysis
1470.24.9	Master spreadsheet navigation techniques, including efficient cell referencing, row and column manipulation, and the use of named ranges, to enhance overall productivity in financial modeling.
1470.24.10	Develop the ability to create clear and visually appealing charts and graphs to represent financial data, enhancing communication and understanding among stakeholders.
1470.24.11	Create dynamic spreadsheets that automatically update financial information, allowing for real-time analysis and adaptation to changing business conditions.
1470.24.12	Understand the appropriate selection and customization of charts and graphs based on the type of financial data being presented, optimizing clarity and impact for diverse audiences.
1470.24.13	Develop skills to interpret and analyze financial charts and graphs effectively, extracting meaningful insights and trends for informed decision-making.
1470.24.14	Enhance the ability to create visually compelling dashboards and reports using charts and graphs, catering to the needs of various stakeholders, and facilitating communication of financial information.
1470.24.15	Develop skills to communicate financial insights derived from spreadsheets, charts, and graphs in a clear and concise manner, ensuring that key findings are easily understood by both financial and non-financial stakeholders.

This course provides students with a foundation in financial management and accounting principles applicable to business operations. Students will explore various aspects of payroll preparation, inventory management, financial analysis, investment decision-making, and financing strategies. Students will acquire a comprehensive understanding of business finance principles and practices, enabling them to effectively manage financial resources, make sound investment decisions, optimize capital structure, and drive organizational performance in business environments.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Payroll Preparation

1471.1	Calculate employee earnings, including salary, hourly, overtime, and commission.
1471.1.1	Apply appropriate formulas and understand relevant labor laws and company policies related to employee earnings.
1471.2	Demonstrate familiarity with electronic payroll data entry.
1471.2.1	Demonstrate how to manage employee payroll information using electronic payroll systems.
1471.3	Complete payroll register.
1471.3.1	Demonstrate how to enter employee payroll data into a payroll register, including information such as employee names, hours worked, rates of pay, deductions, and net pay.
1471.4	Prepare a payroll check and check stub with appropriate information.
1471.4.1	Prepare a payroll check and check stub with appropriate information.
1471.5	Record information found on W-4 forms in the employee data section.
1471.5.1	Accurately record information from W-4 forms into the employee data section of payroll records
1471.6	Calculate appropriate employee payroll taxes.
1471.6.1	Demonstrate proficiency in payroll tax calculations.
1471.7	Calculate appropriate employer payroll tax liabilities.
1471.7.1	Calculate appropriate employer payroll tax liabilities
1471.8	Determine appropriate deposit dates and documentation and prepare federal tax forms.
1471.8.1	Determine appropriate deposit dates and documentation required for federal payroll taxes.
1471.8.2	Prepare federal tax forms accurately, demonstrating understanding of tax deposit schedules, documentation requirements, and completion of IRS forms such as Form 941 and Form 940.

Merchandise Inventory

1471.9	Demonstrate knowledge of a merchandise inventory account using perpetual and periodic methods.
1471.9.1	Apply periodic inventory procedures, such as conducting physical inventory counts, calculating cost of goods sold (COGS), and adjusting inventory balances.
1471.9.2	Analyze the impact of purchasing goods on accounts, examining how transactions affect balance sheet and income statement accounts.
1471.9.3	Understand how to record inventory purchases, cost of goods sold, and related expenses in financial statements.
1471.10	Analyze effects on accounts by the purchase of goods.

1471.10.1	Analyze financial statements to evaluate the impact of goods purchases on key accounting ratios, such as gross profit margin and inventory turnover.
1471.11	Calculate the cost of goods sold.
1471.11.1	Calculate the cost of goods sold.
1471.12	Prepare to adjust entries based on physical inventory.
1471.12.1	Conduct physical inventory counts.
1471.12.2	Prepare adjusting entries to reconcile inventory records, ensuring accurate financial reporting and compliance with accounting principles.
1471.13	Calculate for obsolete or a shrinkage of inventory.
1471.13.1	Calculate inventory shrinkage, accurately recording these adjustments in financial statements to reflect the true value of inventory.
1471.14	Apply cost accounting principles to calculate manufacturing costs, allocate overhead, and analyze cost behaviors in manufacturing businesses.
1471.14.1	Interpret and explain unique costs and accounts in the manufacturing process, such as direct materials, direct labor, and factory overhead.
1471.14.2	Calculate the cost of goods manufactured by determining direct materials, direct labor, and factory overhead costs.
1471.14.3	Use various allocation methods to allocate overhead and indirect costs to products.
1471.14.4	Differentiate between variable, fixed, and mixed costs and apply them in cost-volume-profit and cost-revenue analysis.
1471.14.5	Utilize appropriate software to maintain cost accounting records for manufacturing operations.
1471.14.6	Discuss of cost-volume-profit (CVP) analysis.

Identification and Application of Source Data

1471.15	Identify and locate appropriate business forms used in bookkeeping and/or accounting.
1471.15.1	Identify various business forms used in bookkeeping and accounting. E.g., invoices, purchase orders, and balance sheets).
1471.15.2	Discuss the purposes and applications of business forms used in financial transactions.
1471.16	Apply procedures for using electronic data for various bookkeeping and/or accounting purposes.
1471.16.1	Demonstrate how to maintain accurate financial records using digital tools and software.
1471.17	Interpret and identify information contained in source documents.
1471.17.1	Demonstrate how to record financial transactions and maintain reliable accounting records in a business environment.
1471.18	Analyze transactions and journalize entries for accounts receivable and accounts payable.
1471.18.1	Demonstrating proficiency in understanding the impact of transactions on these accounts.
1471.18.2	Apply double-entry accounting principles effectively.
1471.19	Prepare budgets, analyze variances, and calculate cash flows to support financial planning and decision-making.
1471.19.1	Review revenues, expenditures, trends, and priorities to prepare a comprehensive budget.
1471.19.2	Create budgets and describe their respective uses in financial planning and performance evaluation.
1471.19.3	Compare actual financial results with budgeted amounts through the preparation of performance reports.
1471.19.4	Utilize spreadsheet software to perform budget analysis and variance calculations.
1471.19.5	Calculate and prepare cash flow statements, distinguishing cash flows from operating, investing, and financing activities.

Business Accounting

1471.20	Demonstrate proficiency in understanding and applying principles of corporate accounting.
1471.20.1	Identify the methods for forming a corporation and complete the various steps of the accounting cycle for a corporation or a not-for-profit business.
1471.20.2	Describe the different levels of liability and taxation for Corporations and Limited Liability Corporations.
1471.20.3	Research consolidations for subsidiaries, intercompany transactions, and segment reporting in corporate financial statements.
1471.20.4	Determine stockholder's equity and earnings per share and prepare a statement of stockholders' equity for a corporation.
1471.20.5	Calculate and record dividends declared and paid.
1471.20.6	Describe the different classes of stock and explain how each affects equity.
1471.20.7	Prepare journal entries for capital stock issuance, organization costs, stock subscriptions, and dividend declaration and payment to stockholders.
1471.21	Demonstrate proficiency in understanding and applying principles of partnership accounting.
1471.21.1	Describe the roles and responsibilities of partners, including management rights, decision-making processes, and duties under partnership law.
1471.21.2	Create financial statements for partnerships.
1471.21.3	Record and analyze contributions of assets and services by partners, understanding the impact on partnership capital accounts.
1471.21.4	Calculate and distribute partnership profits and losses using various methods, such as the income ratio, capital ratio, or a specific agreement basis.
1471.21.5	Prepare partnership financial statements, including the statement of partnership equity and the allocation of income statement items to partners.
1471.21.6	Interpret and analyze partnership financial statements to evaluate financial performance and liquidity.
1471.21.7	Explain the accounting treatment for changes in partnership ownership, retirement of partners, and liquidation of partnerships.
1471.21.8	Understand the basics of partnership taxation, including the allocation of partnership income and deductions to partners.
1471.22	Demonstrate proficiency in understanding and applying principles of sole proprietorship accounting.
1471.22.1	Record and classify business transactions for a sole proprietorship using double entry accounting principles, including assets, liabilities, owner's equity, revenue, and expenses.
1471.22.2	Explain the relationship between the owner's equity accounts and the financial position of the business.
1471.22.3	Understand the basics of tax reporting for sole proprietorships, including income tax obligations and deductions allowable for business expenses.
1471.22.4	Discuss the reporting requirements for Schedule C (Profit or Loss from Business) and self-employment tax considerations.

Income Taxation

1471.23	Understand tax components, income sources, adjustments, deductions, tax credits, payments, and refunds.
1471.23.1	Understand various components of income taxes, including filing status, personal exemptions, dependents, and unique filing situations, ensuring awareness of key elements necessary for accurate tax filing.
1471.23.2	Analyze different sources of income subject to taxation, such as wages, interest, retirement income, unemployment compensation, and Social Security benefits, fostering an understanding of taxable income components and their reporting requirements.

1471.23.3	Evaluate adjustments to income and deductions, including standard deduction, tax computation, and credits for child and dependent care expenses, education, and child tax credits.
1471.23.4	Identify opportunities for reducing taxable income and maximizing tax benefits.
1471.23.5	Interpret tax credits, including earned income credit (EIC), and other taxes, comprehending their eligibility criteria, calculation methods, and impact on tax liabilities.
1471.23.6	Understand tax payment methods, including withholding and estimated tax payments, and analyze refund and tax owed calculations, ensuring competence in managing tax liabilities and understanding refund entitlements.
1471.23.7	Complete a tax return.

Financial Analysis and Planning

1471.24	Time value of money concepts.
1471.24.1	Apply time value of money formulas, including present value, future value, and annuity calculations.
1471.24.1	Evaluate the worth of cash flows at different points in time and make informed financial decisions.
1471.25	Financial statement analysis techniques.
1471.25.1	Identify key financial metrics in financial statements and their significance in assessing a company's financial performance.
1471.25.2	Interpret financial ratios and metrics, such as liquidity ratios, profitability ratios, and leverage ratios.
1471.25.3	Analyze a company's financial health, profitability, and operational efficiency to evaluate investment and lending opportunities.
1471.25.4	Compare a company's financial performance to industry benchmarks, historical trends, and competitors' financial statements to identify strengths, weaknesses, and areas for improvement.
1471.26	Forecasting financial statements.
1471.26.1	Identify various forecasting methodologies used in business finance, including trend analysis, regression analysis, and time series analysis.
1471.27	Working capital management.
1471.27.1	Understand working capital, including current assets (such as cash, accounts receivable, and inventory) and current liabilities (such as accounts payable and short-term debt).
1471.27.2	Calculate and interpret key working capital ratios. (e.g, current ratio, quick ratio, and inventory turnover ratio)

Investment Decision Making

1471.28	Capital budgeting methods.
1471.28.1	Understand capital budgeting.
1471.28.2	Apply various capital budgeting techniques, such as net present value (NPV), internal rate of return (IRR), payback period, and profitability index.
1471.28.3	Analyze investment opportunities using capital budgeting methods.
1471.29	Risk and return analysis.
1471.29.1	Differentiate types of risk .
1471.29.2	Understand measures of return (such as expected return and yield).
1471.29.3	Analyze the risk-return profiles of various investment assets.
1471.29.4	Evaluate different investment strategies based on their risk and return characteristics. (e.g., conservative, moderate, and aggressive investment approaches)
1471.30	Stock and bond valuation.

1471.30.1	Demonstrate how to value stocks and bonds, including discounted cash flow (DCF) analysis, dividend discount models (DDM) for stocks, and present value models for bonds.
1471.30.2	Analyze individual stocks and bonds, including calculating the fair value of stocks based on future cash flows or dividends.
1471.30.3	Analyze investment opportunities in stocks and bonds by comparing their market prices to their intrinsic values.
1471.31	Portfolio management principles.
1471.31.1	Evaluate portfolio performance using key performance metrics, such as portfolio return.

Financing Decisions

1471.32	Sources of financing (equity and debt).
1471.32.1	Differentiate between various sources of financing, including equity and debt financing options available to businesses.
1471.32.2	Evaluate different financing alternatives, such as issuing stocks, bonds, bank loans, or venture capital.
1471.33	Capital structure theories.
1471.33.1	Apply capital structure models to analyze and optimize the mix of debt and equity financing.
1471.33.2	Evaluate real-world capital structure decisions made by companies in different industries and economic environments.
1471.34	Dividend policy considerations.
1471.34.1	Explore factors influencing dividend decisions. (e.g., earnings stability, cash flow availability, growth opportunities, and shareholder preferences)
1471.34.2	Analyze different dividend policy alternatives. (e.g., dividend payout ratios, dividend stability, stock repurchases, and dividend reinvestment plans)
1471.35	Financial restructuring strategies.
1471.35.1	Explain financial restructuring, including debt restructuring, equity restructuring, and operational restructuring.
1471.35.2	Identify reasons for and implications of restructuring strategies in corporate finance.
1471.35.3	Analyze various financial restructuring techniques, such as debt refinancing, debt-to-equity swaps, asset sales, and cost-cutting measures.

Principles of Entrepreneurship is a dynamic CTE Enrichment Course designed to immerse students in the entrepreneurial mindset and cultivate their innovative potential. The course explores key concepts such as design thinking and the entrepreneurial process, guiding students from ideation to execution. Through hands-on activities and real-world applications, learners will engage in critical thinking, problem-solving, and creative design. The course culminates in experiential learning opportunities where students pitch a mock business idea, synthesizing their knowledge and skills in a practical, impactful presentation.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Entrepreneurial Mindset

1472.1	Define an entrepreneurial mindset.
1472.1.1	Understand and apply the characteristics of an entrepreneurial mindsets.
1472.1.2	Differentiate between an entrepreneurial mindset and a traditional business/managerial mindset.
1472.2	Nurture a growth mindset.
1472.2.1	Embrace challenges as opportunities for growth.
1472.2.2	Learn from feedback and failure.
1472.3	Foster creativity and innovation.
1472.3.1	Understand and apply creative problem-solving techniques.
1472.3.2	Encourage risk-taking and experimentation.
1472.4	Build self-efficacy and confidence.
1472.4.1	Set and achieve personal goals.
1472.4.2	Develop leadership and decision-making skills.

Design Thinking

1472.5	Understand the design thinking process.
1472.5.1	Define the stages of design thinking: emphasize, ideate, and test.
1472.5.2	Identify the purpose and goals of each stage.
1472.5.3	Explore the iterative nature of the design thinking process.
1472.5.4	Learn from successes and failures to improve ideas.
1472.6	Develop empathy for users.
1472.6.1	Explain the importance of empathy in the entrepreneurial process.
1472.6.2	Conduct user research, including customer interviews and observations.
1472.6.3	Create user personas and empathy maps.
1472.7	Define problems clearly.
1472.7.1	Explain the importance of problem identification and framing in the entrepreneurial process.
1472.7.2	Analyze research findings to identify customer problems.
1472.7.3	Create clear and actionable problem statements.
1472.8	Ideate creative solutions.
1472.8.1	Explain the importance of ideation in the entrepreneurial process.
1472.8.2	Identify and apply brainstorming techniques and creative thinking strategies.
1472.8.3	Evaluate and select ideas based on predetermined criteria.

1472.9	Prototype and test solutions.
1472.9.1	Define and explain the purpose of a prototype.
1472.9.2	Build low-fidelity prototypes to visualize ideas.
1472.9.3	Conduct user testing and gather feedback.
1472.9.4	Iterate and refine a prototype based on user insights.

Entrepreneurial Process

1472.10	Identify and evaluate business opportunities.
1472.10.1	Conduct market research and identify target audiences.
1472.10.2	Analyze trends and competitive landscapes.
1472.10.3	Assess the feasibility and potential of business ideas.
1472.11	Develop a lean canvas.
1472.11.1	Generate and refine a unique business idea.
1472.11.2	Understand the components of a lean canvas: problem, solution, key metrics, unique value proposition, unfair advantage, channels, customer segments, cost structure, and revenue streams.
1472.11.3	Complete each section of a lean canvas with relevant information.
1472.11.4	Use the lean canvas as a tool to refine and pivot business ideas.
1472.12	Develop and pitch a business idea.
1472.12.1	Explain the purpose of pitching within the entrepreneurial process.
1472.12.2	Create a compelling pitch deck.
1472.12.3	Practice and deliver a persuasive pitch to an audience.
1472.12.4	Receive and incorporate feedback.

Entrepreneurial Impact

1472.13	Understand the social and economic impact of entrepreneurship.
1472.13.1	Explore how entrepreneurship drives innovation and economic growth.
1472.13.2	Analyze the role of startups and small businesses in job creation.
1472.14	Explore career opportunities in entrepreneurship.
1472.14.1	Identify various career paths within entrepreneurship.
1472.14.2	Network with entrepreneurs and industry professionals.
1472.15	Understand entrepreneurship at a global level.
1472.15.1	Analyze global entrepreneurial trends and emerging markets.
1472.15.2	Learn about successful global entrepreneurs and their impact.
1472.16	Understand entrepreneurship at a local level.
1472.16.1	Identify local business opportunities and community needs.
1472.16.2	Engage with local entrepreneurs and mentors.
1472.17	Reflect on the personal impact of entrepreneurship.
1472.17.1	Assess how entrepreneurship can shape personal growth and development.
1472.17.2	Reflect on personal goals and motivations in pursuing entrepreneurship.

ESHIP 1 – Introduction to Entrepreneurship. This course serves as an introduction into the nature of entrepreneurship, entrepreneurial mindsets, problem framing (identifying, clarifying, and contextualizing problems), and the design thinking process. Attention will be focused on the local community context with a core theme of the discovery of entrepreneurial opportunities. The course will equip students with an overview of entrepreneurship, help assess and develop their entrepreneurial mindset, and provide a foundation of problem framing and customer discovery through the design thinking process. The goal is to provide students with a thorough understanding of the entrepreneurial discovery process and how to apply iterative processes to the development of new ventures.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Business Law

1474.1	Explain types of business ownership.
1474.1.1	Identify and compare types of entrepreneurships.

Economics

1474.2	Describe the concepts of economics and economic activities.
1474.2.1	Differentiate between economic and non-economic activities.
1474.2.2	Identify economic activities most relevant to entrepreneurship.
1474.3	Determine economic utilities created by business activities.
1474.3.1	Conduct an environmental scan to obtain business information.
1474.4	Explain the concept of economic resources.
1474.4.1	Explain the purpose of market and environmental analysis.
1474.4.2	Conduct a market analysis.
1474.5	Explain the role of business in society.
1474.5.1	Explain the complexity of business operations.
1474.6	Identify the impact of small business/entrepreneurship on market economies.
1474.6.1	Examine entrepreneurship in a global context.
1474.6.2	Examine entrepreneurship in a local context.

Emotional Intelligence

1474.7	Demonstrate honesty and integrity.
1474.7.1	Explain the importance of trust in entrepreneurship.
1474.8	Demonstrate responsible behavior.
1474.8.1	Conduct external written and oral communication professionally.
1474.9	Foster open, honest communication.
1474.9.1	Support a classroom environment conducive representative of the entrepreneurial mindset.
1474.10	Treat others with dignity and respect.
1474.10.1	Apply empathy in venture development.

Entrepreneurship

1474.11	Describe the nature of entrepreneurship.
1474.11.1	Discuss the influence of problem framing on venture development.
1474.11.2	Explain the importance of empathy in entrepreneurship.
1474.12	Assess global trends and opportunities for business ventures.
1474.12.1	Identify global and local business opportunities.
1474.13	Assess risks associated with venture.
1474.13.1	Evaluate risk taking opportunities.
1474.13.2	Explain the importance of rapid experimentation.
1474.13.3	Explain the purpose of a prototype.
1474.13.4	Deploy rapid experimentation strategies.
1474.14	Explain the need for entrepreneurial discovery.
1474.14.1	Create processes for ongoing opportunity recognition.
1474.14.2	Define design thinking and its use as a problem-solving methodology.
1474.14.3	Explain the importance of customer discovery.
1474.14.4	Differentiate between needs and wants.
1474.15	Discuss entrepreneurial discovery processes.
1474.15.1	Identify methods/techniques for problem framing and entrepreneurial discovery.
1474.16	Explain tools used by entrepreneurs for venture planning.
1474.16.1	Identify and apply the design thinking process to venture development.
1474.16.2	Deploy customer discovery strategies.
1474.16.3	Conduct a root cause analysis.
1474.17	Generate venture ideas.
1474.17.1	Explain the importance of ideation.
1474.17.2	Identify methods/techniques to generate a product idea.
1474.17.3	Deploy ideation strategies.
1474.17.4	Identify a product to fill a customer need.

Professional Development

1474.18	Demonstrate problem-solving skills.
1474.18.1	Define entrepreneurial mindset.
1474.18.2	Identify and apply the components of an entrepreneurial mindset.
1474.19	Explain the need for innovation skills.
1474.19.1	Understand and articulate how an entrepreneurial mindset contributes to venture development.
1474.20	Make decisions.
1474.20.1	Differentiate between an entrepreneurial mindset and managerial mindset.
1474.21	Set personal goals.
1474.21.1	Conduct internal and external reflection and feedback processes.
1474.21.2	Reflect and apply the entrepreneurial mindset beyond business environments.

ESHIP 2 – Designing a Desirable Venture. This course helps students create a business customers desire by helping students identify who their customers are, what their unique needs and wants are, and how to build a business that meets them where they are. The course introduces students to the Business Model Canvas (BMC), a tool used to map a business idea. The course will equip students with the ability to target different customers through creative marketing approaches and the development of a value proposition to describe why customers should purchase their product or service. From this, students will build their marketing, branding, and sales strategies for their venture. The course will conclude with an overview of distribution and channels, or how to get the product to customers, as a segway to the continued development of their BMC in ESHIP 3.

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Channel Management

1474.1	Explain the nature and scope of channel management.
1475.1.1	Differentiate between marketing and distribution channels.
1475.2	Explain the nature of channels of distribution.
1475.2.1	Identify common distribution channels.
1475.2.2	Identify common marketing channels.
1475.2.3	Select appropriate channels for venture development.

Economics

1475.3	Distinguish between economic goods and services .
1475.3.1	Explain the difference between a good and a service.
1475.4	Explain the concept of competition.
1475.4.1	Differentiate between types of competitors for venture development.
1475.4.2	Conduct competitive analysis.
1475.4.3	Identify existing alternatives during the venture development process.
1475.5	Explain the concept of economic resources.
1475.5.1	Explain types of economic resources needed for venture development.
1475.5.2	Identify economic resources needed for venture development.
1475.6	Explain the concept of private enterprise.
1475.6.1	Differentiate between private and public enterprises.
1475.6.2	Introduce types of business models.
1475.7	Explain the concept of productivity.
1475.7.1	Identify key metrics to evaluate a venture's success.
1475.8	Explain the principles of supply and demand.
1475.8.1	Explain customers vs. end users.

Entrepreneurship

1475.9	Assess start-up requirements.
1475.9.1	Identify financial components of an entrepreneurial opportunity.
1475.9.2	Identify the minimum viable product (MVP) of an entrepreneurial opportunity.

1475.10	Assess the need to use external resources for concept development.
1475.10.1	Introduce the Lean Canvas as a tool for concept development.
1475.11	Generate venture ideas.
1475.11.1	Complete a Lean Canvas for an entrepreneurial opportunity.

Emotional Intelligence

1475.12	Explain the concept of leadership.
1475.12.1	Assign roles within an entrepreneurial project.
1475.12.2	Create a project work breakdown structure.
1475.14	Foster open, honest communication.
1475.14.1	Conduct effective team meetings.
1475.14.2	Create a communication plan for an entrepreneurial project.

Market Planning

1475.15	Explain the concept of market and market identification.
1475.15.1	Emphasize the importance of market identification in venture development.
1475.16	Select target market.
1475.16.1	Introduce tools for market selection.
1475.16.2	Identify a target market for an entrepreneurial opportunity.

Marketing

1475.17	Explain marketing and its importance in a global economy.
1475.17.1	Explain the importance of marketing as an entrepreneurial channel.
1475.17.2	Introduce common marketing channels within venture development.

Operations

1475.18	Explain the nature of operations.
1475.18.1	Differentiate between traditional business operations and entrepreneurship operations.
1475.18.2	Consider factors influencing entrepreneurship operations.
1475.19	Explain the nature of overhead/operating costs.
1475.19.1	Identify common overhead/operating costs associated with venture development.
1475.20	Evaluate project success.
1475.20.1	Create an evaluation plan for an entrepreneurial opportunity.
1475.20.2	Conduct evaluation of an entrepreneurial project.
1475.20.3	Provide complete and accurate project status reports for an entrepreneurial project.

Pricing

1475.21	Explain factors affecting pricing decisions.
1475.21.1	Explain the nature of pricing in venture development.
1475.21.2	Introduce Cost of Goods Sold (COGS).
1475.22	Explain the nature and scope of the pricing function.
1475.22.1	Introduce common pricing strategies associated with venture development.
1475.22.2	Select a pricing strategy for an entrepreneurial opportunity.

Product/Service Management

1475.23	Describe factors used by businesses to position corporate brands.

1475.23.1	Explain the nature of branding.
1475.23.2	Differentiate between branding and marketing.
1475.24	Determine services to provide customers.
1475.24.1	Differentiate between products and services within venture development.
1475.24.2	Introduce customer service as an essential entrepreneurial skill.
1475.25	Explain the concept of a product mix.
1475.25.1	Examine case studies of product mix within existing companies.
1475.25.2	Introduce common product mix strategies associated with venture development.
1475.26	Explain the nature and scope of the product/service management function.
1475.26.1	Explain how market research influences the product/service management function.
1475.27	Explain the nature of corporate branding.
1475.27.1	Explain the concept of brand equity.
1475.27.2	Discuss the value of brand equity in venture development.
1475.28	Identify company's unique selling proposition.
1475.28.1	Define the concept of a unique selling proposition.
1475.28.2	Introduce the Value Proposition Canvas as a tool for USP development.
1475.28.3	Develop a USP for an entrepreneurial opportunity.

Strategic Management

1475.29	Explain the concept of management.
1475.29.1	Introduce the concept of project management.
1475.29.2	Develop a project scope.
1475.29.3	Develop a project plan.
1475.30	Explain the nature of business plans.
1475.30.1	Introduce common components of a business plan.
1475.30.2	Explain the importance of business plans in venture development.
1475.31	Explain the nature of risk management.
1475.31.1	Conduct a risk analysis for an entrepreneurial project.

ESHIP 3 – Creating a Business Foundation. This course emphasizes business feasibility and viability (Is it possible and will it work?) through a focus on how to set up your business using the Business Model Canvas (BMC). The course also introduces entrepreneurial finance as a core component of determining whether a business will be successful. The course will equip students with the required knowledge and skills to identify and secure key resources and partners for a successful launch. An in-depth approach to entrepreneurial finance will prepare students to develop a competitive revenue model and cost structure for their venture with an understanding of start-up, fixed, and ongoing costs. Students will exit the course with a functional financial model and a strong understanding of accounting and finance tools, such as Inuit QuickBooks, which are essential to small business functions. By the conclusion of ESHIP 3, students will have a completed BMC, financial model, and marketing plan for their venture.

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Business Law

1476.1	Explain types of business ownership.
1476.1.1	Select a business form for an entrepreneurial opportunity.

Economics

1476.2	Describe the functions of prices in markets.
1476.2.1	Explore factors influencing pricing strategy.
1476.2.2	Conduct pricing analyses for an entrepreneurial opportunity.
1476.3	Explain the types of economic systems.
1476.3.1	Explain how different economic systems influence venture development.
1476.4	Identify factors affecting a business's profit.
1476.4.1	Differentiate between revenue and profit.
1476.4.2	Explain the concept of gross profit margin.
1476.4.3	Calculate profit for a business.

Emotional Intelligence

1476.5	Assess long-term value and impact of actions on others.
1476.5.1	Reflect on personal influence.
1476.6	Describe the nature of ethics.
1476.6.1	Explain the influence of personal ethics on entrepreneurial trajectory.
1476.7	Explain reasons for ethical dilemmas.
1476.7.1	Examine case studies on ethical dilemmas in entrepreneurship.
1476.8	Recognize and respond to ethical dilemmas.
1476.8.1	Identify strategies to respond to ethical dilemmas within an entrepreneurial context.
1476.9	Treat others with dignity and respect.
1476.9.1	Respond with positive feedback to all shared ideas.
1476.10	Demonstrate honesty and integrity.
1476.10.1	Preserve others ideas and ownership of those ideas.

Entrepreneurship

1476.11	Assess start-up requirements.
1476.11.1	Reflect on personal influence.
1476.12	Assess the need to use external resources for concept development.
1476.12.1	Identify key partners needed for venture development.
1476.12.2	Identify key activities required for venture development.
1476.12.3	Identify key resources needed for venture development.
1476.13	Describe the use of business ethics in entrepreneurship.
1476.13.1	Identify ethical considerations that will influence venture development.
1476.14	Determine feasibility of venture ideas.
1476.14.1	Complete a feasibility assessment of an entrepreneurial opportunity.
1476.15	Explain considerations in making the decision to hire staff.
1476.15.1	Identify staffing needs for key stages of the entrepreneurial process.
1476.15.2	Differentiate between personnel and contractual labor.
1476.15.3	Determine staffing requirements for an entrepreneurial opportunity.
1476.16	Explain factors to consider in determining a venture's human-resource needs.
1476.16.1	Differentiate between traditional needs and entrepreneurial human-resource needs.
1476.16.2	Select appropriate human-resource needs for an entrepreneurial opportunity.
1476.17	Explain tools used by entrepreneurs for venture planning.
1476.17.1	Introduce the Business Model Canvas (BMC).
1476.17.2	Complete a BMC for an entrepreneurial opportunity.
1476.18	Identify capital resources needed for the venture.
1476.18.1	Identify capital resources for key stages of the entrepreneurial process.

Market Planning

1476.19	Conduct SWOT analysis for use in the marketing planning process.
1476.19.1	Describe the purpose of a SWOT analysis.
1476.19.2	Complete a SWOT analysis for an entrepreneurial opportunity.
1476.20	Develop marketing plan.
1476.20.1	Identify key components of a marketing plan.
1476.21	Explain the concept of marketing strategies.
1476.21.1	Identify common marketing strategies.
1476.21.2	Explore case studies of effective marketing strategies for entrepreneurial ventures.
1476.22	Explain the nature of marketing plans.
1476.22.1	Differentiate between a marketing plan for a mature company and an entrepreneurial venture.
1476.22.2	Explore case studies of marketing plans from existing companies.
1476.23	Select marketing metrics.
1476.23.1	Explore common marketing metrics.
1476.23.2	Identify methods of calculating marketing metrics.
1476.24	Set marketing goals and objectives.
1476.24.1	Differentiate between marketing goals and objectives for a mature company and an entrepreneurial venture.

Operations

1476.25	Explain the concept of production.

1476.25.1	Identify key production activities for an entrepreneurial opportunity.
1476.26	Explain the concept of supply chain.
1476.26.1	Explore the concept of supply chain through case study.
1476.26.2	Identify key partners required for the supply chain for an entrepreneurial venture.
1476.27	Explain the nature and scope of purchasing.
1476.27.1	Explain procurement processes.
1476.27.2	Explain strategies to identify purchasing channels.
1476.27.3	Identify purchasing requirements for an entrepreneurial venture.

Pricing

1476.28	Determine cost of product.
1476.28.1	Identify Cost of Goods Sold for an entrepreneurial opportunity.
1476.29	Explain factors affecting pricing decisions.
1476.29.1	Identify pricing factors influencing an entrepreneurial opportunity.

Product/Service Management

1476.30	Build corporate brands.
1476.30.1	Create a logo.
1476.30.2	Create a corporate brand vision.
1476.31	Build product/service brand.
1476.31.1	Create a slogan.
1476.31.2	Calculate the brand equity for an entrepreneurial opportunity.
1476.32	Determine services to provide customers.
1476.32.1	Determine services to provide customers.
1476.33	Identify company's unique selling proposition.
1476.33.1	Determine services to provide customers.

Promotion

1476.34	Explain the role of promotion as a marketing function.
1476.34.1	Provide examples of promotion within entrepreneurship.
1476.35	Explain the types of promotion.
1476.35.1	Examine case studies on promotion from existing businesses.
1476.35.2	Identify commonly used promotion strategies for entrepreneurial ventures.
1476.35.3	Select promotion types for an entrepreneurial opportunity.
1476.36	Explain types of advertising media.
1476.36.1	Examine case studies on advertising from existing businesses.
1476.36.2	Explore advertising as a revenue strategy for entrepreneurial ventures.
1476.36.3	Explain the importance of advertising media selection as it relates to target market selection.
1476.36.4	Select advertising media for an entrepreneurial opportunity.
1476.37	Identify the elements of the promotional mix.
1476.37.1	Examine case studies on the promotional mix from existing businesses.
1476.37.2	Explain the differences between elements of the promotional mix.
1476.37.3	Create a promotional mix for an entrepreneurial opportunity.

ESHIP 4 – Launching a Successful Venture. The final course of the entrepreneurship pathway prepares and supports students in the required steps to officially launch their business in the real world. Students will be familiarized with the technical aspect of the launch, including required business licenses, the best business structure to support their idea, intellectual property to protect their ideas, and who they can connect with to support the growth of their business. The course will also help students gain an understanding of how to manage a new business, including essential functions of business operations, human resources, team development, employee relations, and product/service management. By the conclusion of the pathway, student ventures will be developed to a point where they are capable of being fully launched and funded by external sources.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Business Law

1477.1	Explain types of business ownership.
1477.1.1	Explain government and regulatory requirements for various types of business ownership.
1477.1.2	Explain the strengths and weaknesses of various types of business ownership.
1477.1.3	Select a form of business ownership for an entrepreneurial opportunity.
1477.1.4	Identify requirements of business ownership for an entrepreneurial opportunity (i.e., licensure, etc.)

Emotional Intelligence

1477.2	Assess long-term value and impact of actions on others.
1477.2.1	Create a valuation of an entrepreneurial opportunity.
1477.2.2	Identify personal long-term goals as it relates to entrepreneurship.
1477.3	Demonstrate responsible behavior.
1477.3.1	Demonstrate self-management while working independently on an entrepreneurial opportunity.
1477.4	Foster open, honest communication.
1477.4.1	Develop communication strategies for regular progress updates on entrepreneurial opportunity progress.
1477.5	Treat others with dignity and respect.
1477.5.1	Interact professionally with internal and external stakeholders while developing an entrepreneurial opportunity.

Entrepreneurship

1477.6	Assess start-up requirements.
1477.6.1	Create an inventory of start-up requirements for an entrepreneurial opportunity.
1477.7	Assess the need to use external resources for concept development.
1477.7.1	Identify external resources required for an entrepreneurial opportunity.
1477.7.2	Develop a plan to acquire necessary external resources.
1477.8	Describe considerations in selecting capital resources.
1477.8.1	Explain types of capital available for venture development.
1477.8.2	Rank the applicability of capital resources for an entrepreneurial opportunity.
1477.9	Describe processes used to acquire adequate financial resources for venture creation/start-up.

1477.9.1	Explain the concept of capital readiness.
1477.9.2	Explain factors capital providers implement when allocating financial resources.
1477.9.3	Explore common processes used to acquire capital for entrepreneurial opportunities.
1477.10	Explain tools used by entrepreneurs for venture planning.
1477.10.1	Explain the concept of an entrepreneurship ecosystem.
1477.10.2	Discuss the importance of network development for entrepreneurs.
1477.11	Select sources to finance venture creation/start-up.
1477.11.1	Map existing capital resources within a local, state, and global context.

Financial Analysis

1477.12	Explain the concept of accounting.
1477.12.1	Differentiate between accounting for mature companies and start-ups/new businesses.
1477.12.2	Introduce accounting tools commonly used by entrepreneurial ventures.
1477.13	Explain the role of finance in business.
1477.13.1	Differentiate between personal and entrepreneurial finance.
1477.13.2	Explain the importance of separation of personal and business finances.
1477.13.3	Provide a high-level overview of the financial considerations for new businesses.

Human Resources Management

1477.14	Discuss the nature of human resources management.
1477.14.1	Differentiate between human resources management for mature companies and start-ups/new businesses.
1477.14.2	Identify human resources essentials for an entrepreneurial opportunity.

Information Management

1477.15	Apply information to accomplish a task.
1477.15.1	Source reliable information for venture development.
1477.16	Assess information needs.
1477.16.1	Identify existing gaps in knowledge for venture development.
1477.17	Discuss the nature of information management.
1477.17.1	Differentiate between information management for mature companies and start-ups/new businesses.
1477.18	Evaluate quality and source of information.
1477.18.1	Identify tools for effective research.
1477.18.2	Differentiate between qualitative and quantitative research.
1477.18.3	Differentiate between primary and secondary research.
1477.19	Identify ways that technology impacts business.
1477.19.1	Examine case studies on the influence of technology in business strategy.
1477.19.2	Explore innovation strategy.
1477.19.3	Explore technology adoption strategies.
1477.20	Obtain needed information efficiently.
1477.20.1	Collect and analyze information to support the need for an entrepreneurial opportunity.
1477.21	Store information for future use.
1477.21.1	Discuss processes to effectively store information.
1477.21.2	Discuss privacy and security considerations when storing information.
1477.21.3	Develop an information storage plan for an entrepreneurial opportunity.

Market Planning

1477.22	Develop marketing plan.
1477.22.1	Develop marketing plan for an entrepreneurial opportunity.
1477.23	Explain the nature of sales forecasts.
1477.23.1	Explain the use of a sales funnel.
1477.23.2	Examine case studies of sales forecasts from existing businesses.
1477.24	Explain the role of situation analysis in the marketing planning process.
1477.24.1	Provide tools for situation analysis.
1477.24.2	Examine case studies demonstrating the impact of situation analysis.
1477.24.3	Conduct a situation analysis for an entrepreneurial opportunity.
1477.25	Forecast sales for marketing plan.
1477.25.1	Complete a sales funnel for an entrepreneurial opportunity.
1477.26	Select marketing metrics.
1477.26.1	Generate marketing metrics for an entrepreneurial opportunity.
1477.27	Select target market.
1477.27.1	Identify the Total Addressable Market (TAM), Serviceable Addressable Market (SAM), and Serviceable Obtainable Market (SOM) for an entrepreneurial opportunity.
1477.27.2	Calculate the financial value of the TAM, SAM, SOM for an entrepreneurial opportunity.
1477.27.3	Create a customer persona.
1477.28	Set marketing budget.
1477.28.1	Project start-up and ongoing marketing costs.
1477.29	Set marketing goals and objectives.
1477.29.1	Create realistic marketing goals and objectives that are measurable.

Pricing

1477.30	Calculate break-even point.
1477.30.1	Complete a five-year financial projection.
1477.31	Determine cost of product.
1477.31.1	Complete a pricing strategy.
1477.31.2	Calculate Return on Investment (ROI).
1477.31.3	Calculate a realistic financial ask to reach break-even point.

Professional Development

1477.32	Demonstrate problem-solving skills.
1477.32.2	Response effectively to scenario-based questions related to an entrepreneurial opportunity
1477.33	Make decisions.
1477.33.1	Take ownership of the creation of an entrepreneurial opportunity
1477.34	Set personal goals.
1477.34.1	Identify weekly and monthly priorities for venture development
1477.34.2	Monitor and self-manage progress toward personal goals

Strategic Management

1477.35	Develop an organizational plan for human resources.
1477.35.1	Create a human resources strategy.
1477.35.2	Create an organizational chart.
1477.36	Develop business plan.

1477.36.1	Identify key components of a business plan.
1477.36.2	Complete and share a business plan with an external partner.
1477.36.3	Pitch a business plan to external stakeholders.
1477.37	Develop company goals/objectives.
1477.37.1	Create company mission, vision, and values.
1477.37.2	Identify a company exit strategy.
1477.38	Identify and benchmark key performance indicators.
1477.38.1	Explore tools used for business benchmarking.
1477.38.2	Track business progress against a benchmark tool.
1477.38.3	Compile and present a cumulative business progress report.

Allowable Teacher Endorsement: 0400, 0419, 0500, 0519, 0560, 0561, 0600, 0603, 0605, 7721, 7970

This course explores E-commerce Leadership and Professional Development to provide students with an understanding of key aspects essential for success in the dynamic world of online business. Participants will explore leadership principles, professionalism, business dynamics, digital citizenship, and the product or service design process, gaining valuable insights and skills crucial for navigating the evolving landscape of e-commerce.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Leadership

1478.1	Demonstrate intrapreneurship.
1478.1.1	Explain the role, purpose, and functions of management.
1478.1.2	Describe effective management skills needed to maximize individual and organizational productivity.
1478.1.3	Develop problem-solving skills that prioritize innovation, enabling individuals to address e-commerce challenges with creative and forward-thinking solutions.
1478.1.4	Analyze e-commerce challenges with creativity, innovation, and a proactive entrepreneurial spirit.
1478.1.5	Cultivate awareness of emerging e-commerce trends, fostering the proactive integration of new technologies and strategies.
1478.1.6	Compose effective communication correspondence to articulate and present intrapreneurial ideas.
1478.2	Manage conflict with others.
1478.2.1	Apply conflict management to address and resolve conflicts efficiently within e-commerce.
1478.2.2	Research cultural differences within a globalized e-commerce environment.
1478.2.3	Develop an e-commerce code of conduct that includes guidelines for respectful communication, conflict resolution procedures, and ethical behavior.
1478.2.4	Model interpersonal skills.
1478.3	Adapt in an ambiguous environment.
1478.3.1	Describe the influence of economic, technological, competitive, and global environments on e-commerce.
1478.3.2	Demonstrate the ability to think critically and adaptively in an ambiguous e-commerce environment.
1478.3.3	Characterize adaptive behaviors and open communication within e-commerce teams to collectively respond to challenges and uncertainties.
1478.4	Motivate and supervise personnel to complete projects and achieve business goals.
1478.4.1	Examine the functions of management in e-commerce organizations including organizational structure, human resources, and leadership.
1478.4.2	Identify various leadership styles and describe and apply theories of motivation.
1478.5	Model integrity and ethical leadership.
1478.5.1	Explore the concepts of social responsibility and managerial ethics within e-commerce.

Professional

1478.6	Communicate clearly and effectively orally and in writing.
1478.6.1	Identify and utilize effective techniques and writing styles for business correspondence including letters, memorandums, and reports to communicate virtually.
1478.6.2	Draft, edit, and proofread written messages in a variety of virtual business document formats.

1478.6.3	Demonstrate effective communication through oral and written methods, including oral presentations, written communications, and research.
1478.7	Work productively, collaborate, and develop relationships effectively with diverse team members.
1478.7.1	Research and analyze data for use in business reports, documents, and presentations.
1478.7.2	Examine the impact of cultural and global diversity on business communication.
1478.7.3	Discuss the basics of group dynamics and the challenges of managing work teams.
1478.8	Demonstrate self-development and learning orientation.
1478.8.1	Reflect on personal strengths, weaknesses, and areas for improvement, fostering self-awareness as a foundation for self-development.
1478.8.2	Formulate clear and achievable goals for personal growth and development, aligning aspirations with learning objectives to continuously enhance individual capabilities.
1478.8.3	Investigate skills to embrace change, viewing challenges as opportunities for learning and growth rather than obstacles.
1478.8.4	Acquire effective time management skills to allocate time for continuous learning and self-development amidst professional responsibilities.
1478.9	Demonstrate professionalism.
1478.9.1	Build and leverage professional networks to identify and access learning opportunities, recognizing the value of diverse perspectives and experiences.
1478.9.2	Develop effective problem-solving skills within a professional e-commerce context.
1478.9.3	Exhibit a commitment to customer service excellence, understanding and meeting the needs of clients and customers with professionalism and a customer-centric mindset.
1478.9.4	Incorporate a professional appearance and demeanor in both physical and virtual environments, recognizing the importance of first impressions in building trust and credibility.

Functional

1478.10	Understand general business dynamics.
1478.10.1	Compare the various forms of business ownership and discuss why individuals accept the risk of e-commerce.
1478.10.2	Develop a foundational understanding of general business concepts, including key terminology, principles, and fundamental theories relevant to the e-commerce environment.
1478.11	Conduct research and analysis utilizing data to effectively make decisions (e.g., quantitative, and qualitative analysis).
1478.11.1	Understand entrepreneurial dynamics within the e-commerce landscape, recognizing the role of innovation, risk-taking, and adaptability in fostering business growth.
1478.11.2	Describe the significance of data analytics and business intelligence in e-commerce decision-making.
1478.12	Demonstrate problem-solving and critical thinking.
1478.12.1	Review strategic business planning, encompassing goal setting, resource allocation, and decision-making aligned with overall business objectives in the e-commerce sector.

Orientation

1478.13	Demonstrate digital citizenship by applying industry-accepted ethical practices and behaviors.
1478.13.1	Recognize the role of ethics and social responsibility in effective business decision-making.
1478.13.2	Summarize the concept of digital citizenship, recognizing its importance in the context of ethical practices and behaviors within the e-commerce industry.
1478.13.3	Explore ethical social media practices, including responsible content sharing, engagement, and communication to build positive brand image and foster a supportive online community.

1478.14	Use product or service design processes, guidelines, and research to build a quality product or service.
1478.14.1	Recognize product or service design processes, including ideation, prototyping, testing, and iteration, to facilitate the creation of high-quality e-commerce offerings.
1478.14.2	Apply established design guidelines and best practices relevant to the e-commerce industry, ensuring that product or service designs align with usability, accessibility, and user experience standards.
1478.15	Identify and use communication tools, strategies, and documents for business (e.g., external email, collaborative platforms, SMART goals).
1478.15.1	Develop proficiency in using external email as a communication tool for business purposes, including composing clear and professional messages, managing email etiquette, and utilizing features effectively.
1478.15.2	Differentiate use of collaborative platforms for effective teamwork and communication, including tools like Slack, Microsoft Teams, or other platforms relevant to the e-commerce business environment.
1478.15.3	Create and manage various business documents, such as reports, proposals, and presentations, using tools like Microsoft Office, Google Workspace, or other document creation platforms.
1478.15.4	Understand and apply the SMART (Specific, Measurable, Achievable, Relevant, Time-bound) criteria in goal setting.
1478.15.5	Facilitate virtual meetings using platforms like Zoom, Microsoft Teams, or other virtual communication tools, ensuring productive and engaging discussions among team members.
1478.15.6	Demonstrate excellence in customer communication through various channels, including email, live chat, and social media, ensuring prompt and professional responses to customer inquiries and concerns.
1478.15.7	Understand and prepare for effective crisis communication, including the development of crisis communication plans and strategies to address unforeseen challenges in the e-commerce business.
1478.15.8	Implement document version control practices to manage changes, revisions, and collaborative editing, ensuring consistency and accuracy in shared business documents.
1478.15.9	Apply techniques for documenting meeting minutes, ensuring accurate and concise records of discussions, decisions, and action items during business meetings.
1478.15.10	Develop strategies for employee training and internal communication, utilizing various tools and platforms to disseminate important information, policies, and updates within the e-commerce organization.

This course is designed to equip participants with the skills and knowledge necessary for thriving in the dynamic and competitive landscape of online business. This course delves into critical aspects such as adapting to the e-commerce environment, understanding business law, mastering marketing and sales techniques, and navigating the complexities of product development.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Leadership

1479.1	Adapt in an ambiguous environment.
1479.1.1	Demonstrate think critically and adaptively in an e-commerce environment.
1479.1.2	Identify and navigate uncertainties within the e-commerce landscape (e.g., market conditions, technological shifts, and consumer behaviors).
1479.1.3	Distinguish project management.

Functional

1479.2	Understand general business dynamics.
1479.2.1	Recognize the economic factors that influence e-commerce, including inflation, interest rates, and global economic trends, to make informed business decisions.
1479.2.2	Comprehend the dynamics of supply chain management within e-commerce, recognizing the connections between suppliers, manufacturers, distributors, and retailers.
1479.3	Demonstrate understanding of financial, business, and HR laws, standards, and regulations (e.g., payroll tax law).
1479.3.1	Interpret compliance with business laws and regulations impacting e-commerce operations, (e.g., contracts, intellectual property, and other business-related matters).

Marketing/Sales/Product Development

1479.4	Comply with intellectual property laws, copyright laws, and ethical practices when creating digital communications.
1479.4.1	Explain the marketing function of business including product development, promotion, pricing, and distribution.
1479.4.2	Demonstrate a comprehensive understanding of intellectual property laws.
1479.4.3	Identify and implement ethical practices in the development of digital communications.
1479.4.4	Navigate legal frameworks associated with intellectual property and copyright laws.
1479.4.5	Evaluate and integrate intellectual property considerations into the planning and execution of digital communication strategies.
1479.5	Analyze customer requirements through marketing and user research to design and develop a product.
1479.5.1	Examine consumer behavior about the buying process and marketing decisions.
1479.5.2	Utilize effective data collection methods to gather customer insights, including surveys, interviews, and market analysis, to inform product design and development decisions.
1479.5.3	Evaluate market trends and consumer behavior, translating findings into actionable design strategies that align with customer preferences and expectations.

1479.5.4	Collaborate with cross-functional teams to incorporate customer feedback into the product development process based on user preferences and market demands.
1479.6	Communicate information about products, services, images, and/or ideas to achieve a desired outcome using various digital and print channels.
1479.6.1	Examine and describe the key elements of the marketing mix.
1479.6.2	Establish key performance indicators (KPIs) to measure the success of the product in meeting customer requirements, enabling ongoing assessment and improvement throughout the product lifecycle.
1479.6.3	Create targeted messages that resonate with the intended audience, considering demographics, preferences, and communication channel nuances.
1479.6.4	Utilize digital channels such as social media, email, and online platforms, along with print channels like brochures and flyers, to reach diverse audiences and maximize communication impact.
1479.6.5	Implement multimedia elements, including visuals, graphics, and multimedia content, to enhance communication effectiveness and engagement across different channels.
1479.6.6	Organize communication styles and tones to align with the specific characteristics of each channel, optimizing the message for clarity and resonance.
1479.6.7	Develop and maintain a consistent brand voice and identity across all digital and print communication channels to reinforce brand recognition and trust.
1479.6.8	Assemble analytics and metrics to evaluate the performance of communication campaigns across various channels, making data-driven adjustments for continuous improvement.
1479.6.9	Relate compliance with relevant regulations and ethical standards in all communication materials distributed through digital and print channels.
1479.6.10	Investigate appropriate advertising channels, considering the target audience, industry trends, and the nature of the products or services.
1479.6.11	Schedule partnerships and collaborations with influencers, affiliates, or other businesses to expand the reach of advertising and promotion initiatives.
1479.6.12	Construct consistency in brand messaging and visual identity across all advertising and promotional materials to strengthen brand recognition and equity.
1479.7	Apply sales techniques to meet client needs and wants and identify, demonstrate, and implement solutions in managing effective business customer relationships.
1479.7.1	Apply basic marketing concepts to solve marketing challenges.
1479.7.2	Demonstrate proficiency in applying a variety of sales techniques to understand and fulfill client needs and wants effectively.
1479.7.3	Identify and prioritize client requirements through active listening, questioning, and empathetic communication, ensuring a comprehensive understanding of their expectations.
1479.7.4	Implement solution-oriented approaches to address client needs, aligning products or services with their specific requirements and demonstrating a commitment to providing valuable solutions.
1479.7.5	Formulate adapt sales techniques to different customer personalities, preferences, and communication styles, fostering positive and productive interactions.
1479.7.6	Utilize effective communication and presentation skills to clearly convey product features, benefits, and solutions, reinforcing the value proposition to clients.
1479.7.7	Examine opportunities for upselling or cross-selling based on client needs, contributing to increased revenue and enhanced customer satisfaction.
1479.7.8	Implement customer relationship management (CRM) tools and techniques to track interactions, monitor client preferences, and ensure personalized service delivery.
1479.8	Determine and adjust prices to maximize return while maintaining customer perception of value.
1479.8.1	Design an outline for the marketing management and planning process.

1479.8.2	Analyze market conditions and competitive pricing to determine optimal price points for products in the ecommerce catalog.
1479.8.3	Utilize pricing strategies that balance maximizing returns with maintaining a positive customer perception of value, aligning prices with market expectations.
1479.8.5	Assemble a process to monitor customer feedback, reviews, and market trends to assess and adjust pricing strategies, maintaining a competitive edge in the ecommerce space.
1479.8.6	Construct tiered pricing structures, discounts, and bundling strategies to encourage upselling and maximize customer lifetime value.
1479.8.7	Conduct regular competitor analysis to stay informed about industry pricing trends, ensuring the ecommerce platform remains competitive in the market.
1479.8.9	Support ways to boost sales and revenue through strategic promotions, discounts, and incentives that encourage repeat purchases and customer loyalty.
1479.9	Understand appropriate sales and distribution channels.
1479.9.1	Evaluate and identify the most suitable sales and distribution channels for the ecommerce business, considering factors such as target audience, product type, and market dynamics.
1479.9.2	Research and analyze the effectiveness of various online platforms and marketplaces to determine optimal channels for reaching the target customer.
1479.9.3	Understand the advantages and limitations of different sales and distribution channels, including direct sales, third-party marketplaces, social media, and affiliate marketing.
1479.9.4	Implement a multichannel strategy to diversify sales avenues and expand the reach of the ecommerce business across different online platforms.
1479.9.5	Locate emerging trends and technologies in e-commerce sales and distribution channels, ensuring the business remains agile and adaptable to evolving market landscapes.
1479.9.6	Utilize analytics and performance metrics to assess the effectiveness of each sales channel, making data-driven decisions to optimize resource allocation and marketing efforts.
1479.9.7	Develop an inventory management system for different sales and distribution channels.
1479.9.8	Weigh and adjust the e-commerce strategy based on customer behavior and market trends of online sales channels.
1479.10	Obtain, develop, maintain, and improve a product or service mix in response to market opportunities and competition (e.g., complete a SWOT analysis).
1479.10.1	Conduct a thorough SWOT analysis to identify strengths, weaknesses, opportunities, and threats within the ecommerce market, informing strategic decisions for product and service mix development.
1479.10.2	Examine the market for emerging trends, consumer preferences, and competitive offerings to identify new opportunities for expanding the product or service mix.
1479.10.3	Formulate innovation in product or service offerings by exploring new technologies, features, or enhancements that can differentiate the ecommerce business from competitors.
1479.10.4	Implement a proactive risk management strategy to address potential threats and challenges identified through the SWOT analysis, ensuring resilience and adaptability in the ecommerce business.
1479.11	Access, evaluate, and disseminate information (e.g., competitive analysis).
1479.11.3	Utilize technology and tools for efficient data collection, analysis, and dissemination, ensuring that decision-makers have access to timely and accurate information.
1479.11.4	Understand partnerships with external research sources, industry experts, or market intelligence providers to supplement internal efforts and gain diverse perspectives on market dynamics.

E-commerce III is an advanced course designed to elevate expertise in the ever-evolving world of online business. This comprehensive course covers critical areas including Ethical Leadership, Human Resources and Laws, Website Design and Development, Business Communication Technology Tools, Business Day-to-Day Operations, and Organizational Hierarchy and Workflow. Participants will delve into advanced strategies and operational intricacies, gaining the skills needed to lead ethically, optimize human resources, design impactful websites, leverage communication tools, and ensure seamless day-to-day operations within the organizational framework.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Leadership

1480.1	Adapt in an ambiguous environment.
1480.1.1	Develop e-commerce strategies in response to dynamic and unpredictable circumstances, ensuring alignment with organizational goals and market demands.
1480.1.2	Develop a habit of continuously monitoring and staying informed about emerging trends, technologies, and market shifts within the e-commerce sector to proactively respond to changes.
1480.2	Model integrity and ethical leadership.
1480.2.1	Integrate ethical considerations into customer relations, ensuring fair and transparent practices in marketing, sales, and customer service within the e-commerce context.
1480.2.2	Demonstrate ethical principles to relationships with suppliers and business partners in e-commerce, fostering ethical engagement throughout the supply chain.

Functional

1480.3	Demonstrate understanding of financial, business, and HR laws, standards, and regulations (e.g., payroll tax law).
1480.3.1	Discuss a thorough understanding of HR laws and employment regulations, including anti-discrimination laws, wage and hour regulations, and other legal aspects that govern the employer-employee relationship in the e-commerce sector.
1480.3.2	Understand and adhere to data privacy and security laws, ensuring compliance with regulations such as GDPR (General Data Protection Regulation) and other relevant data protection standards in the e-commerce industry.
1480.3.3	Demonstrate awareness and adherence to consumer protection laws.
1480.3.4	Demonstrate understanding and compliance with laws governing employee benefits, including healthcare, retirement plans, and other fringe benefits provided by the e-commerce organization.
1480.3.5	Understand laws governing contractual agreements in e-commerce.

Information Technology/Operations

1480.4	Apply appropriate internet skills (e.g., social media, search engines, web design).
1480.4.1	Demonstrate adherence to standardized HTML code formatting conventions, including proper indentation, consistent tag naming conventions, and alignment for enhanced readability.
1480.4.2	Establish a systematic approach to organize and manage web page files, maintaining a clear and hierarchical directory structure for efficient collaboration and maintenance.

1480.4.3	Examine best practices in utilizing Cascading Style Sheets (CSS) or templates for consistent and efficient styling across web pages, emphasizing the separation of content and presentation.
1480.4.4	Implement a standardized method for embedding images and links within web pages, ensuring proper file formats, alt text for accessibility, and optimizing for fast loading times.
1480.4.5	Define guidelines for constructing styles, encompassing typography, color schemes, spacing, and other visual elements, to maintain a cohesive and visually appealing design throughout the website.
1480.4.6	Define rules for utilizing floating elements in web page layouts, ensuring proper alignment, clearing, and responsive design principles to enhance the visual presentation and user experience.
1480.4.7	Design and implement the ecommerce website with a focus on user experience, ensuring intuitive navigation, clear calls-to-action, and a visually appealing interface.
1480.4.8	Develop a responsive website that adapts seamlessly to various devices and screen sizes, providing an optimal viewing and interaction experience for users on desktops, tablets, and smartphones.
1480.4.9	Present products effectively with high-quality images, detailed descriptions, and organized categorization, facilitating an easy and enjoyable shopping experience for users.
1480.4.10	Develop and optimize website performance by minimizing load times, optimizing images, and employing caching strategies, ensuring a smooth and responsive user experience.
1480.4.11	Implement Search Engine Optimization (SEO) best practices, including keyword optimization, meta tags, and sitemaps, to enhance the website's visibility and ranking in search engine results.
1480.4.12	Support accessibility standards are met, making the ecommerce website usable for individuals with disabilities, and complying with relevant regulations such as the Web Content Accessibility Guidelines (WCAG).
1480.5	Apply appropriate presentation, word processing, and spreadsheet software skills.
1480.5.1	Analyze and articulate the purpose of presentation, word processing and spreadsheet documents in the e-commerce setting.
1480.5.2	Utilize presentation software skills to create compelling product presentations, incorporating visuals, product details, and engaging content to enhance the online shopping experience for customers.
1480.5.3	Apply word processing software skills to create professional and polished documentation, including product descriptions, terms and conditions, and customer communication, etc.
1480.5.4	Demonstrate proficiency in spreadsheet software to analyze ecommerce data, track sales, manage inventory, and generate reports.
1480.5.5	Apply presentation and word processing skills to create marketing materials such as promotional slideshows, newsletters, and advertisements, effectively conveying the value proposition of products and services.
1480.5.6	Apply word processing skills to craft clear and effective communication materials for customers, including order confirmations, shipping notifications, and customer support documentation, ensuring a positive customer experience.
1480.6	Implement systems, strategies, and techniques used to manage information in a business.
1480.6.1	Develop strategies and processes for website users with the ability to create accounts, manage their profiles, track order history, and save preferences, fostering a personalized and convenient shopping experience.
1480.7	Implement, monitor, and evaluate business processes to ensure efficiency and quality results including complex business processes and day-to-day operations (e.g., organizational chart, workflow diagram).
1480.7.1	Demonstrate proficiency in evaluating the quality of results produced by business processes.
1480.7.2	Apply strategies to optimize day-to-day operations, focusing on improving routine tasks, reducing bottlenecks, and enhancing overall operational efficiency in the e-commerce setting.

1480.7.3	Create and utilize organizational charts that visually represent the structure and hierarchy of the e-commerce organization, facilitating clear communication and understanding of roles and responsibilities.
1480.7.4	Develop skills in creating detailed workflow diagrams that illustrate the flow of activities and information within complex business processes, aiding in visualizing, analyzing, and optimizing workflows.
1480.7.5	Explore and implement technology solutions that enhance business process efficiency, leveraging tools and systems to automate tasks and improve the overall effectiveness of day-to-day operations.
1480.7.6	Develop strategies for training employees on implemented business processes.
1480.7.7	Investigate ways to enhance business processes, incorporating feedback, and implementing changes that drive efficiency and quality results.

Human Resources

1480.8	Demonstrate understanding of the tools used by HR to evaluate performance.
1480.8.1	Understand performance systems used by HR in the e-commerce industry.
1480.8.2	State how HR establishes and aligns performance goals with organizational objectives in the e-commerce context.
1480.8.3	Understand the concept and implementation of 360-degree feedback processes, recognizing how feedback from peers, subordinates, and supervisors contributes to an evaluation of performance.
1480.8.4	Discuss competency frameworks used in e-commerce HR, identifying the essential skills, knowledge, and behaviors required for success in various roles within the organization.
1480.8.5	Understand how HR develops and administers recognition and reward programs in e-commerce, acknowledging and incentivizing high-performing individuals and teams.
1480.8.6	Explore ethical considerations in performance evaluation, understanding the importance of fairness, transparency, and confidentiality in the HR processes related to performance assessment.
1480.9	Demonstrate understanding of benefits and employee policy manuals.
1480.9.1	Demonstrate an understanding of the employee policy manual in the e-commerce organization, including policies related to the code of conduct, work hours, leave policies, and other relevant guidelines.
1480.9.2	Develop strategies for integrating benefits information into employee orientation and onboarding processes, ensuring that new hires are well-informed about available benefits in the e-commerce industry.

E-commerce IV is an advanced course designed to equip students with the strategic management skills required to navigate the intricate landscape of online business successfully. This comprehensive course covers Project Management, Productivity Enhancement, Team Development, Security Measures, Business Finances, Accounting Principles, Tax Regulations, Risk Management, Consumer Behavior Analysis, Buying Tactics, and the impact of Consumer Personal Finances on business operations. Participants will delve into strategic decision-making, financial management, risk mitigation, and consumer-centric strategies to propel e-commerce ventures to new heights.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Leadership

1481.1	Motivate and supervise personnel to complete projects and achieve business goals.
1481.1.1	Demonstrate effective planning, execution, and completion of e-commerce projects to achieve specified business goals.
1481.1.2	Execute motivation strategies to inspire and encourage personnel, enhancing team morale, engagement, and overall productivity.
1481.1.3	Develop effective communication skills to articulate project goals, expectations, and milestones, fostering a clear understanding among team members and promoting alignment with e-commerce objectives.
1481.1.4	Develop systems for recognizing and rewarding personnel achievements, fostering a positive work environment, and motivating individuals to contribute their best to e-commerce projects.
1481.1.5	Develop adaptability skills to manage personnel through changes in project scope, goals, or business strategies, ensuring resilience and flexibility within the e-commerce team.

Functional

1481.2	Understand general business dynamics.
1481.2.1	Distinguish common ethical challenges and dilemmas specific to the e-commerce industry.
1481.2.2	Investigate legal and regulatory standards governing e-commerce operations.
1481.3	Demonstrate understanding of financial, business, and HR laws, standards, and regulations (e.g., payroll tax law).
1481.3.1	Understand the legal and regulatory framework governing e-commerce.
1481.3.2	Utilize mathematical and financial knowledge for tax planning, ensuring compliance with tax regulations and optimizing the e-commerce organization's tax position.
1481.3.3	Examine payroll tax laws, understanding the calculation and remittance of payroll taxes, and ensuring accurate and timely payroll processing within the e-commerce organization.
1481.3.4	Examine financial reporting standards, including Generally Accepted Accounting Principles (GAAP) or International Financial Reporting Standards (IFRS), to ensure accurate and transparent financial reporting in the e-commerce organization.
1481.4	Utilize mathematical concepts, mathematical skills, and financial concepts to obtain necessary information for financial decision-making.
1481.4.1	Develop proficiency in analyzing financial data using mathematical concepts and skills, extracting relevant information for informed decision-making in the e-commerce sector.
1481.4.2	Utilize mathematical and financial concepts to conduct ratio analysis, evaluating the financial health, efficiency, and profitability of the e-commerce business.

1481.4.3	Apply mathematical and financial principles to perform cost-benefit analyses for various projects, initiatives, or investments, aiding decision-makers in assessing the potential returns and risks.
1481.4.4	Develop financial models using mathematical and financial concepts to simulate scenarios, project future financial outcomes, and support decision-making processes in the e-commerce business.
1481.4.5	Demonstrate ability to calculate and assess return on investment (ROI) for various business activities, projects, or marketing campaigns, employing mathematical concepts to evaluate the effectiveness of financial decisions.
1481.4.6	Construct a break-even analysis using mathematical concepts, identifying the point at which revenues equal costs, and providing insights into the financial viability of products or services in the e-commerce market.
1481.4.7	Apply mathematical concepts to optimize inventory management, ensuring efficient stock levels, minimizing carrying costs, and maximizing profitability in the e-commerce supply chain.

Information Technology/Operations

1481.5	Implement systems, strategies, and techniques used to manage information in a business.
1481.5.1	Develop security measures for online transactions, including SSL encryption, secure payment gateways, and compliance with industry standards to safeguard customer data.
1481.5.2	Design an efficient shopping cart system and checkout process, minimizing steps and friction, and providing users with transparency regarding shipping costs, taxes, and order summaries.
1481.6	Implement, monitor, and evaluate business processes to ensure efficiency and quality results including complex business processes and day-to-day operations (e.g., organizational chart, workflow diagram).
1481.6.1	Design collaboration and communication channels among different departments and teams within the e-commerce organization.

Finance/Accounting/Risk Management

1481.7	Understand financial statements for making business decisions.
1481.7.1	Investigate the accounting cycle, including the adjustment and closing processes for a sole proprietorship.
1481.7.2	Examine how to record transactions and prepare and analyze the financial statements for a service business and a merchandising operation.
1481.7.3	Describe the function of accounting and financial management in an organization and explain the role money and financial institutions play in maintaining a successful business and economic environment.
1481.8	Employ financial risk management strategies and techniques used to minimize business loss (risk).
1481.8.1	Construct inventory valuation using all of the GAAP approved methods.
1481.8.2	Formulate and record depreciation, depletion, and amortization using all of the GAAP approved methods.
1481.8.3	Design strategies to implement and enforce Internal Controls.
1481.8.4	Demonstrate proficiency in mathematical calculations related to pricing strategies, including markup, discounting, and setting competitive prices for products or services in the e-commerce industry.
1481.8.5	Incorporate mathematical concepts into risk assessment and mitigation strategies, quantifying financial risks and developing measures to safeguard the financial health of the e-commerce business.
1481.9	Recognize and analyze potential IT security threats to develop and maintain security requirements.
1481.9.1	Recall the OSI model layers.
1481.9.2	Recall information security standards.
1481.9.3	Recognize vendor-neutral and vendor-specific professional certifications.
1481.9.4	Create an outline of insecure coding practices.
1481.9.5	Generalize payment card industry standards.
1481.9.6	Identify and locate education and training in the security field.

1481.9.7	Recall U.S. compliance laws.
1481.9.8	Implement an information systems security policy.
1481.9.9	Define and explain HIPAA.

Marketing/Sales/Product Development

1481.10	Analyze customer requirements through marketing and user research to design and develop a product.
1481.10.1	Describe the principles, practices, and concepts used in retail marketing.
1481.10.2	Examine consumer behavior, the buying process, and the practice of market segmentation in retailing.
1481.10.3	Examine the key elements of planning, organizing, and executing a retail marketing mix.
1481.11	Apply sales techniques to meet client needs and wants and identify, demonstrate, and implement solutions in managing effective business customer relationships.
1481.11.1	Evaluate retail operations management, including decisions related to retail location, human resources, product composition, inventory, and supply chain management.
1481.12	Determine and adjust prices to maximize return while maintaining customer perception of value.
1481.12.1	Analyze cost-control methods and pricing techniques retailers use to maintain profitability.

Personal Finance

1481.13	Understand financial goals.
1481.13.1	Examine consumer roles and consumer decisions.
1481.13.2	Explain how social media and influencers can impact a consumer's spending decisions.
1481.13.3	Identify steps a consumer can take to decrease the influence of social media on their spending decisions.
1481.14	Identify the costs and benefits of various types of credit and the importance of one's credit record.
1481.14.1	Identify the major types of credit and their characteristics.
1481.14.2	Understand the three basic components of lines of credit: principal, interest rate, and term.
1481.14.3	Define net worth and how it is calculated.
1481.14.4	Explain how a credit card works in terms of making purchases and managing payments.
1481.14.5	Differentiate between amortized installment loans and revolving credit lines.
1481.14.6	Describe how Buy Now, Pay Later plans work.
1481.15	Make financial decisions by considering alternatives and consequences.
1481.15.1	Identify ways advertisements can influence their consumer decisions.
1481.15.2	Explain what dark patterns are and identify common types.
1481.15.3	Understand what comparison shopping is, how it can help consumers, and when it makes sense to comparison shop.
1481.15.4	Identify a variety of factors to consider when comparison shopping.
1481.15.5	Discuss different factors to consider when comparison shopping beyond things like price and quality, such as environmental impact.
1481.15.6	Evaluate various online marketplace options.
1481.16	Evaluate saving and investment options.
1481.16.1	Compare different savings vehicles such as a savings account, CD, and money market account.
1481.16.2	Value short, medium, and long-term savings goals.
1481.16.3	Explain what an emergency fund is for and how much to save up.
1481.16.4	Define investing and distinguish it from saving and trading.
1481.16.5	Identify reasons for investing, including outpacing inflation.
1481.16.6	Explain what the stock market is and why companies and investors choose to participate in the stock market.
1481.16.7	Explain what stocks are and how they can make money from investing in them.

Allowable Teacher Endorsement: 0400, 0419, 0500, 0519, 0560, 0561, 0600, 0603, 0605, 7721, 7970

1481.17	Develop a system for keeping and using financial records (e.g., organize a personal budget).
1481.17.1	Describe the purpose of a budget.
1481.17.2	Research and choose appropriate budgeting apps to meet specific needs.
1481.17.3	Create a budget.
1481.18	Describe/Evaluate factors affecting take-home pay.
1481.18.1	Explain the difference between gross pay and net pay.
1481.18.2	Demonstrate how to read a pay stub and understand how taxes and other deductions are withheld to calculate your net pay.
1481.18.3	Recognize common employer benefits.

This course is designed to enhance students' knowledge of game programming and design, focusing on paper prototyping and other planning techniques. Students will explore how visual and audio elements impact the gaming experience and learn the quality assurance processes necessary for producing a polished game. By the end of the course, students will have mastered various design platforms, programming languages, as well as drawing and animation techniques, culminating in the creation of an interactive demonstration of their games.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Game Design Fundamentals

1492.1	Understand fundamental principles of game design.
1492.1.1	Demonstrate knowledge of game mechanics, player experience, and the iterative design process.
1492.1.2	Incorporate achievement systems and leaderboards into a role-playing game (RPG) to appeal to players who seek recognition and competition.
1492.1.3	Craft level designs that provide balanced challenges and opportunities for player skill progression, maintaining a sense of flow and satisfaction.
1492.1.4	Balance game difficulty and progression to accommodate different player skill levels, ensuring both accessibility and a sense of accomplishment.

Game Development Tools

1492.2	Utilize game development tools.
1492.2.1	Work with game engines, design software, and understand the game development pipeline.
1492.2.2	Research game engines (e.g., Unity, Unreal Engine), design software (e.g., Photoshop), and version control systems.
1492.2.3	Employ design software to create and manipulate assets for use in game development, including textures, models, and animations.
1492.2.4	Implement version control systems like Git or SVN to manage collaborative game development projects, facilitating team coordination and codebase management.

Game Genres and Styles:

1492.3	Explore different game genres and styles.
1492.3.1	Analyze and identify characteristics of various game genres and styles.
1492.3.2	Develop first-person shooters, role-playing games, strategy games, simulation games, etc.
1492.3.3	Develop strategic gameplay elements, including resource management, unit tactics, and base building, to challenge players' decision-making skills in real-time or turn-based strategy games.
1492.3.4	Create rich narrative arcs, character progression systems, and branching dialogue paths to immerse players in expansive role-playing game (RPG) worlds.

Storytelling in Games:

1492.4	Understand the role of storytelling in games.
1492.4.1	Create narrative structures, character development, and plot design for games.
1492.4.2	Create engaging narratives that immerse players in the game world.

1492.4.3	Offer player choices that impact the storyline.
1492.4.4	Use level design to enhance storytelling.

Graphics and Visual Design

1492.5	Grasp the importance of graphics and visual design in gaming.
1492.5.1	Understand aesthetics, user interface design, and visual storytelling.
1492.5.2	Implement innovative graphics for stunning visuals.
1492.5.3	Design cohesive art styles to complement game themes.
1492.5.4	Optimize performance for smooth gameplay on diverse platforms.

Sound and Music in Games

1492.6	Explore the role of sound and music in gaming.
1492.6.1	Understand sound design, music composition, and their impact on the gaming experience.
1492.6.2	Implement sound effects, voice acting, music composition, and understand their impact on immersion.
1492.6.3	Use sound cues for gameplay feedback.
1492.6.4	Compose music to enrich storytelling.

Game Testing and Quality Assurance

1492.7	Learn game testing and quality assurance.
1492.7.1	Develop testing strategies, identify bugs, and ensure game quality.
1492.7.2	Master testing methodologies, bug tracking, and smooth gaming experiences.
1492.7.3	Collaborate with developers to ensure software functionality.
1492.7.4	Use testing tools to assess game performance.
1492.7.5	Test games rigorously to find and report bugs.

Game Monetization and Business Models

1492.8	Understand game monetization strategies.
1492.8.1	Explore various business models in the gaming industry, including free-to-play, microtransactions, and subscriptions.
1492.8.2	Research freemium models, in-app purchases, advertisements, and the impact on player engagement.
1492.8.3	Implement monetization strategies that balance player satisfaction with revenue generation, considering factors like fairness and transparency.
1492.8.4	Monitor and adjust monetization tactics based on player feedback and market trends to optimize revenue streams while maintaining player engagement.

This course introduces students to the principles of economics as applied to business decision-making. Students will explore topics such as demand and supply analysis, production and cost theory, market structures, pricing strategies, and the role of government in business. Through case studies and simulations, students will develop analytical skills to assess business opportunities and challenges in various economic environments. This foundational knowledge will prepare them for further study in business-related fields and equip them with essential skills for success in the business world.

***If this course is offered as dual credit, it must adhere to an established agreement between the secondary and postsecondary schools. If this course is offered without dual credit, the teacher of record must be properly endorsed as outlined in the WVDE Testing and Endorsement Manual.*

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Introduction to Business Economics

1471.1	Understand the role of economics in business decision-making.
1471.1.1	Define basic economic concepts such as scarcity, opportunity cost, and marginal analysis.
1471.1.2	Analyze how businesses apply economic principles to optimize resource allocation and maximize profits.
1471.1.3	Explore the interdisciplinary nature of business economics, integrating concepts from economics, accounting, and finance.

Demand and Supply Analysis

1471.2	Analyze the determinants of demand and supply and their implications for business operations.
1471.2.1	Understand the law of demand and the law of supply.
1471.2.2	Analyze factors affecting demand elasticity and supply elasticity.
1471.2.3	Apply demand and supply analysis to forecast market trends and make pricing decisions.

Production and Cost Theory

1471.3	Explore theories of production and cost and their relevance to business decision-making.
1471.3.1	Understand the concepts of total, average, and marginal product.
1471.3.2	Analyze short-run and long-run production decisions, including the law of diminishing returns.
1471.3.3	Examine various cost concepts such as fixed costs, variable costs, and marginal costs.

Market Structures and Pricing Strategies

1471.4	Understand different market structures and their implications for pricing and competition.
1471.4.1	Differentiate between perfect competition, monopoly, monopolistic competition, and oligopoly.
1471.4.2	Analyze pricing strategies used by firms in different market structures.
1471.4.3	Evaluate the impact of market structure on firm behavior and market outcomes.

Business and Government

1471.5	Analyze the role of government in regulating business activities and promoting market efficiency.
1471.5.1	Understand the objectives of government intervention in the economy, including consumer protection and antitrust regulation.

Dual Credit Business Economics**Course #: 1471****Allowable Teacher Endorsement:** 0400, 0419, 0500, 0519, 0560, 0561, 0600, 0603, 0605, 0800, 1000, 1001, 7721

1471.5.2	Analyze the impact of government policies such as taxation, subsidies, and regulation on business operations.
1471.5.3	Evaluate the costs and benefits of government intervention in the economy.

This course introduces the student to the skills required for visual communication in the 21st Century. Students will use digital cameras and professional software tools to create publications for print and the web. Units of Study: Page Layout, Desktop Publishing, Digital Publishing.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1514.1	Demonstrate application of appropriate industry safety practices.
1514.1.1	Identify common safety hazards present in visual communication environments such as studios, workshops, and labs.
1514.1.2	Identify various manual tools used in cross-media publication, such as rulers, cutting mats, scissors, and craft knives.
1514.1.3	Describe the importance of adhering to safety protocols and procedures in the visual communication industry.
1514.1.4	Demonstrate safe and effective usage techniques to ensure proper handling and prevent accidents or injuries.
1514.1.5	Develop skills in assessing risks associated with specific visual communication tasks and environments.
1514.2	Demonstrate application of appropriate electrical safety practices.
1514.2.1	Identify common electrical hazards present in visual communication equipment, including but not limited to cameras, computers, lighting fixtures, and printers.
1514.2.2	Develop skills in safely handling and operating electrical equipment, including proper power cable management and outlet usage.
1514.3	Demonstrate application of appropriate chemical safety practices.
1514.3.1	Identify common chemical hazards present in visual communication materials and processes, such as inks, solvents, cleaners, and fixatives.
1514.3.2	Describe the potential health effects associated with exposure to various chemicals used in visual communication, including skin irritation, respiratory issues, and toxicity.
1514.3.3	Identify safe ventilation practices to minimize exposure to airborne chemicals, including proper use of fume hoods and ventilation systems.

Career Overview

1514.4	Identify and describe career options/emerging trends in visual communication and interactive media.
1514.4.1	Research and identify diverse career paths within visual communication and interactive media industries, including emerging trends.
1514.4.2	Describe current and emerging career opportunities in visual communication and interactive media, highlighting key skills and qualifications.
1514.4.3	Analyze industry trends and technological advancements to anticipate future career prospects and adapt skill sets accordingly.
1514.5	Identify the educational requirements for various visual communications and interactive media design careers.

1514.5.1	Research and compile educational prerequisites for different careers in visual communication and interactive media design, including degree programs and specialized certifications.
1514.5.2	Analyze the educational pathways necessary for entry into specific roles within visual communication and interactive media design fields, considering both traditional and alternative routes.
1514.5.3	Evaluate the alignment between educational qualifications and industry demands in visual communication and interactive media design, identifying areas for skill development and continued education.
1514.6	Identify elements of a professional portfolio for the visual communications and interactive media design field.
1514.6.1	Research the importance of creating a professional portfolio and how to begin saving and organizing files.
1514.7	Identify ways in which visual communication and interactive media design can be used in business.
1514.7.1	Explore business applications of visual communication and interactive media design.

Computer Literacy

1514.8	Demonstrate knowledge of computer terminology.
1514.8.1	Explain the purpose and characteristics of different types of software, including system software (e.g., operating systems) and application software (e.g., image editing programs, design software).
1514.8.2	Define terms related to digital media and visual communication, such as pixel, resolution, aspect ratio, vector graphics, raster graphics, and file compression.
1514.8.3	Analyze the impact of emerging technologies and trends on computer terminology in the field of visual communication, such as augmented reality (AR), virtual reality (VR), and artificial intelligence (AI).
1514.8.4	Apply computer terminology knowledge in practical contexts, such as discussing software features, troubleshooting technical issues, and communicating effectively
1514.8.5	Explain common file formats used in the visual design industry.
1514.8.6	Describe hardware components like graphics cards and drawing tablets.
1514.8.7	Discuss web design terms such as HTML and CSS.
1514.9	Identify issues of web safety and personal/professional online confidentiality.
1514.9.1	Explore terminology specific to web design and development, including HTML, CSS, JavaScript, responsive design, and content management systems (CMS).
1514.9.2	Identify potential online risks and threats specific to the field of visual design (e.g., intellectual property theft, unauthorized use of personal information, and exposure to malware).
1514.9.3	Understand the importance of maintaining confidentiality in their personal and professional online activities (e.g., sharing sensitive visual design work, client information, or proprietary assets).
1514.9.4	Develop awareness of ethical considerations related to online confidentiality in visual design.
1514.9.5	Practice safe online behavior by critically evaluating the credibility and reliability of online sources, adhering to ethical standards in their digital communications, and being mindful of the potential consequences of their online actions.
1514.10	Identify and operate peripherals.
1514.10.1	Identify and use peripherals like printers and scanners, graphic tablets, digital cameras, projectors, etc.
1514.10.2	Extend the screen of computers using external monitors or displays to allow for multitasking and improved productivity.
1514.11	Demonstrate appropriate knowledge and use of industry-standard software.
1514.11.1	Identify industry-standard software and their intended purpose.
1514.11.2	Explore graphic design software.
1514.11.3	Explore video editing software.
1514.11.4	Explore web development software.

1514.13	Demonstrate application of basic troubleshooting and maintenance skills.
1514.13.1	Develop skills in basic troubleshooting and problem-solving related to computer hardware and software issues.
1514.14	Demonstrate file management skills.
1514.14.1	Explore file management techniques, including creating, saving, organizing, and retrieving digital files.
1514.14.2	Compare and contrast different digital storage options (cloud storage, external hard drives, SSDs) in terms of capacity, speed, cost, and reliability.
1514.14.3	Demonstrate proficiency in maintaining version control, regularly backing up files, and securely sharing files.
1514.15	Identify and explain various file formats (e.g., .pdf, .jpg, .png).
1514.15.1	Identify common file formats used in visual communications.
1514.15.2	Explain format characteristics and compatibility for various file formats.
1514.16	Demonstrate understanding of procedures involved in importing and exporting.
1514.16.1	Analyze the impact of technology on visual communication practices and industries, including trends in digital media production and distribution.

Ethics

1514.17	Identify ethical responsibilities regarding copyright and infringement.
1514.17.1	Ensure compliance with copyright laws when sharing visual assets.
1514.17.2	Understand consequences of infringement.
1514.17.3	Give credit to original creators.
1514.17.4	Stay informed about fair use guidelines.
1514.18	Demonstrate awareness of government and industry regulations and standards.
1514.18.1	Stay updated on government and industry regulations.
1514.18.2	Adhere to privacy regulations.
1514.18.3	Follow industry-specific regulations.
1514.18.4	Obtain licenses for third-party images to avoid infringement.
1514.19	Identify the characteristics of positive digital citizenship.
1514.19.1	Engage respectfully online and avoid cyberbullying.
1514.19.2	Respect intellectual property rights by attributing sources.
1514.19.3	Protect personal privacy with strong passwords and privacy settings.
1514.19.4	Verify information before sharing to prevent misinformation.
1514.20	Understand how to maintain a positive digital footprint.
1514.20.1	Maintain a professional online presence with updated portfolios.
1514.20.2	Engage positively in online communities and discussions.
1514.20.3	Monitor online reputation for accuracy.
1514.20.4	Review and remove outdated online content.

Communication Career Foundations

1514.21	Identify educational requirements for various visual communications and multimedia design careers.
1514.21.1	Explore degree programs in graphic design or multimedia arts.
1514.21.2	Gain specialized skills through certification programs.
1514.21.3	Network with industry professionals for career insights.
1514.21.4	Review the Occupational Outlook Handbook for careers and requirements.
1514.22	Identify elements of a professional portfolio for visual communications and multimedia design.

1514.22.1	Showcase diverse projects to demonstrate versatility including designs, web layouts, and infographics.
1514.22.2	Provide project insights and design process details.
1514.22.3	Highlight collaborations and client work.
1514.22.4	Display proficiency in industry-standard software.
1514.22.5	Design a clean layout with high-quality visuals.
1514.23	Understand how visual communications and multimedia design apply to business.
1514.23.1	Recognize visual communication's role in branding and marketing.
1514.23.2	Recognize how videos and infographics drive consumer behavior.
1514.23.3	Acknowledge the importance of intuitive website navigation.
1514.23.4	Recognize how charts aid in data analysis and decision-making.
1514.23.5	Recognize visual communication's role in internal communication.

Multimedia

1514.24	Define multimedia terminology, including web-based terminology.
1514.24.1	Define multimedia terms like "animation" and "HTML" for understanding.
1514.24.2	Explain graphic design terms such as "vector graphics" and "typography."
1514.24.3	Define audio production terms like "sound editing" and "audio mixing."
1514.24.4	Outline video terminology including "frame rate" and "resolution."
1514.24.5	Define web-based terms such as "CSS" and "responsive design."
1514.25	Identify ways that social media impacts the industry.
1514.25.1	Understand how social media boosts brand visibility through targeted ads.
1514.25.2	Recognize social media's impact on consumer preferences.
1514.25.3	Identify the importance of social listening for brand reputation.
1514.25.4	Acknowledge social media's role in democratizing content creation.
1514.26	Identify various types of multimedia applications that include current technology.
1514.26.1	Explore software applications for graphic design and video editing.
1514.26.2	Use current software for creating visual content like presentations and infographics.
1514.26.3	Develop interactive experiences with specialized software.
1514.26.4	Access multimedia content on various platforms.
1514.26.5	Collaborate in real-time with online meetings.
1514.27	Identify how to incorporate interactivity in multimedia projects.
1514.27.1	Create a website with interactive navigation with clickable buttons and menus.
1514.27.2	Develop a video presentation with a survey or quiz embedded.
1514.27.3	Use animated infographics for visual engagement.
1514.27.4	Develop choose-your-own-adventure scenarios for personalized experiences.
1514.27.5	Add social media sharing buttons to expand content reach.
1514.28	Demonstrate knowledge of basic principles of web design.
1514.28.1	Understand layout, typography, and color in web design.
1514.28.2	Learn about font selection and readability.
1514.28.3	Grasp color theory and its application.
1514.28.4	Optimize website navigation for various devices.
1514.28.5	Understand web accessibility basics.
1514.29	Demonstrate knowledge of basic principles of animation.
1514.29.1	Master timing and spacing for realistic movement.
1514.29.2	Understand anticipation and follow-through.
1514.29.3	Learn squash and stretch for impact.

1514.29.4	Follow pendulum trajectory for animation.
1514.29.5	Grasp staging and composition principles.

Print-Based Digital Visual Literacy

1514.30	Define and use the elements of design (e.g., line, space, value).
1514.30.1	Define design elements like line, space, and value.
1514.30.2	Understand space, including positive and negative space.
1514.30.3	Learn about value's role in creating contrast.
1514.30.4	Explore shape's ability to convey meaning.
1514.30.5	Choose colors to evoke specific emotions.
1514.31	Define and use the principles of design (e.g., unity, balance, rhythm).
1514.31.1	Define unity for cohesive design.
1514.31.2	Understand balance for even distribution.
1514.31.3	Repeat elements for website rhythm.
1514.31.4	Use contrasting colors for emphasis.
1514.31.5	Scale elements for balanced layouts.
1514.32	Demonstrate application of elements of a successful composition.
1514.32.1	Apply the rule of thirds for balanced composition.
1514.32.2	Use leading lines to guide the viewer's gaze.
1514.32.3	Employ contrast to emphasize key elements.
1514.32.4	Incorporate framing elements for context.
1514.32.5	Utilize negative space to highlight the main subject.
1514.33	Evaluate/Critique the effectiveness of visual communications and media design.
1514.33.1	Assess clarity and coherence of visual materials.
1514.33.2	Evaluate if a website's layout guides attention effectively.
1514.33.3	Evaluate color, typography, and imagery.
1514.33.4	Evaluate how a video's music and visuals enhance meaning.
1514.33.5	Gather feedback to assess a social media campaign's effectiveness.

Conceptual Design

1514.34	Identify elements of design specifications for customers.
1514.34.1	Determine customer preferences for colors, fonts, and imagery.
1514.34.2	Decide on layout and composition for visual materials.
1514.34.3	Ensure brand consistency with logos and graphics.
1514.34.4	Establish visual tone and style guidelines.
1514.34.5	Optimize designs for mobile devices and high-resolution printing.
1514.35	Identify the importance and use of brainstorming and various types of research.
1514.35.1	Brainstorm with the team to develop concepts for a campaign.
1514.35.2	Use market research and audience analysis to understand client needs.
1514.35.3	Employ user research methods like interviews for design feedback.
1514.35.4	Analyze competitor strategies to stay competitive.
1514.35.5	Draw inspiration from various sources for creative design.
1514.36	Apply knowledge of conceptual design terminology, thumbnails, and storyboards.
1514.36.1	Use conceptual design terms to discuss ideas.
1514.36.2	Create thumbnails to explore design variations.
1514.36.3	Develop storyboards for visual project sequences.

1514.36.4	Revise designs based on feedback.
1514.37	Apply appropriate design production techniques for output.
1514.37.1	Manage colors for consistent reproduction.
1514.37.2	Use appropriate file formats and resolutions.
1514.37.3	Preflight and proof designs for errors.
1514.37.4	Arrange elements for print-ready layouts.
1514.38	Proof projects (e.g., proof marks).
1514.38.1	Double-check text and graphics for errors.
1514.38.2	Apply proof marks for design corrections.
1514.38.3	Use digital proofing tools for efficient review.
1514.38.4	Use marks such as circle, arrow, tilde, stet, crop, bleed, registration, insertion, and deletion marks appropriately.
1514.38.5	Set up review periods to keep projects on track.

Color Theory

1514.39	Demonstrate knowledge of color concepts, including primary, secondary, and tertiary colors.
1514.39.1	Explain primary colors (e.g., red, blue, yellow), secondary colors (e.g., orange, green, purple), and tertiary colors (e.g., red-orange, blue-green, yellow-purple), along with their relationships on the color wheel and how they can be combined to create harmonious color schemes.
1514.39.2	Experiment with color mixing techniques using traditional media (e.g., paint) or digital tools (e.g., Adobe Color) to create color palettes for branding, graphic design, and layout composition in cross-media publishing projects.
1514.39.3	Create mood boards or visual compositions using primary, secondary, and tertiary colors to convey specific themes or messages relevant to cross-media publishing contexts, such as corporate identity, product branding, or editorial design.
1514.40	Identify and apply additive and subtractive color principles.
1514.40.1	Differentiate additive and subtractive color principles.
1514.40.2	Identify examples of additive color models, such as RGB (Red, Green, Blue), used in digital displays and lighting systems.
1514.40.3	Explain how additive color mixing works, including the concept of color addition and the creation of white light through the additive mixing of primary colors.
1514.40.4	Identify examples of subtractive color models, such as CMYK (Cyan, Magenta, Yellow, Black), used in printing and painting processes.
1514.40.5	Explore the process of subtractive color mixing, including how pigments absorb certain wavelengths of light and reflect others.
1514.41	Apply correct usage of RGB, CMYK, HEX, and spot color.
1514.41.1	Apply additive color principles to create digital artwork or designs using RGB color mode in graphic design software.
1514.41.2	Apply subtractive color principles to create print materials or traditional artworks using CMYK color mode or mixing physical pigments.
1514.42	Identify characteristics of color (e.g., tint, shade, value).
1514.42.1	Differentiate between tint, shade, and value and explain how they affect the perception of color.
1514.42.2	Identify examples of tints, shades, and values in artworks, designs, and natural environments.
1514.42.3	Explore the concept of tint as a color mixed with white, resulting in a lighter or pastel hue.
1514.42.4	Explore the concept of shade as a color mixed with black, resulting in a darker or muted hue.
1514.42.5	Examine the concept of value as the lightness or darkness of a color, independent of its hue.

1514.43	Select appropriate color involving the psychology of color.
1514.43.1	Analyze the impact of color choices on the mood, tone, and visual impact of a design or artwork.
1514.43.2	Apply color contrast for readability and emphasis.
1514.43.3	Create harmonious palettes aligned with brand identity.

Typography

1514.44	Demonstrate knowledge of typographic terminology.
1514.44.1	Differentiate between serif and sans-serif typefaces and explain when each is appropriate for use in design projects.
1514.44.2	Explain the importance of kerning, leading, and tracking in typography and how it affects readability and aesthetics.
1514.44.3	Discuss the significance of alignment in typography, including left, right, center, and justified alignment
1514.44.4	Identify common typographic symbols and terminology used in graphic design software
1514.45	Identify the anatomy of type.
1514.45.1	Label the key anatomical elements of typefaces, including but not limited to ascender, descender, baseline, x-height, serif, stem, bowl, counter, and terminal.
1514.45.2	Understand how anatomical elements contribute to the overall appearance and legibility of typography.
1514.46	Identify characteristics of type styles and families.
1514.46.1	Distinguish between different type styles (such as serif, sans-serif, script, and display) and families (such as Helvetica, Times New Roman, Arial, and Garamond)
1514.46.2	Recognize different type families, such as Helvetica, Times New Roman, Arial, and Garamond, and describe their distinguishing characteristics
1514.46.3	Analyze how variations within type families, such as different weights (e.g., light, regular, bold) and widths (e.g., condensed, extended), affect the appearance and usage of typefaces.
1514.46.4	Discuss the importance of selecting appropriate type styles and families to convey the intended message and enhance the visual appeal of design projects.
1514.47	Identify and demonstrate appropriate use of various types of measurements.
	Define and differentiate between various units of measurement commonly used in visual design, such as pixels, inches, centimeters, points, and picas.
	Identify the appropriate situations for using different units of measurement based on the medium and requirements of design projects.
	Demonstrate the ability to convert between different units of measurement accurately and efficiently.
1514.48	Manage typography design problems and preflight check when designing and exporting.
1514.48.1	Address typography issues like inconsistent font styles for better readability.
1514.48.2	Conduct preflight checks to ensure correct typography formatting for various platforms.
1514.48.3	Establish a clear typographic hierarchy for effective communication.
1514.48.4	Adjust letter spacing for improved readability.
1514.49	Choose and apply appropriate typeface, including ones for various jobs.
1514.49.1	Choose typefaces that match project tone and audience.
1514.49.2	Prioritize readability, using serif fonts for body text.
1514.49.3	Tailor fonts to job roles, using formal serifs for corporate materials.
1514.49.4	Maintain consistency by limiting font variations.
1514.49.5	Experiment with typography combinations for engaging designs.

Print-Based & Digital Materials & Equipment

1514.50	Identify and safely use equipment.

1514.50.1	Learn to use cameras, scanners, and printers for visual content.
1514.50.2	Set up and calibrate monitors for accurate color representation.
1514.50.3	Use drawing tablets and styluses for digital illustrations.
1514.50.4	Master software for digital design tasks.
1514.50.5	Understand printing equipment for physical outputs.
1514.51	Identify and safely use electronic tools (e.g., hardware).
1514.51.1	Master graphic tablets for digital drawing.
1514.51.2	Utilize digital cameras for high-quality images.
1514.51.3	Operate scanners for digitizing artwork.
1514.51.4	Calibrate monitors for accurate colors.
1514.51.5	Understand printer functions for physical outputs.
1514.52	Identify and safely use presentation material.
1514.52.1	Choose appropriate presentation materials like slideshows.
1514.52.2	Master presentation software features for engagement.
1514.52.3	Design presentations for clarity and consistency.
1514.52.4	Practice effective delivery techniques.
1514.52.5	Gather feedback for improvement.

Interactive Media

1514.53	Define interactive media terminology, including web-based, video, and audio.
1514.53.1	Define web-based, video, and audio interactive media.
1514.53.2	Explain interactive video as content with user interaction.
1514.53.3	Describe audio interactive media like voice-controlled interfaces.
1514.53.4	Define interactivity, UI, and UX design roles.
1514.53.5	Illustrate VR, AR, and gamification examples.
1514.54	Identify ways that social media marketing impacts the industry.
1514.54.1	Explain social media's role in broadening brand reach and engagement.
1514.54.2	Understand social media's targeted advertising capabilities.
1514.54.3	Recognize influencers' impact on product promotion.
1514.54.4	Utilize social media analytics for campaign optimization.
1514.54.5	Appreciate user-generated content's influence on brand perception.
1514.55	Identify various types of interactive media applications, including emerging technology.
1514.55.1	Identify web-based, video, and audio interactive media.
1514.55.2	Recognize emerging technology like VR and AR.
1514.55.3	Understand gamification applications for engagement.
1514.55.4	Demonstrate the importance of e-learning.
1514.56	Correctly use and present various types of interactive media.
1514.56.1	Incorporate interactive elements into a website.
1514.56.2	Design a mobile-responsive interactive infographic.
1514.56.3	Create an interactive map.
1514.56.4	Ensure clear presentation and accessibility across devices.
1514.56.5	Continuously refine based on user feedback and metrics.
1514.57	Demonstrate awareness of governmental and industrial regulations.
1514.57.1	Stay updated on governmental and industry regulations like GDPR and ASTM D4236.
1514.57.2	Understand copyright laws and obtain necessary permissions.
1514.57.3	Follow advertising regulations from organizations like the FTC.

1514.57.4	Adhere to environmental regulations.
1514.58	Investigate ways to promote a new website.
1514.58.1	Research search engine optimization (SEO) techniques to improve website visibility.
1514.58.2	Utilize social media to engage and promote the website.
1514.58.3	Collaborate with influencers to expand reach.
1514.58.4	Implement email marketing to nurture leads and drive traffic.

Materials and Tools

1514.59	Identify and safely use manual tools.
1514.59.1	Recognize and use manual tools like pencils, brushes, and rulers.
1514.59.2	Learn proper techniques for effective tool use.
1514.59.3	Maintain manual tools for longevity and performance.
1514.59.4	Integrate manual tools with digital workflows.
1514.59.5	Experiment with combining manual tools for unique effects.
1514.60	Identify and safely use electronic tools (e.g., hardware).
1514.60.1	Use electronic tools like graphic tablets, digital cameras, printers, and scanners.
1514.60.2	Learn proper operation techniques for electronic tools.
1514.60.3	Maintain electronic tools for optimal performance.
1514.60.4	Integrate electronic tools with software applications.
1514.60.5	Experiment with electronic tools for innovative workflows.
1514.61	Identify and safely use presentation materials.
1514.61.1	Identify and use presentation materials like poster boards, projectors, screens.
1514.61.2	Learn proper handling and display techniques for presentation materials.
1514.61.3	Ensure visual appeal with appropriate colors and layouts.
1514.61.4	Explore digital tools for dynamic presentations.

This course explores the digital imaging process using industry-standard software, enabling students to enhance and refine their photographs. With a focus on photojournalism and advertising photography, students will explore the technical aspects of digital cameras, including DSLR and mirrorless models, and learn key functions such as shutter speed, aperture, ISO, and exposure settings. Through hands-on projects and creative assignments, students will apply principles of design and composition to capture compelling images.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Computer Literacy

1515.1	Demonstrate knowledge of computer terminology.
1515.1.1	Identify and define essential computer terms related to digital photography, such as pixels, resolution, file formats (JPEG, PNG, RAW), and metadata.
1515.1.2	Discuss what metadata is, how it is embedded in digital photos, and its importance for organizing and cataloging images, including EXIF data.
1515.1.3	Utilize appropriate computer terminology accurately in their digital photography projects, including in written reports and oral presentations about their work.
1515.2	Demonstrate understanding of different platforms and cross-application design.
1515.2.1	Explain how photo editing software (e.g., Adobe Photoshop, Lightroom) and photo management software (e.g., Adobe Bridge) are utilized.
1515.3	Demonstrate appropriate knowledge and use of industry-standard software.
1515.3.1	Describe the purposes and functions of various software tools used in digital photography.
1515.3.2	Understand the evolution of photographic technology and its impact on society.
1515.3.3	Perform basic editing tasks, such as cropping, color correction, and retouching.
1515.3.4	Formulate and apply photo retouching and design tools.
1515.3.5	Demonstrate knowledge of using layers.
1515.4	Demonstrate application of basic troubleshooting and maintenance skills.
1515.4.1	Demonstrate ability to identify, diagnose and resolve common technical issues encountered in digital photography (e.g., camera malfunctions, memory card errors, software crashes, and connectivity problems).
1515.4.2	Perform routine maintenance tasks, including cleaning camera lenses and sensors, updating firmware and software, and managing storage devices.
1515.5	Demonstrate file management skills.
1515.5.1	Understand and correctly use terms related to file management, such as folders, directories, file paths, file extensions, and compression.
1515.5.2	Demonstrate proficiency in basic computer functions essential for digital photography, such as copying files, creating folders, renaming files, and using basic keyboard shortcuts.
1515.6	Identify and explain various file formats (e.g., .pdf, .jpg, .png).
1515.6.1	Distinguish between various image file formats (JPEG, PNG, TIFF, RAW) and explain the advantages and disadvantages of each in different photographic contexts
1515.7	Demonstrate understanding of procedures involved in importing and exporting.

1515.7.1	Explain the concept of resolution, including how it is measured (dpi, ppi), and discuss its impact on image quality and print size

Visual Literacy

1515.8	Define and use the principles of design (e.g., unity, balance, rhythm).
1515.8.1	Identify and explain key principles of design, such as balance, contrast, emphasis, movement, pattern, rhythm, and unity.
1515.8.2	Discuss how design elements contribute to the overall composition and effectiveness of a photograph.
1515.8.3	Explore various photographic styles and genres (e.g., portrait, landscape, macro, street photography).
1515.9	Demonstrate application of elements of a successful composition.
1515.9.1	Plan and execute compositions that demonstrate an understanding of balance, contrast, emphasis, movement, pattern, rhythm, and unity.
1515.9.2	Integrate their understanding of visual literacy and design principles into a digital photography portfolio
1515.9.3	Apply principles of composition, such as rule of thirds, leading lines, and framing
1515.9.4	Understand and utilize lighting techniques for natural and artificial light.
1515.9.5	Demonstrate a basic understanding of visual/emotional impact in photography.
1515.9.6	Discuss subject matter and its impact on a photograph's meaning.
1515.9.7	Analyze and demonstrate the impact of lighting in photography including mood and purpose.
1515.9.8	Recognize various lighting equipment and utilize safe practices.
1515.9.9	Utilize professional studio lighting setups, light modifiers, and other lighting equipment to achieve certain effects.
1515.10	Evaluate/Critique the effectiveness of visual communications and media design.
1515.10.1	Evaluate the use of design principles in various forms of digital media, including advertisements, social media, and photojournalism.
1515.10.2	Discuss how the principles of design guide the viewer's eye and convey messages effectively.

Print-Based & Digital Materials & Equipment

1515.7	Identify and properly use equipment
1515.7.1	Identify and explain the functions of various print-based photography equipment, including printers, paper types (glossy, matte, fine art), and calibration tools.
1515.7.2	Understand how different equipment components affect the final print quality.
1515.7.3	Demonstrate the proper use of digital photography equipment, including cameras (DSLR, mirrorless), lenses, memory cards, and accessories.
1515.7.4	Understand the importance of equipment care and storage.
1515.7.5	Identify and use camera parts and controls, such as shutter speed, aperture, ISO, and exposure settings.
1515.7.6	Identify special purpose camera formats and types, such as action cameras, medium format cameras, and their unique uses.
1515.7.7	Distinguish the differences between lenses of various focal lengths, understanding how each affects composition and perspective.
1515.7.8	Compare and contrast manual and automatic camera settings.
1515.7.9	Demonstrate the ability to adjust settings to achieve desired photographic effects in various lighting.
1515.7.10	Explain the purposes of and utilize camera stabilizers.

1515.8	Identify and properly use electronic tools (e.g. hardware)
1515.8.1	Identify and explain the functions of key hardware components related to digital photography, including cameras, memory cards, USB drives, monitors, and printers.
1515.8.2	Compare and contrast the characteristics, advantages, and limitations of print versus digital outputs.
1515.8.3	Perform basic maintenance tasks on both print-based and digital photography equipment.
1515.8.4	Prepare digital files for printing by understanding and applying concepts such as resolution, color profiles, and file formats.
1515.8.5	Utilize software tools to adjust and optimize images for print.
1515.8.6	Understand the role of monitor calibration and printer profiling in ensuring color accuracy and consistency between digital screens and printed outputs.
	Capture high-quality images using digital cameras for inclusion in print materials, websites, or digital publications.
1515.9	Identify and properly use presentation material
1515.9.1	Integrate print and digital workflows, understanding how to move seamlessly between the two.
1515.9.2	Create projects that include both digital displays (websites, digital portfolios) and physical prints (photo books, exhibitions).

This course introduces the student to the skills required for multimedia production. Students will utilize digital camcorders as well as video editing, and sound recording software to create multimedia projects. Areas of study include video and sound editing, and motion graphics and effects. Units of Study: Videography Basics, Video Editing, Motion Graphics.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1516.1	Execute industry safety practices, including electrical and chemical safety protocols, effectively.
1516.1.1	Demonstrate application of appropriate industry safety practices.
1516.1.2	Demonstrate application of appropriate electrical safety practices.
1516.1.3	Demonstrate application of appropriate chemical safety practices.

Ethics

1516.2	Adhere to ethics and guidelines.
1516.2.1	Identify ethical responsibilities regarding copyright and infringement.
1516.2.2	Demonstrate awareness of government and industry regulations and standards.
1516.2.3	Identify the characteristics of positive digital citizenship.
1516.2.4	Understand how to maintain a positive digital footprint.

Communications Career Foundations

1516.3	Discover career options and trends in visual communication and interactive media. Recognize education needs and portfolio elements.
1516.3.1	Identify and describe career options/emerging trends in visual communication and interactive media.
1516.3.2	Identify the educational requirements for various visual communications and interactive media design careers.
1516.3.3	Identify elements of a professional portfolio for the visual communications and interactive media design field.
1516.3.4	Identify ways in which visual communication and interactive media design can be used in business.

Computer Literacy

1516.4	Apply knowledge of computer and troubleshooting skills.
1516.4.1	Demonstrate knowledge of computer terminology.
1516.4.2	Identify issues of web safety and personal/professional online confidentiality.
1516.4.3	Demonstrate understanding of different platforms and cross-application design.
1516.4.4	Identify and operate peripherals.
1516.4.5	Demonstrate appropriate knowledge and use of industry-standard software.

1516.4.6	Demonstrate application of basic troubleshooting and maintenance skills.
1516.4.7	Demonstrate file management skills.
1516.4.8	Identify and explain various file formats (e.g., .pdf, .jpg, .png).
1516.4.9	Demonstrate understanding of procedures involved in importing and exporting.

Interactive Media

1516.5	Define interactive media terminology, including web-based, video, and audio.
1516.5.1	Identify key principles of animation, including timing, spacing, anticipation, follow-through, and squash and stretch.
1516.5.2	Understand the concept of frame-by-frame animation and its application in creating smooth and lifelike motion.
1516.5.3	Explore the principles of character animation, including principles such as exaggeration, appeal, and secondary action.
1516.5.4	Examine the role of keyframes and interpolation in creating motion tweens and shape tweens in digital animation software.
1516.5.5	Practice creating simple animations using traditional animation techniques, such as flipbooks or hand-drawn animation.
1516.5.6	Utilize digital animation software tools to create basic animations incorporating keyframes and motion tweens.
1516.5.7	Experiment with different animation styles and techniques, including 2D and 3D animation, stop motion, and motion graphics.
1516.5.8	Apply principles of timing and spacing to create animations that effectively convey weight, momentum, and emotion.
1516.5.9	Analyze examples of animated sequences from films, television shows, and digital media, identifying how animation principles are applied to enhance storytelling and visual communication.
1516.5.10	Create a short animated sequence or project that demonstrates an understanding of basic animation principles and techniques.
1516.5.1	Create animated GIFs, SVG animations, or HTML5 animations optimized for web and mobile platforms, allowing them to enhance digital content with dynamic visual elements.

Multimedia

1516.5	Recognize social media's industry impact and diverse multimedia applications.
1516.5.1	Define multimedia terminology, including web-based terminology.
1516.5.2	Identify ways that social media impacts the industry.
1516.5.3	Identify various types of multimedia applications that include current technology.
1516.5.4	Identify how to incorporate interactivity in multimedia projects.
1516.5.5	Demonstrate knowledge of basic principles of web design.
1516.5.6	Demonstrate knowledge of basic principles of animation.

Print-Based Digital Visual Literacy

1516.6	Master design elements and principles.
1516.6.1	Define and use the elements of design (e.g., line, space, value).
1516.6.2	Define and use the principles of design (e.g., unity, balance, rhythm).
1516.6.3	Demonstrate application of elements of a successful composition.

1516.6.4	Evaluate/Critique the effectiveness of visual communications and media design.

Conceptual Design

1516.7	Identify and apply design techniques.
1516.7.1	Identify elements of design specifications for customers.
1516.7.2	Identify the importance and use of brainstorming and various types of research.
1516.7.3	Apply knowledge of conceptual design terminology, thumbnails, and storyboards.
1516.7.4	Apply appropriate design production techniques for output.
1516.7.5	Proof projects (e.g., proof marks).

Color Theory

1516.8	Demonstrate color knowledge, principles, and modes.
1516.8.1	Demonstrate knowledge of color concepts, including primary, secondary, and tertiary colors.
1516.8.2	Identify and apply additive and subtractive color principles.
1516.8.3	Apply correct usage of RGB, CMYK, HEX, and spot color.
1516.8.4	Identify characteristics of color (e.g., tint, shade, value).
1516.8.5	Select appropriate color involving the psychology of color.

Typography

1516.9	Show typographic knowledge.
1516.9.1	Demonstrate knowledge of typographic terminology.
1516.9.2	Identify the anatomy of type.
1516.9.3	Identify characteristics of type styles and families.
1516.9.4	Identify and demonstrate appropriate use of various types of measurements.
1516.9.5	Manage typography design problems and preflight check when designing and exporting.
1516.9.6	Choose and apply appropriate typefaces, including ones for various jobs.

Print-Based & Digital Materials & Equipment

1516.10	Recognize and utilize equipment effectively.
1516.10.1	Identify and safely use equipment.
1516.10.2	Identify and safely use electronic tools (e.g., hardware).
1516.10.3	Identify and safely use presentation material.

Editing

1516.11	Understand editing practices and techniques.
1516.11.1	Understand the difference between linear/nonlinear editing.
1516.11.2	Identify strategies and methods used in TV production.
1516.11.3	Produce a video designed to influence the viewer toward a specific idea.
1516.11.4	Study and implement stock footage libraries.
1516.11.5	Apply audio and video effects and transitions.
1516.11.6	Add and manipulate text, titles, and graphics.

1516.11.7	Mix and balance audio sources.
1516.11.8	Share and distribute final video productions.
1516.11.9	Explore and create productions using a variety of advanced camera and editing techniques.

Cinematography

1516.12	Demonstrate knowledge of cinematic techniques and processes.
1516.12.1	Experience field recording using portable video equipment.
1516.12.2	Carry out “on-camera” performance techniques necessary in production.
1516.12.3	Explore differences between Standard Definition (SD) and High Definition (HD) formats.
1516.12.4	Identify and utilize camera angles, camera movements, shot variety and pacing, shot composition, and beginning of directing.
1516.12.5	Explore different audio recording options.
1516.12.6	Practice studio setup and equipment including audio board, lighting, and chroma-keying effect of switcher.

Studio Equipment and Producing

1516.13	Develop knowledge of studio production.
1516.13.1	Recognize and identify camera, sound, editing, and special effects.
1516.13.2	Operate within the rigid time constraints implicit in broadcasting.
1516.13.3	Operate and care for in-studio and portable equipment, e.g., cameras, editors, character generators, switchers, audio equipment etc.
1516.13.4	Arrange lighting, teleprompter, and other necessary materials in the studio.
1516.13.5	Identify related careers and occupations.
1516.13.6	Function as a contributing member of a production crew including Director, Tech Director, Audio Engineer, CG Operator, Source Player, Camera Operator, Teleprompter, Talent, Light Tech, and Floor Manager.
1516.13.7	Develop complete “directable” TV scripts including video directions, audio directions, direction to talent, times (elapsed and/or remaining), notes, etc.

This course introduces students to the emerging field of cross-media publishing. Students will explore the use of blogging, video sharing, and social media services as journalism and marketing tools. Students will research, write, and produce multimedia content to be disseminated across various platforms (print, video, and digital publishing). Units of Study: 21st Century Publishing, Marketing across Media, Content Marketing.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Computer Literacy

1517.1	Demonstrate knowledge of computer terminology.
1517.1.1	Explain basic computer terminology.
1517.1.2	Differentiate between hardware components (e.g., monitor, keyboard, mouse) and software components (e.g., applications, operating systems)
1517.2	Demonstrate appropriate knowledge and use of industry-standard software.
1517.2.1	Describe commonly used industry-standard software applications relevant to their field of study, such as Adobe Creative Suite (Photoshop, Illustrator, InDesign), Microsoft Office Suite (Word, Excel, PowerPoint).
1517.2.2	Apply advanced features and tools within industry-standard software to design and create projects.
1517.3	Demonstrate file management skills.
1517.3.1	Apply file management techniques using operating system features and file management software.
1517.3.2	Demonstrate proficiency in version control and backup practices to ensure data integrity and security
1517.4	Demonstrate understanding of procedures involved in importing and exporting.
1517.4.1	Differentiate between common import and export formats across different software applications.
1517.4.2	Demonstrate the procedures for importing and exporting digital content using specific software tools.
1517.5	Demonstrate application of basic troubleshooting and maintenance skills.
1517.5.1	Demonstrate the ability to apply systematic troubleshooting techniques to diagnose and resolve basic computer problems.
1517.6	Identify and explain various file formats (e.g., .pdf, .jpg, .png.)
1517.6.1	Identify and list common file formats used for different types of digital content, including documents (e.g., .pdf, .docx), images (e.g., .jpg, .png, .gif), audio (e.g., .mp3, .wav), video (e.g., .mp4, .avi), and compressed files (e.g., .zip).
1517.6.2	Explain the characteristics and specific uses of selected file formats.
1517.6.3	Demonstrate the ability to convert files between different formats using appropriate software tools or online converters.

Multimedia

1517.7	Define multimedia terminology, including web-based terminology.
1517.7.1	Apply the correct terminology when planning and developing multimedia projects.
1517.7.2	Identify and describe common multimedia file formats.
1517.7.3	Explain how different multimedia elements are integrated into web-based projects
1517.7.4	Analyze the impact of evolving web technologies on multimedia production and delivery.
1517.8	Identify ways that social media impacts the industry.

1517.8.1	Analyze and explain how social media platforms impact marketing strategies across various industries.
1517.8.2	Identify key social media marketing tactics, such as influencer partnerships, targeted ads, and content marketing.
1517.8.3	Explore how social media influences consumer behavior and purchasing decisions.
1517.8.4	Investigate how social media drives trends and innovations within various industries.
1517.8.5	Understand and define key web design principles, including layout, color theory, typography, and visual hierarchy.
1517.9	Identify various types of multimedia applications that include current technology.
1517.9.1	Classify different types of multimedia applications that incorporate current technology. (e.g., entertainment and gaming, educational and e-learning tools, digital publishing platforms, multimedia production and editing software, and healthcare applications).
1517.9.2	Explain the unique requirements and constraints of designing for various platforms, such as resolution, file format compatibility, and user interaction.
1517.9.3	Demonstrate the ability to transfer and adapt design elements across multiple platforms, ensuring consistency and maintaining design integrity.
1517.9.4	Apply best practices for cross-application design, including the use of universal file formats and vector graphics to ensure scalability and quality.
1517.9.5	Create a project that showcases a cohesive design implemented across different platforms, demonstrating an understanding of platform-specific adjustments.
1517.9.6	Evaluate the effectiveness of designs when viewed on different platforms and make necessary adjustments to optimize user experience.
1517.10	Demonstrate knowledge of basic principles of web design.
1517.10.1	Explore and define key web-based terminology.
1517.10.2	Explore the concepts of User Experience (UX) and User Interface (UI) design.
1517.10.3	Apply responsive design techniques to ensure websites are accessible and functional across different devices and screen sizes.
1517.10.4	Implement web design best practices, including proper use of HTML and CSS, accessibility standards, and optimization for speed and performance.
1517.10.5	Understand the importance of clean, semantic code and how it impacts search engine optimization (SEO) and user experience.
1517.10.6	Create wireframes and prototypes to plan and visualize website layouts and interactions.
1517.10.7	Demonstrate using web design tools and software.
1517.11	Demonstrate knowledge of basic principles of animation.
1517.11.1	Explore keyframe animation techniques.
1517.11.2	Apply concepts of timing and spacing to control the speed and flow of animations.
1517.11.3	Utilize storyboarding techniques to plan animations.
1517.11.4	Create animations that effectively convey weight, timing, and pacing.
1517.11.5	Explain the concept of interactivity in multimedia projects, distinguishing between passive and interactive media experiences.
1517.11.6	Explore techniques and tools used to incorporate interactivity in multimedia projects (e.g., interactive buttons, clickable hotspots, navigation menus, sliders, quizzes, animations, and real-time data updates).
1517.11.7	Research successful cross-media publishing campaigns that leverage interactive media elements, such as interactive infographics, immersive video experiences, and multimedia storytelling projects.
1517.12	Demonstrate the ability to use scanners to convert physical documents, photographs, or artwork into digital images.

1517.12.1	Utilize scanners to convert physical documents, photographs, or artwork into digital images for editing, archiving, or inclusion in digital publications.
1517.12.2	Operate laser printers, inkjet printers, and large-format printers to produce physical copies of documents, brochures, posters, and other printed materials.
1517.12.3	Create hand-drawn illustrations and designs directly on a digital surface using graphics tablets.
1517.12.4	Calibrate color across different devices, such as monitors, printers, and cameras, using color calibration devices to ensure accurate color reproduction.
1517.13	Demonstrate appropriate knowledge and use of industry-standard software.
1517.13.1	Identify and compare different platforms used in cross-media design, including print, web, and mobile applications.
1517.13.2	Demonstrate proficiency in using industry-standard software applications for graphic design.
1517.13.3	Demonstrate proficiency in using industry-standard software applications for video editing.
1517.13.4	Demonstrate proficiency in using industry-standard software applications for web development.

Print-Based and Digital Visual Literacy

1517.14	Define and use the elements of design (e.g., line, space, value).
1517.14.1	Understand how each element contributes to visual composition in various media forms.
1517.14.2	Create mock layouts or designs using digital tools.
1517.14.3	Incorporate principles of line, space, and value to create visually appealing compositions suitable for different cross-media publishing contexts.
1517.15	Define and use the principles of design (e.g., unity, balance, rhythm).
1517.15.1	Understand how these principles guide the arrangement and organization of visual elements to create effective compositions in various media contexts.
1517.15.2	Assess how effectively these principles are applied to enhance visual communication, user experience, and overall impact in design.
1517.15	Correctly use and present various types of interactive media.
1517.15.1	Produce high-quality video content that incorporates interactive elements such as clickable links, annotations, and embedded multimedia.
1517.15.2	Create audio projects that include interactive components, such as podcasts with chapter markers or audio files with embedded links.
1517.15.3	Apply best practices for user interface (UI) and user experience (UX) design to interactive media projects.
1517.16	Evaluate/Critique the effectiveness of visual communications and media design.
1517.16.1	Explore emerging technologies in interactive media, including virtual reality (VR), augmented reality (AR), and mixed reality (MR).
1517.16.2	Analyze the role of emerging technologies, such as artificial intelligence (AI) and machine learning, in shaping the future of interactive media.
1517.16.3	Research how interactive media applications have influenced communication, entertainment, and learning.

Conceptual Design Process

1517.17	Identify elements of design specifications for customers.
1517.17.1	Review print materials, including details such as paper size, color mode (CMYK or RGB), bleed and margin settings, and resolution requirements for images.
1517.17.2	Provide templates for design specifications documents for websites, covering aspects such as layout preferences, typography choices, color palettes, navigation structure, and functionality requirements (e.g., contact forms, e-commerce features).

1517.17.3	Analyze and interpret design briefs from clients, identify key elements of design specifications, and translate them into actionable tasks for cross-media publishing projects.
1517.18	Apply knowledge of conceptual design terminology, thumbnails, and storyboards.
1517.18.1	Explain key conceptual design terms such as composition, perspective, color theory, contrast, balance, and focal point.
1517.18.2	Practice creating thumbnails and conceptual sketches as preliminary design drafts.
1517.18.3	Apply conceptual design principles learned to explore multiple design ideas quickly, focusing on composition, layout, and visual storytelling.
1517.18.4	Integrate thumbnails and conceptual sketches into a sequence that communicates the flow of visuals, transitions, and key elements.
1517.19	Apply appropriate design production techniques for output.
1517.19.1	Demonstrate the ability to select and prepare design elements such as images, graphics, text, and multimedia components for production.
1517.19.2	Apply design principles (e.g., alignment, contrast, hierarchy) and industry standards (e.g., color profiles, resolution, file formats) to ensure visual consistency and quality.
1517.19.3	Execute production techniques to finalize and prepare designs for output.

Color Theory

1517.20	Demonstrate knowledge of color concepts, including primary, secondary, and tertiary colors.
1517.20.1	Explain the primary colors (red, blue, yellow), secondary colors (green, orange, purple), and tertiary colors (e.g., red-orange, blue-green).
1517.20.2	Understand the relationships between these colors and how they are derived from one another.
1517.20.3	Create color wheels and exploring color harmonies (e.g., complementary, analogous, triadic).
1517.20.4	Demonstrate how primary, secondary, and tertiary colors can be used to create visually appealing and balanced designs.
1517.20.5	Analyze the use of primary, secondary, and tertiary colors in different design contexts.
1517.21	Identify and apply additive and subtractive color principles.
1517.21.1	Explain the principles of additive color (RGB: Red, Green, Blue) and subtractive color (CMYK: Cyan, Magenta, Yellow, Key/Black).
1517.21.2	Understand how these color systems work and how colors are mixed differently in light (additive) versus pigment/ink (subtractive) applications.
1517.21.3	Demonstrate their understanding by creating visual projects that apply additive color principles using digital tools and subtractive color principles using traditional media or printing techniques.
1517.21.4	Analyze examples of media that use additive and subtractive color principles, such as digital screens, photography, printing, and painting.
1517.22	Apply correct usage of RGB, CMYK, HEX, and spot color.
1517.22.1	Utilize HEX codes to specify colors in web design projects, ensuring consistency across digital platforms.
1517.22.2	Select appropriate spot colors to achieve specific branding or design requirements, considering factors such as color accuracy and cost.
1517.22.3	Create a project that demonstrates correct usage of RGB, CMYK, HEX, and spot color, applying each color model appropriately to achieve desired outcomes.
1517.22.4	Understand design principles and their role in creating effective multimedia content.
1517.23	Identify characteristics of color (e.g., tint, hue, saturation, shade, and value).
1517.23.1	Apply knowledge of color characteristics to create visually appealing compositions for print and digital media.

1517.23.2	Apply knowledge of color characteristics by creating design projects that utilize various tints, shades, saturations, and values of different hues
1517.24	Select appropriate color involving the psychology of color.
1517.24.1	Understand how color choices impact mood, message, and visual hierarchy in design projects.
1517.24.2	Discuss how these characteristics influence the overall aesthetic, emotional response, and effectiveness of the design.
1517.24.3	Explain how different hues can evoke specific emotions and reactions (e.g., red for excitement or urgency, blue for calmness or trust, green for growth or nature).
1517.24.4	Select colors intentionally to evoke desired emotional responses and convey specific messages in designs.
1517.24.5	Analyze branding and marketing materials, identifying how color psychology is used to influence consumer perception and behavior.

Typography

1517.25	Identify characteristics of type styles and families.
1517.25.1	Apply knowledge of type styles and families to make informed decisions when selecting and pairing typefaces for typographic compositions.
1517.26	Identify and demonstrate appropriate use of various types of measurements.
1517.26.1	Apply appropriate measurements when creating and designing visual elements for digital and print media, ensuring consistency and accuracy.
1517.26.2	Discuss the importance of understanding measurement units in maintaining design integrity and quality across different platforms and media.
1517.26.3	Explain various measurement units used in design, including points, picas, inches, millimeters, pixels, and ems.
1517.26.4	Demonstrate proficiency in converting between different measurement units commonly used in design
1517.27	Manage typography design problems and preflight check when designing and exporting.
1517.27.1	Conduct checks for font embedding, correct font versions, missing fonts, font licensing, and proper text formatting.
1517.27.2	Perform comprehensive preflight checks to ensure that all typographic elements are correctly formatted and ready for export.
1517.27.3	Demonstrate proficiency in using typography tools within design software to adjust spacing, alignment, kerning, leading, and tracking.
1517.27.4	Understand the legal and technical aspects of using and distributing fonts in designs.
1517.27.5	Demonstrate selecting appropriate export formats and settings to maintain typographic integrity.
1517.28	Choose and apply appropriate typeface per various jobs.
1517.28.1	Analyze different design contexts and determine the most suitable typefaces for various projects.
1517.28.2	Apply typographic hierarchy effectively by using different weights, styles, and sizes of typefaces.
1517.28.3	Choose typefaces that align with the brand's identity and values.
1517.28.4	Evaluate the readability and aesthetic qualities of various typefaces in different design scenarios.
1517.28.5	Apply typefaces consistently across multiple media, including print collateral, digital assets, websites, and multimedia presentations.

Print-Based & Digital Materials & Equipment

1517.29	Identify and safely use manual tools.
1517.29.1	Demonstrate safe use of tools such as typography and straightedge rulers, Pantone color swatch book and light table.
1517.30	Identify and safely use electronic tools (e.g., hardware).

1517.30.1	Use equipment such as desktop computers, flatbed scanners, and inkjet printers.
1517.30.2	Understand proper handling techniques and safety precautions when interacting with electronic devices.
1517.30.3	Outline safety protocols and best practices for using electronic tools in cross-media publishing workflows.
1517.31	Identify and safely use presentation materials.
1517.31.1	Learn to recognize each type of equipment, such as projectors, screens, and interactive whiteboards, understand its functions, and follow safety guidelines to prevent accidents and damage.
1517.31.2	Learn to adjust projector settings, position projection screens, and connect multimedia devices to ensure smooth and effective presentations.
1517.31.3	Identify the appropriate use of presentation hardware tools, such as an LCD projector, interactive white board.

This course focuses on media writing and digital citizenship skills, emphasizing ethical practices, copyright law, fair use, and the responsibilities of content creators. It covers government and industry regulations, the impact of AI on communication, freedom of the press, and the significance of positive digital citizenship. Students explore career options in visual communications and multimedia design, create professional portfolios, and understand design principles in business contexts. Practical training includes using equipment, electronic tools, and presentation materials, ensuring proficiency in digital communication and media production.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Ethics

1518.1	Identify ethical responsibilities with regard to copyright and infringement.
1518.1.1	Explain the fundamental principles of copyright law and identify different types of copyrighted materials.
1518.1.2	Understand how to apply fair use principles and the process of obtaining permission to use copyrighted materials in their media projects.
1518.1.3	Create original media content while properly using and attributing Creative Commons-licensed materials.
1518.1.4	Understand the ethical responsibilities of online content creators, including issues related to copyright, attribution, and responsible sharing.
1518.1.5	Use watermarks or digital rights management tools to protect original media content from unauthorized use or distribution.
1518.2	Demonstrate awareness of government and industry regulations and standards.
1518.2.1	Understand the ethical considerations involved in using social media, including issues like privacy, misinformation, and digital etiquette.
1518.2.2	Explore the ethical implications of digital privacy and security, including data protection, consent, and the impact of surveillance.
1518.2.3	Explore ethical issues surrounding AI in communication technology and be able to consider these issues in the design and use of AI tools.
1518.2.4	Investigate issues related to freedom of the press granted by the First Amendment.
1518.2.5	Apply ethical principles, laws, and regulations in various digital communication scenarios, promoting honest and respectful interactions.
1518.3	Identify the characteristics of positive digital citizenship.
1518.3.1	Explore characteristics of positive digital citizenship.
1518.3.2	Identify specific behaviors and actions that exemplify respect for others, ethical behavior, and contributions to online communities.
1518.3.3	Discuss online safety, cyberbullying prevention, ethical content sharing, and responsible digital footprint management.
1518.4	Understand how to maintain a positive digital footprint.
1518.4.1	Identify the components that contribute to a positive digital footprint.
1518.4.2	Discuss creating and curating professional profiles on social media, sharing constructive and respectful content, showcasing achievements and skills, and actively managing privacy settings.
1518.4.3	Develop strategies and practices to maintain a positive digital footprint.

Communication Career Foundations

1518.5	Identify educational requirements for various visual communications and multimedia design careers.
1518.5.1	Research the educational requirements for careers in visual communications and multimedia design.
1518.5.2	Identify and describe career options/emerging trends in visual communication and interactive media.
1518.5.3	Identify the educational requirements for various visual communications and interactive media design careers.
1518.5.4	Compare and contrast the roles of creators, performers, and others involved in the production and presentation of broadcasting/journalism, performing arts, and visual arts.
1518.5.5	Demonstrate an awareness of the arts within a cultural context to understand the nature and scope of art in society.
1518.5.6	Demonstrate understanding of company hierarchies and roles within arts and communication organization structures.
1518.6	Identify elements of a professional portfolio for visual communications and multimedia design.
1518.6.1	Discuss purpose of a professional portfolio in visual communications and multimedia design.
1518.6.2	Identify elements required for a professional portfolio in visual communications and multimedia design.
1518.6.3	Identify the target audience for a portfolio, which may include potential employers, clients, or admissions committees.
1518.6.4	Develop a compelling and professional portfolio that showcases their capabilities in visual communications and multimedia design.
1518.7	Understand how visual communications and multimedia design apply to business.
1518.7.1	Explain how visual communications and multimedia design concepts and principles are applied in various business contexts

Computer Literacy

1518.8	Identify issues of web safety and personal/professional online confidentiality.
1518.8.1	Define what web safety and online confidentiality entail.
1518.8.2	Identify common web safety issues that individuals may encounter.
1518.8.3	Understand the potential risks associated with sharing personal information and engaging in online activities.
1518.8.4	discuss strategies for ensuring personal and professional online confidentiality.
1518.9	Demonstrate file management skills.
1518.9.1	Understand principles of effective file organization, including creating logical folder structures, naming conventions, and version control practices.
1518.9.2	Understand the difference between cloud-based and physical storage.

Print-Based & Digital Visual Literacy

1518.10	Define and use the elements of design (e.g., line, space, value).
1518.10.1	Analyze examples from different media sources (e.g., advertisements, websites, magazines) to identify and interpret the use of line, space, and value in design.
1518.11	Define and use the principles of design (e.g., unity, balance, rhythm).

1518.11.1	Discuss how these principles are used to organize visual elements, create visual interest, and guide the viewer's eye through the composition.
1518.12	Demonstrate the application of elements of a successful composition.
1518.12.1	Identify how elements of composition are applied.
1518.12.2	Evaluate how these elements work together to convey meaning, attract attention, and engage the audience.
1518.12.3	Design a visually compelling layout for a specific media writing project.
1518.13	Evaluate/Critique the effectiveness of visual communication and media design.
1518.13.1	Evaluate how well these examples utilize design principles, typography, color theory, imagery, and layout to effectively convey information, evoke emotions, and engage the audience.
1518.13.2	Develop criteria for evaluating visual communication and media design.

Conceptual Design Process

1518.14	Identify the importance and use of brainstorming and various types of research.
1518.14.1	Explain the importance of brainstorming in the initial stages of project development.
1518.14.2	Identify different types of research methods used in project planning and development.
1518.14.3	Conduct various types of research to inform and validate ideas.
1518.15	Identify the importance use of brainstorming and various types of research.
1518.15.1	Articulate the significance of brainstorming as a method for fostering creativity and generating innovative ideas.
1518.15.2	Categorize and describe various types of research methods, including qualitative (e.g., interviews, focus groups) and quantitative (e.g., surveys, experiments).
1518.16	Proof projects (e.g., proof marks)
1518.16.1	Identify common proofreader's marks, including symbols for insertion, deletion, transposition, and punctuation corrections.
1518.16.2	Identify common visual communication proofs, including print layouts, outlines, digital proofs, and outlines.
1518.16.3	Demonstrate the ability to use proofreader's marks accurately and consistently when editing written documents and visual designs.
1518.16.4	Discuss the importance of clear communication and standardization in using proofreader's marks to ensure effective collaboration between designers, editors, and clients.
1518.16.5	Demonstrate proficiency in creating and evaluating proofs for visual communication publishing projects.

Typography

1518.17	Demonstrate knowledge of typographic terminology.
1518.17.1	Explain key typographic terms, including font, typeface, serif, sans-serif, leading, kerning, tracking, baseline, x-height, and ascender/descender.
1518.17.2	Ensure readability and visual appeal in written media formats such as articles, blog posts, and advertisements.
1518.17.3	Analyze the impact of different typographic choices on communication and readability.
1518.18	Identify the anatomy of type.
1518.18.1	Apply knowledge of type styles and families to make informed decisions when selecting and pairing typefaces for typographic compositions.
1518.18.2	Identify and label the anatomical parts of different typefaces.

1518.18.3	Analyze how different anatomical features of typefaces affect design and readability.
1518.19	Identify and demonstrate appropriate use of various types of measurements.
1518.19.1	Understand the contexts in which each unit is most appropriately used, such as print versus digital media.
1518.20	Manage typography design problems and preflight checks when designing and exporting.
1518.20.1	Utilize typography tools in design software to adjust spacing, alignment, and formatting.
1518.21	Choose and apply appropriate typeface, including ones for various jobs.
1518.21.1	Apply appropriate adjustments to enhance readability, aesthetics, and overall design quality.
1518.21.2	Analyze different design contexts and select appropriate typefaces based on factors such as tone, audience, and medium.
1518.21.3	Apply appropriate typefaces effectively to enhance the visual communication and impact of their design projects.
1518.21.4	Choose typefaces that align with the brand's identity, consistency in typography helps reinforce brand recognition.
1518.21.5	Establish a hierarchy of information using different weights, styles, and sizes of typefaces to guide the reader's attention.
1518.21.6	Ensure consistency in the application of selected typefaces across all associated materials, encompassing print collateral, digital assets, websites, and multimedia presentations.

Print-Based & Digital Materials & Equipment

1518.22	Identify and properly use equipment.
1518.22.1	Describe the purpose and functions of equipment used in design and media production.
1518.22.2	Understand how each piece of equipment contributes to the production workflow and the specific tasks it is designed for.
1518.22.3	Demonstrate the proper setup, operation, and maintenance of equipment used in design and media production.
1518.23	Identify and properly use electronic tools (e.g., hardware)
1518.23.1	Demonstrate the proper setup, configuration, and operation of electronic tools used in design and media production.
1518.23.2	Develop basic troubleshooting skills for electronic tools.
1518.24	Identify and properly use presentation material.
1518.24.1	Categorize various types of presentation materials used in professional settings, including slides (e.g., PowerPoint, Keynote), digital images, charts/graphs, videos, audio clips, and physical props (models, prototypes).
1518.24.2	Understand the purpose and effectiveness of each type of material in conveying information and engaging an audience.
1518.24.3	Create visually appealing and informative slides.
1518.24.4	Demonstrate presentation skills using appropriate materials.

Media Writing and Journalism

1518.25	Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology (e.g., presentations, podcasts, blogs, wikis, and forums).
1518.25.1	Demonstrate ability to use technology to communicate ideas effectively.
1518.25.2	Create a digital presentation.
1518.25.3	Produce a podcast
1518.25.4	Create a blog post.

1518.25.5	Utilize creative thinking skills to adapt traditional narratives into modern products.
1518.26	Use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources collaboratively.
1518.26.1	Demonstrate their ability to solve problems using critical thinking and digital tools.
1518.26.2	Exhibit how to work in teams to solve a real-world problem using digital tools and resources, emphasizing project management and critical thinking.
1518.26.3	Demonstrate knowledge of finding stories, collecting information, and verifying information.
1518.26.4	Utilize note-taking software to organize information, ideas, and clippings.
1518.26.5	Utilize a voice recorder, cell phone, or similar device to assist notetaking during interviews.
1518.26.6	Consult secondary sources for corroboration and fact-checking.
1518.27	Produce media for an intended target audience.
1518.27.1	Explain digital media accessibility features and accommodations.
1518.27.2	Create media communications that are accessible to people with visual, cognitive, or auditory disabilities. (webpages, videos, print media)
1518.27.3	Create closed-captioning or subtitles for videos to ensure accessibility for individuals with hearing impairments.
1518.28	Develop proficiency in various forms of media writing, including news articles, press releases, blogs, and social media content.
1518.28.1	Understand the characteristics and formats of different types of media writing, including news articles, feature stories, opinion pieces, blogs, and social media posts.
1518.28.2	Identify key elements such as headlines, leads, body content, and conclusions specific to each format.
1518.28.3	Apply industry-standard style guidelines and proper grammar rules in media writing.
1518.29	Integrate multimedia elements and utilize digital tools effectively to enhance storytelling and audience engagement in media writing projects.
1518.29.1	Incorporate relevant multimedia content that enhances storytelling and engages the audience.
1518.30	Develop proficiency in journalistic writing and reporting.
1518.30.1	Understand and apply core principles of journalism, including accuracy, fairness, objectivity, and ethical considerations
1518.30.2	Master different journalistic writing styles, including news writing, feature writing, opinion writing, and investigative reporting.
1518.30.3	Understand the role of journalism in society, including its impact on public opinion, democracy, and social change.

Word Processing

1518.31	Use basic word processing commands to create, format, and edit documents.
1518.31.1	Create, format, and edit documents.
1518.31.2	Apply advanced formatting techniques to create visually appealing and professionally formatted documents.
1518.31.3	Understand how to share, track changes, and provide feedback in a collaborative writing environment.
1518.32	Identify common on-screen elements of a word processing application.
1518.32.1	Understand the common on-screen elements of a word processing application.
1518.32.2	Explain the purpose of different document views and navigation tools in a word processing application.
1518.32.3	Customize the word processing environment to enhance the workflow, writing, and editing experience.

This course will introduce the student to the multimedia designer's role in the information age. Students will collect data and analyze that information to determine how to communicate it visually. Students will create various types of forms and infographics. Units of Study: Form Layout, Data Visualization, Infographic Layout.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Form Layout

1519.1	Form Layout
1519.1.1	Identify form layout best practices, the differences between input types, and the use of tables for layout structure.
1519.1.2	Compare input types and determine how each is used.
1519.1.3	Organize information to group related questions.
1519.1.4	Determine input type for each question.
1519.1.5	Use tables to organize and align the layouts of forms.
1519.1.6	Apply interactive form fields in a page layout program such as InDesign.
1519.1.7	Output an interactive form a PDF (Portable Document Format) file.
1519.1.8	Use an online editing tool to create a web form.
1519.1.9	Save data collected from a form into a spreadsheet.

Data Visualization

1519.2	Data Visualization
1519.2.1	Demonstrate knowledge of the various forms of displaying information graphically, and the importance of communicating analytics graphically.
1519.2.2	Investigate common examples of data visualization such as charts, graphs, weather forecasts, data maps, etc.
1519.2.3	Determine an appropriate type of graphic representation (pie chart, bar graph, etc.) for a given set of data.
1519.2.4	Use illustration, word processing, or spreadsheet software to convert data into a graphical format.
1519.2.5	Format the graphic for both print and digital output.

Infographic Layout

1519.3	Infographic Layout
1519.3.1	Demonstrate knowledge of the major types of infographics and static, animated, and interactive infographic formats.
1519.3.2	Investigate the major types of infographics.
1519.3.3	Use illustration software to create various types of infographics for print.
1519.3.4	Use animation software to create an animated infographic for video.
1519.3.5	Convert infographics for the web and mobile devices.

Safety

1519.4	Safety
1519.4.1	Apply appropriate office safety practices.
1519.4.2	Apply appropriate electrical safety practices.
1519.4.3	Apply appropriate chemical safety practices.

Career Overview

1519.5	Career Overview
1519.5.1	Identify and describe career options/emerging trends in visual communication and interactive media.
1519.5.2	Identify the educational requirements for various visual communications and interactive media design careers.
1519.5.3	Identify elements of a professional portfolio for the visual communications and interactive media design field.
1519.5.4	Identify ways in which visual communication and interactive media design can be used in business.

Computer Literacy

1519.6	Computer Literacy
1519.6.1	Demonstrate knowledge of computer terminology.
1519.6.2	Identify and operate peripherals.
1519.6.3	Demonstrate appropriate knowledge and use of industry-standard software.
1519.6.4	Apply basic troubleshooting and maintenance skills.
1519.6.5	Identify and explain various file formats (e.g., .pdf, .jpg, .gif, .eps, .png).
1519.6.6	Describe procedures involved with importing and exporting.
1519.6.7	Identify legal and ethical responsibilities.
1519.6.8	Demonstrate appropriate knowledge and use of industry-standard software.
1519.6.9	Apply basic troubleshooting and maintenance skills.
1519.6.10	Demonstrate file management skills.

Aerospace I is a dynamic experience designed to equip students for careers and further study in aerospace technologies. Through project-based learning, students dive into the engineering design process, exploring tools for data collection and analysis. The course covers the science of aviation, materials and structures, safety, and practical experiences, including designing and testing a pilot seat, kite, straw rocket and launcher, motor-powered rocket, and a model glider. Ideal for those curious about aviation and aerospace careers, this course fosters hands-on exploration and lays the foundation for a deeper understanding of aerospace principles.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Engineering Design Process

1540.1	Identify aerospace engineering problems and define design challenges.
1540.1.1	Research real-world aerospace challenges.
1540.1.2	Define a clear problem statement for a design challenge.
1540.1.3	Present constraints (cost, time, resources) impacting the design solutions.
1540.1.4	Apply human factors engineering to aerospace design problems (e.g., ergonomics).
1540.1.5	Document reverse engineering processes for aerospace components.
1540.2	Develop, prototype, and refine aerospace products using the design process.
1540.2.1	Design initial prototype (e.g., a straw rocket).
1540.2.2	Prototype performance (e.g., distance, flight path).
1540.2.3	Refine design based on testing data and modify as needed.
1540.2.4	Conduct comparative stress testing on materials to assess durability.

Aerospace Materials and Structures

1540.3	Understand material properties and selection criteria.
1540.3.1	Compare material properties (e.g., strength, weight).
1540.3.2	Select materials based on the needs of the aerospace structure.
1540.3.3	Justify material choices based on their performance characteristics.
1540.3.4	Assess material fatigue and stress points through experimental analysis.
1540.4	Analyze aerospace structures for strength, durability, and functionality.
1540.4.1	Conduct stress tests on material samples.
1540.4.2	Evaluate the load-bearing capacity of various structures (e.g., wing designs).
1540.4.3	Analyze the results to identify weak points in materials.
1540.4.4	Design and conduct weight distribution experiments to optimize structural integrity in aerospace applications.
1540.5	Use wind tunnel experiments and computer simulations to study aerodynamics.
1540.5.1	Prepare a wind tunnel for aerodynamic testing, including proper calibration and setup.
1540.5.2	Design an aerodynamic test model (e.g., a small aircraft or airfoil) to be tested in the wind tunnel.
1540.5.3	Conduct wind tunnel experiments to measure airflow patterns, pressure distribution, and other aerodynamic forces on the test model.
1540.5.4	Interpret simulation and wind tunnel data to compare real-world performance with theoretical predictions.

1540.5.5	Adjust the design of the model based on testing and simulation results to optimize aerodynamic performance.

Data Collection and Analysis Tools

1540.6	Conduct tests and record data for aerospace prototypes.
1540.6.1	Set up calibrate testing equipment for data collection.
1540.6.2	Record flight performance data (e.g., altitude, speed).
1540.6.3	Analyze collected data to assess the prototype's performance.
1540.6.4	Apply projectile motion equations to model and predict ballistic trajectories.
1540.6.5	Compare theoretical vs. experimental projectile motion results through launch data collection.
1540.7	Explain FAA regulations and safety standards for aerospace industries.
1540.7.1	Identify key FAA regulations that govern aerospace operations and safety protocols.
1540.7.2	Explain the role of the FAA in maintaining airspace safety and regulating aircraft design and maintenance.
1540.7.3	Describe the certification process for aircraft and pilots, including necessary tests and documentation.
1540.7.4	Demonstrate knowledge of emergency procedures and safety equipment used in aerospace operations (e.g., fire suppression, first aid, emergency evacuation).
1540.8	Demonstrate team collaboration and technical documentation skills.
1540.8.1	Collaborate effectively with team members to accomplish tasks such as design, testing and research.
1540.8.2	Assign roles and responsibilities within the team to ensure efficient work on aerospace projects (e.g., one member focuses on materials, another on aerodynamics).
1540.8.3	Develop technical documentation for aerospace projects, including project proposals, research findings, test results, and design specifications.
1540.8.4	Create visual representations of technical designs (e.g., sketches, CAD drawings) to support documentation and project understanding.

Aerodynamics and Flight Mechanics

1540.9	Understand and apply basic principles of aerodynamics in aerospace design.
1540.9.1	Explain the four forces of flight: Lift, Thrust, Drag, and Weight.
1540.9.2	Apply Bernoulli's principles and Newton's Laws to wing design.
1540.9.3	Design basic aerodynamic shapes (e.g., airfoil, fuselage).
1540.9.4	Calculate lift, drag, and other aerodynamic forces for different aircraft configurations.
1540.9.5	Compare airfoil designs through wind tunnel testing and simulations.
1540.10	Conduct basic aerodynamic testing on prototypes.
1540.10.1	Build a simple prototype (e.g., glider, paper airplane) based on aerodynamic principles.
1540.10.2	Test the prototypes in a wind tunnel or through flight tests.
1540.10.3	Analyze performance data (e.g., speed, stability) and recommend design changes.
1540.10.4	Conduct controlled testing to analyze stability and forces.
1540.10.5	Design and test surfaces (ailerons, elevators, rudders) to measure flight stability and maneuverability.

Principles of Flight and Aircraft Systems

1540.11	Describe the principles of flight control stability.
1540.11.1	Explain the basic flight controls: Ailerons, Elevators, and Rudders.
1540.11.2	Demonstrate how these controls influence aircraft motion (e.g., pitch, roll, yaw).

1540.11.3	Describe how different control surfaces affect aircraft stability and maneuverability.
1540.11.4	Develop and test control surfaces in CAD before applying them to physical models.
1540.12	Identify aircraft components and systems.
1540.12.1	Identify major aircraft systems (e.g., propulsion, electrical, landing gear).
1540.12.2	Label components of a typical aircraft (e.g., wings, fuselage, cockpit).
1540.12.3	Explain the functions of key aircraft systems in flight operations.

Airspace and Aviation Regulations

1540.13	Understand airspace classifications and aviation regulations.
1540.13.1	Identify types of airspaces (e.g., controlled, uncontrolled, restricted).
1540.13.2	Explain the importance of aviation regulations and safety protocols.
1540.13.3	Describe the role of the FAA and other regulatory bodies in ensuring safe flight.
1540.13.4	Research and report on FAA regulations for model rocketry and amateur flight tests.
1540.14	Understand and apply basic flight safety procedures.
1540.14.1	Review aviation safety procedures (e.g., pre-flight checks, emergency protocols).
1540.14.2	Explain the importance of safety equipment (e.g., parachutes, life vests).
1540.14.3	Conduct a mock safety briefing for flight operations.
1540.14.4	Design a launch safety protocol for high-powered model rockets.

Aerospace II extends the exploration of aerospace technologies and related industries. This course deepens students' preparation for careers and further study, emphasizing advanced principles and theories of flight. Building on the foundation of Aerospace Engineering I, students engage in authentic projects related to atmospheric and space flight, focusing on pneumatic projectiles, aerodynamics forces, and quality management. Through collaborative teamwork, students apply the design process, utilize tools for data analysis, and dive into a deeper understanding of the science of aviation. Projects include designing, building, and testing a wing; plotting a course for takeoff and landing; creating a wing attachment system; testing materials under stress and designing an electric-powered plane. The course culminates in students presenting their innovative ideas and solutions to business and industry partners, showcasing their knowledge and skills in the aviation field.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Aerodynamic and Flight Systems

1541.1	Apply principles of aerodynamics to design wing and flight control systems.
1541.1.1	Apply Bernoulli's principles and Newton's laws to wing design.
1541.1.2	Design a wing and calculate lift and drag forces.
1541.1.3	Test the wing in a simulation or wind tunnel for performance.
1541.1.4	Evaluate hypersonic wing performance, including Mach effects and shockwave interactions.
1541.1.5	Analyze structural integrity and aerodynamic efficiency of different wing designs through CAD modeling and Finite Element Analysis (FEA).
1541.2	Evaluate the performance of different airfoils in flight.
1541.2.1	Test different airfoils in a flight simulator or wind tunnel.
1541.2.2	Measure lift, drag, and other aerodynamic properties.
1541.2.3	Select the best-performing airfoil for specific flight conditions.
1541.2.4	Compare subsonic, transonic, and supersonic airfoils for stability and efficiency.
1541.2.5	Investigate boundary layer effects and flow separation using flow visualization techniques (Wind Tunnel Testing).

Flight Propulsion and Control

1541.3	Design and test propulsion systems for small aircraft.
1541.3.1	Design an electric-powered propulsion system for a model aircraft.
1541.3.2	Test the propulsion system for thrust, efficiency, and power usage.
1541.3.3	Adjust motor size and propeller design for optimal performance.
1541.3.4	Compare the efficiency of brushless DC motors vs. brushed motors and AC motors.
1541.3.5	Explore propeller pitch and diameter impact on thrust.
1541.4	Develop control surfaces to influence aircraft motion (pitch, roll, yaw).
1541.4.1	Build control surfaces (e.g., ailerons, rudders).
1541.4.2	Install control surfaces on an aircraft model.
1541.4.3	Test aircraft stability and maneuverability with different control surface configurations.
1541.5	Evaluate alternative fuel sources for aerospace applications.
1541.5.1	Compare electric, hybrid, and alternative fuel propulsion systems.

1541.5.2	Assess efficiency, power output, and sustainability of alternative fuels.
1541.5.3	Evaluate hydrogen fuel cells and solar-powered flight applications.
1541.5.4	Investigate battery management systems for electric-powered UAVs.

Flight Navigation and Communication

1541.6	Plot and analyze flight paths using GPS and aviation maps.
1541.6.1	Plot a flight path using GPS coordinates and aviation charts.
1541.6.2	Evaluate the flight route for obstacles, weather conditions, and fuel efficiency.
1541.6.3	Make adjustments to the flight plan based on data analysis.
1541.6.4	Apply GPS tracking and autonomous navigation to RC aircraft flight missions.

Aerospace III is a exploration that enables students to deepen their knowledge of space through a series of engaging projects. Building upon the prerequisites of Fundamentals of Aerospace Technology and Advanced Aerospace Technology, students undertake in-depth research, concept application, and prototype development. This project-based learning course extends the exploration of flight control systems, remote-controlled vehicles, and the virtual world. Students learn to fly using simulators, collaboratively propose a shift from a VOR navigation system to a GPS system, determine cost savings, develop rotor blades for helicopters, and design and program an unmanned flying vehicle. This course provides a comprehensive understanding of advanced aerospace concepts, preparing students for the dynamic challenges in the field.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Unmanned Aerial Systems (UAS)

1542.1	Design and develop unmanned aerial systems for specific tasks.
1542.1.1	Design an autonomous drone for a specific task (e.g., delivery, surveillance.)
1542.1.2	Build the drone and incorporate necessary sensors and actuators.
1542.1.3	Test the drone’s performance for the designated task.
1542.1.4	Compare Carbon Fiber (CF) and Fiberglass components for structural efficiency in drone construction.
1542.1.5	Investigate low-solder vs. full-solder electronics assembly for UAV systems.
1542.2	Program autonomous drones using computer programming languages
1542.2.1	Write code to control drone flight, navigation, and sensors.
1542.2.2	Upload code to the drone’s controller.
1542.2.3	Test drone autonomy and adjust code based on test results.
1542.2.4	Develop multi-waypoint flight paths using GPS-based navigation.
1542.2.5	Implement object-avoidance algorithms using LiDar or optical sensors.

Aviation Control Systems and Human Factors

1542.3	Analyze the interactions between human pilots and aircraft control systems.
1542.3.1	Analyze flight simulator data to examine control inputs from pilots.
1542.3.2	Evaluate how pilot actions affect flight stability and control.
1542.3.3	Suggest design improvements to reduce human error and improve control.
1542.3.4	Compare manual flight vs. autonomous flight stability and reaction time.
1542.4	Investigate human error in aviation and deep safety protocols.
1542.4.1	Identify potential sources of human error in aviation.
1542.4.2	Develop a safety protocol to minimize these errors.
1542.4.3	Test the protocol in simulation scenarios to evaluate its effectiveness.
1542.4.4	Conduct scenario-based training to evaluate FAA Part 107 safety requirements (Flight Operations & FAA Part 107).
1542.4.5	Assess the effectiveness of real-time feedback systems for pilots and UAV operators.

Material Science & Engineering Applications

1542.3	Investigate advanced material science applications in aerospace.
1542.3.1	Analyze heat transfer properties of aerospace materials.
1542.3.2	Apply Young's Modulus and Hooke's Law to UAV structural components.
1542.3.3	Compare composite materials (carbon fiber vs. fiberglass) for aerospace applications.
1542.3.4	Investigate rotor blade aerodynamics and material durability.

Aerospace IV is a course focused on outer space and underwater applications, students collaborate on six projects, designing and testing a laser communication system, planning for space survivability, and creating 3D models of satellite orbits and underwater exploration vehicles. The course culminates in a capstone project presentation, offering a comprehensive showcase of students' innovative contributions to aerospace technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Space Systems and Engineering

1543.1	Apply principles of orbital mechanics to design space missions.
1543.1.1	Design a space mission using orbital mechanics principles.
1543.1.2	Calculate spacecraft velocity, trajectory, and fuel requirements.
1543.1.3	Evaluate mission design for feasibility and risk factors.
1543.1.4	Assess the impact of gravity assists and slingshot maneuvers on mission efficiency.
1543.1.5	Compare low-Earth orbit (LEO) vs. geostationary orbit (GEO) for mission planning.
1543.2	Develop spacecraft components for deep space missions.
1543.2.1	Design spacecraft components (e.g., power systems, propulsion) for a deep-space mission.
1543.2.2	Test components for performance under extreme conditions (e.g., radiation, temperature).
1543.2.3	Integrate components into a full spacecraft design.
1543.2.4	Design and evaluate ROV communication systems for space-based and planetary exploration.

Space Survival and Human Factors in Space

1543.3	Investigate life support systems for human space exploration.
1543.3.1	Design a life support system for space missions (e.g., oxygen, temperature regulation).
1543.3.2	Test the system for functionality and sustainability in a space environment.
1543.3.3	Refine system design based on testing and feedback.
1543.3.4	Develop a thermal shielding system to protect space habitats from extreme temperatures.
1543.4	Design and test space exploration vehicles for use in challenging environments.
1543.4.1	Design a vehicle (e.g., rover, lander) for exploration of a planet's surface.
1543.4.2	Test vehicle performance in simulated environments (e.g., Martian terrain).
1543.4.3	Adjust vehicle design based on test results to improve navigation and durability.
1543.4.4	Simulate a lunar environment to assess habitat and vehicle durability.

Remote Exploration and Data Collection

1543.5	Develop and test remote exploration vehicles (rovers, drones, submersibles).
1543.5.1	Design a remote exploration vehicle for a specific environment (e.g., Mars, ocean).
1543.5.2	Build and test the vehicle to perform tasks like mapping and data collection.
1543.5.3	Refine the vehicle design based on field test results.
1543.5.4	Compare different ROV communication methods (radio waves, laser, satellite relays) for deep space environments.
1543.6	Implement data collection methods for remote exploration.

1543.6.1	Integrate collection sensors (e.g., cameras, temperature sensors) into exploration vehicles.
1543.6.2	Program sensors to collect data during exploration.
1543.6.3	Analyze the data collected and refine mission objectives based on findings.
1543.6.4	Use satellite imagery analysis to optimize coverage and data retrieval for space missions.

This course aligns with Southern Regional Education Board (SREB) standards. You must receive training to access the curriculum/standards for this program of study. For more information, please logon to www.sreb.org.

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Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

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AC Advanced Manufacturing I is a High School Manufacturing course that is nationally recognized and available through the Southern Regional Education Board.

For more information, visit [Advanced Career - Southern Regional Education Board \(sreb.org\)](http://sreb.org).

Course that introduces students to manufacturing's role in our society. In addition to concentrating on design and problem solving the course introduces the students to several other concepts as well including an introduction to control system technology, automated manufacturing systems and robotics.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

AC Advanced Manufacturing II is a High School Manufacturing course that is nationally recognized and available through the Southern Regional Education Board.

For more information, visit [Advanced Career - Southern Regional Education Board \(sreb.org\)](http://sreb.org).

This course applies the learning from the first course. This course involves projects related to the systems that are found in factories. Students learn about effective and energy efficient use of motors, drive systems, pumping systems, conveyors, piping and control systems. Students focus on properties of materials and materials testing creating documentation examining the properties and justifying selections based on the properties. Students learn that some products manufactured become the raw materials for more complex products. Students explore the technologies utilized in manufacturing.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

AC Advanced Manufacturing III is a High School Manufacturing course nationally recognized and available through the Southern Regional Education Board.

For more information, visit [Advanced Career - Southern Regional Education Board \(sreb.org\)](https://www.sreb.org).

This is the third course in the four-course sequence and focuses on industrial control and automation systems as they apply to the advanced manufacturing equipment. This equipment depends on the use and coordination of information, automation, computation, software, sensing, and networking. Students will design and create mechatronic systems to accomplish advanced manufacturing tasks. Students will also create sophisticated technical reports similar to ones generated by engineers in this industry.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

AC Advanced Manufacturing IV is a High School Manufacturing course that is nationally recognized and available through the Southern Regional Education Board.

For more information, visit [Advanced Career - Southern Regional Education Board \(sreb.org\)](http://sreb.org).

This course allows students to apply knowledge of materials to the design for manufacturing necessary to bring a product to market. Students explore the business of manufacturing while creating work cells to process materials into products. Students design a prototype and then redesign with the goal of manufacturing the product. Students analyze and evaluate all aspects of the design and production process with an emphasis on lean, green manufacturing. Students pay special attention to the control systems integration, data acquisition, and quality control processes necessary for Six Sigma production.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Production & Design Concepts immerses students in the core principles of production and design. Focused on cultivating employability skills, fostering a 6S culture, and nurturing teamwork, this course is a dynamic blend of problem-solving and critical thinking. From mastering basic production line controls to understanding conveyor design, quality assurance, and safety protocols, students gain a holistic view of the industrial landscape.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Fundamental Manufacturing Principles

1579.1	Adhere to safety protocols and workplace procedures.
1579.1.1	Demonstrate an understanding of safety protocols and procedures relevant to manufacturing environments.
1579.1.2	Apply appropriate Personal Protective Equipment (PPE) and adhere to safety guidelines.
1579.1.3	Recognize potential hazards and take corrective actions to maintain a safe work environment.
1579.1.4	Understand the importance of workplace cleanliness and organization for safety and efficiency.
1579.1.5	Comprehend emergency procedures and protocols, including fire safety and evacuation plans.
1579.2	Demonstrate employability skills and professionalism.
1579.2.1	Develop a career plan aligned with personal interests and skills within the manufacturing industry.
1579.2.2	Demonstrate effective communication and problem-solving skills in a professional setting.
1579.2.3	Seek employment opportunities and apply for positions in manufacturing companies.
1579.2.4	Evaluate job offers based on factors such as working conditions, benefits, and growth potential.
1579.2.5	Exhibit professionalism, reliability, and a strong work ethic to maintain employment and advance in the industry.
1579.3	Promote a 6S culture for improved workplace efficiency and organization.
1579.3.1	Understand the principles of 6S methodology (Sort, Straighten, Shine, Standardize, Sustain, Safety) and its importance in the manufacturing environment.
1579.3.2	Apply 6S principles to maintain a clean, organized, and efficient workplace.
1579.3.3	Identify opportunities for process improvement and productivity enhancement through 6S practices.
1579.3.4	Collaborate with team members to implement 6S initiatives and foster a culture of continuous improvement.
1579.3.5	Recognize the connection between workplace organization and overall operational effectiveness.
1579.4	Develop teamwork and leadership skills to enhance collaboration and productivity.
1579.4.1	Participate effectively in group discussions and collaborative projects within a manufacturing team.
1579.4.2	Demonstrate cooperative and respectful behavior towards colleagues, supervisors, and clients.
1579.4.3	Understand the importance of teamwork in achieving organizational goals and objectives.
1579.4.4	Take initiative to assist others and contribute to team success.
1579.4.5	Exhibit leadership qualities such as initiative, accountability, and problem-solving within a team environment.

Problem-Solving and Critical Thinking in Manufacturing

1579.5	Identify and analyze problems to find effective solutions in manufacturing processes.

1579.5.1	Define manufacturing problems and challenges, including issues related to process efficiency, quality control, and equipment maintenance.
1579.5.2	Analyze problem using systematic approaches to identify root causes and contributing factors.
1579.5.3	Gather relevant information and data through research, observation, and data analysis.
1579.5.4	Evaluate alternative solutions and strategies based on reasoned criteria and industry best practices.
1579.5.5	Make informed recommendations and decisions to address manufacturing challenges and optimize processes.
1579.6	Communicate and document technical information.
1579.6.1	Read and interpret design documentation, technical manuals, and blueprints relevant to manufacturing processes.
1579.6.2	Write technical reports and documentation to communicate findings, recommendations, and project updates.
1579.6.3	Deliver oral presentations to convey technical information and project updates to stakeholders.
1579.6.4	Interpret critical aspects of drawing, plans, and schematics to guide manufacturing operations.
1579.6.5	Contribute to team projects by sharing information, documenting progress, collaborating effectively.
1579.7	Apply manufacturing theory and practices to address challenges and optimize processes.
1579.7.1	Understand fundamental manufacturing processes, principles, and methodologies applicable to diverse industries.
1579.7.2	Describe and compare manufacturing practices such as Lean Manufacturing, Six Sigma, and Kaizen.
1579.7.3	Explore basic logistics and supply chain management concepts relevant to manufacturing operations.
1579.7.4	Identify and demonstrate the use of common hand tools and precision measuring instruments in manufacturing settings.
1579.7.5	Discuss basic electrical theory and calculations relevant to manufacturing equipment and systems.
1579.8	Ensure quality control and assurance measures are implemented to maintain production integrity.
1579.8.1	Understand the importance of quality control in manufacturing to ensure product consistency and customer satisfaction.
1579.8.2	Identify key principles and techniques of quality management, including statistical process control and quality assurance.
1579.8.3	Apply quality control tools and methods to monitor and improve manufacturing processes.
1579.8.4	Interpret and analyze quality metrics and performance indicators to identify areas for improvement.
1579.8.5	Implement corrective and preventive actions to address quality issues and prevent defects in manufacturing outputs.

Electrical Principles in Production and Design

1579.9	Develop and Understanding of Basic Electrical Theory and Safety
1579.9.1	Explain fundamental electrical principles relevant to manufacturing environment.
1579.9.2	Differentiate between alternating current (AC) and direct current (DC) and identify their applications in manufacturing systems.
1579.9.3	Calculate electrical values in series and parallel circuits using Ohm's Law and Kirchhoff's Laws.
1579.9.4	Safely use electrical instruments such as digital multimeters (DMM) to measure voltage and resistance.
1579.9.5	Understand basic electrical safety practices, including equipment grounding and the use of protective measures in manufacturing setting.
1579.10	Power and Control Circuits
1579.10.1	Interpret requirements concerning wiring devices and service-entrance equipment in manufacturing context.

1579.10.2	Explain the functions of components such as limit switches, relays, and solenoids in industrial control circuits.
1579.10.3	Identify and compare different types of power circuits including single-phase, three-phase, and direct current circuits.
1579.10.4	Describe basic transformer action and its applications in industrial power systems.
1579.10.5	Explain the purpose and operation of Programmable Logic Controllers (PLCs) in industrial automation.

Mechanical Drives and Quality Control is a comprehensive exploration of fundamental principles in mechanical drive systems, design, and quality control. Students lean into the intricacies of proper installation, troubleshooting, repair, and maintenance techniques for mechanical drive systems. This course not only emphasizes the critical aspects of 6S, acceptance sampling, and continual improvement but also offers a hands-on approach. Through an authentic culminating project, students actively engage in research and experiencing equipment design, automation/control, quality assurance, production design for manufacturability, and the nuanced aspects of system design and operation.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Mechanical Drives and Quality Control Fundamentals

1580.1	Apply Manufacturing Math, Science, and Measurement.
1580.1.1	Apply mathematical functions to solve problems related to mechanical drives and quality control in manufacturing.
1580.1.2	Create and interpret graphs and charts to analyze data relevant to manufacturing processes.
1580.1.3	Match measurement techniques to specific manufacturing processes, including general and precision measurements.
1580.1.4	Utilize mechanical formulas to solve problems involving geometric shapes and metric conversions.
1580.1.5	Understand molecular actions related to temperature, chemical reactions, and moisture content in manufacturing materials.
1580.2	Ensure Quality Control.
1580.2.1	Identify components of manufacturing systems and apply continuous quality improvement principles to optimize processes.
1580.2.2	Explain the impact of quality assurance on profitability and customer satisfaction in manufacturing.
1580.2.3	Utilize statistical tools such as histograms for process improvement and quality control.
1580.2.4	Perform inspections and quality checks to ensure product conformity and adherence to standards.
1580.3	Demonstrate Leadership and Communication.
1580.3.1	Recognize the importance to leadership in driving excellence and innovation in manufacturing organizations.
1580.3.2	Analyze the impact of different leadership styles on team performance and organizational culture.
1580.3.3	Research and understand effective communication strategies for facilitating teamwork and collaboration in manufacturing settings.
1580.3.4	Demonstrate effective teamwork skills and contribute positively to group dynamics and project outcomes.
1580.4	Apply Hydraulic and Pneumatic Principles.
1580.4.1	Interpret basic hydraulic and pneumatic symbols commonly used in mechanical drive systems.
1580.4.2	Apply knowledge of hydraulic and pneumatic components to design and troubleshoot systems.
1580.4.3	Understand fundamental principles of hydraulic and pneumatic systems and their applications in manufacturing processes.

Design and Implementation of Manufacturing Systems

1580.5	Design manufacturing systems for efficient production and operation.

1580.5.1	Design products with consideration for manufacturability and production processes.
1580.5.2	Create prototypes and mock-ups to test and validate manufacturing concepts.
1580.5.3	Utilize tools such as flowcharts and pseudocode to develop controlled manufacturing programs.
1580.5.4	Understand open- and closed-loop systems and their applications in manufacturing automation.
1580.5.5	Interpret sensor input and develop programs to control manufacturing systems based on sensor feedback.
1580.6	Utilize tools, technology, and automation for optimized manufacturing processes.
1580.6.1	Use spreadsheet applications to analyze manufacturing data and solve problems.
1580.6.2	Apply computational thinking to develop algorithms for solving manufacturing challenges.
1580.6.3	Construct physical objects using a variety of hand tools and shop tools, following proper safety and maintenance procedures.
1580.6.4	Utilize computer-aided design (CAD) software to develop and simulate manufacturing processes.
1580.6.5	Automate manufacturing processes using algorithmic thinking and programmable logic controllers (PLCs).
1580.7	Apply manufacturing processes and techniques to achieve production goals.
1580.7.1	Analyze common manufacturing processes and their applications in different industries.
1580.7.2	Design manufacturing processes to optimize efficiency, quality, and resource utilization.
1580.7.3	Compare and evaluate different manufacturing techniques such as Lean Manufacturing, Six Sigma, and Kaizen.
1580.7.4	Apply project management techniques to coordinate and execute manufacturing projects effectively.
1580.7.5	Utilize flowcharts and process diagrams to outline and document manufacturing processes and tasks.

Process Control and Resource Management

1580.8	Optimize Process Control for efficient operations and improved output.
1580.8.1	Identify various process control applications and techniques used in manufacturing operations.
1580.8.2	Collect and analyze data to monitor and improve work processes, including the implementation of LEAN principles.
1580.8.3	Interpret project plans and report to track job progress and identify areas for improvement.
1580.8.4	Appropriately report job status and communicate findings to stakeholders to facilitate decision-making.
1580.9	Identify and manage resources effectively through strategic purchasing and resource allocation.
1580.9.1	Evaluate “make or buy” decisions and understand their impact on manufacturing operations and supply chain management.
1580.9.2	Demonstrate knowledge of vendor relationships and services to optimize procurement processes.
1580.9.3	Identify and allocate resources effectively to support manufacturing projects and operations.

Special Topics in Production & Design is designed to provide student a foundational understanding of theories in manufacturing and production technologies working with local manufacturers embracing advanced technology, this course adopts an authentic inquiry-based approach. Students build essential employability skills crucial for success in the evolving manufacturing landscape.

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Safety

1581.1	Exhibit understanding of safety procedures.
1581.1.1	Understand and adhere to industry-specific safety protocols and regulations.
1581.1.2	Proficiently complete necessary documentation related to safety procedures.
1581.1.3	Execute routine safety checks during operations to ensure equipment functionality and compliance.
1581.1.4	Identify and properly handle hazardous materials according to established guidelines.
1581.1.5	Communicate effectively and demonstrate problem-solving skills in addressing safety concerns.
1581.2	Exhibit proficient use of safety equipment.
1581.2.1	Identify and utilize appropriate safety equipment for various tasks within the manufacturing environment.
1581.2.2	Understand the functions and limitations of safety devices and equipment.
1581.2.3	Demonstrate proper maintenance and storage of safety equipment.
1581.2.4	Ensure personal protective equipment (PPE) is selected and used correctly according to industry standards.

Employability Skills

1581.3	Demonstrate effective career development and planning.
1581.3.1	Collaborate with industry professionals to develop a personalized career plan aligned with manufacturing goals.
1581.3.2	Utilize resources to actively seek employment opportunities within the manufacturing sector.
1581.3.3	Construct effective job applications and resumes tailored to industry requirements.
1581.3.4	Evaluate job offers based on criteria such as working conditions, benefits, and growth prospects.
1581.4	Professionalism and adaptability.
1581.4.1	Demonstrate professionalism in communication, appearance, and conduct within diverse work environments.
1581.4.2	Exhibit adaptability and flexibility in responding to changing circumstances and tasks.
1581.4.3	Uphold ethical standards and practices in all professional interactions.
1581.4.4	Seek feedback and actively work to improve personal and professional skills.

Manufacturing Theory

1581.5	Exhibit comprehensive understanding of Manufacturing Processes.
1581.5.1	Develop a comprehensive understanding of fundamental manufacturing processes and principles.
1581.5.2	Analyze various manufacturing practices, such as Lean Manufacturing and Six Sigma, and their applications.

1581.5.3	Apply knowledge of logistics and supply chain management concepts to optimize manufacturing operations.
1581.6	Demonstrate proficiency in tool usage and measurement.
1581.6.1	Identify and select appropriate hand tools commonly used in manufacturing processes.
1581.6.2	Demonstrate proficiency in using precision measuring tools for accurate measurements.
1581.6.3	Apply principles of basic measurement systems to ensure quality control in manufacturing processes.
1581.6.4	Understand and implement maintenance procedures for tools and equipment to ensure longevity and functionality.

The Manufacturing Internship course offers students a transformative real-world work experience, seamlessly intertwining on-the-job training (OJT) with manufacturing and academic competencies. Throughout the course, students engage in enriching work-based learning (WBL) opportunities navigating the complexities of employability skills, such as ethics, communication, teamwork, and professionalism, forms the core of this experience. This course serves as a bridge, empowering students to seamlessly transition from learner to valuable contributor within the manufacturing workforce.

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Workplace Exploration

1582.1	Exhibit understanding of workplace dynamics.
1582.1.1	Discuss various methods of socialization into different employment settings within the manufacturing field.
1582.1.2	Examine organizational structures, including policies and procedures, across different workplace settings.
1582.1.3	Compare organizational mission statements to actual organizational performance.
1582.1.4	Identify and apply conceptual frameworks commonly used in workplace settings.
1582.1.5	Recognize the importance of understanding and meeting the needs of different types of customers.
1582.1.6	Examine effective methods of giving and receiving supervision within a manufacturing context.
1582.1.7	Explain the requirements and competencies necessary for success in a chosen specialization within the manufacturing industry.

Employment Process

1582.2	demonstrate preparedness for work-based learning placement.
1582.2.1	Research potential work-based learning aligned with career interests.
1582.2.2	Complete a comprehensive job application tailored to the desired placement.
1582.2.3	Design and develop a professional resume suitable for the work-based learning placement.
1582.2.4	Plan and craft a letter of introduction to prospective employers.
1582.2.5	Compile and organize portfolio materials relevant to the simulated workplace environment.

Legal, Ethical Safety Guidelines

1582.3	Demonstrate understanding legal and ethical responsibilities.
1582.3.1	Discuss relevant labor laws applicable to work-based learning placements.
1582.3.2	Understand the principles of worker's compensation as they apply to both paid and unpaid student workers.
1582.3.3	Evaluate and apply safety protocols and procedures in the workplace.
1582.3.4	Recognize and uphold standards of confidentiality within the workplace environment.

Professional Behavioral Competencies

1582.4	Demonstrate Professionalism and Communication Skills.
1582.4.1	Exhibit professional and ethical behavior consistent with workplace expectations.
1582.4.2	Demonstrate a positive attitude and strong work ethic in the workplace.
1582.4.3	Effectively communicate verbally and non-verbally with colleagues and supervisors.

1582.4.4	Present information clearly and persuasively using a variety of technology tools.
1582.4.5	Identify and utilize relevant information for problem-solving in workplace scenarios.
1582.4.6	Communicate findings and information through oral, written, and multimedia platforms.

Workplace Assessment

1582.5	Conduct reflective practices and skills assessment.
1582.5.1	Select specific skills and tasks to focus on during the work-based learning experience.
1582.5.2	Assess and document the learning outcomes and experiences gained during the work-based learning placement.
1582.5.3	Apply research-based knowledge and theoretical concepts to practical situations encountered in the workplace.
1582.5.4	Research and evaluate job roles within the student's chosen career field to inform career development and future opportunities.

This course provides students with a theoretical and hands-on knowledge of Fiber Optics. Students learn the basics of cable termination, testing and troubleshooting using sophisticated electronic equipment, terminate fiber optic cables with ST and SC connectors, perform a mechanical splice, learn fundamental principles, applications, and technologies surrounding fiber optic communication. The course will delve into the fundamental principles, applications, and technologies surrounding fiber optic communication. As one of the most critical components of modern telecommunication and networking systems, fiber optics has revolutionized the way we transmit data, voice, and video over long distances at high speeds.

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Understanding Fiber Optic Basics

1598.1	Develop a solid foundation in the principles of optical fibers, total internal reflection, and attenuation.
1598.1.1	Perform splicing and termination exercises to master fiber optic cable handling.
1598.1.2	Conduct demonstrations to observe total internal reflection in fiber optics.
1598.1.3	Research and test strategies like signal amplification to mitigate attenuation in fiber optic networks.

Fiber Optic Components

1598.2	Explore the various components that make up a fiber optic system, such as optical fibers, connectors, splices, couplers, and amplifiers.
1598.2.1	Assemble and disassemble fiber optic components to understand their interplay within a system, observing how connectors, splices, and couplers affect signal transmission.
1598.2.2	Study the characteristics and functions of optical fibers, connectors, splices, couplers, and amplifiers through literature review and hands-on examination.
1598.2.3	Test the performance of fiber optic systems by measuring signal strength, loss, and quality at various points within the network, identifying areas for improvement in component selection and configuration.

Fiber Optic Communication Systems

1598.3	Learn about the diverse types of fiber optic communication systems, including point-to-point, passive optical networks (PON), and wavelength-division multiplexing (WDM).
1598.3.1	Research point-to-point, passive optical networks (PON), and wavelength-division multiplexing (WDM) systems through online courses, textbooks, and technical articles to understand their architectures and functionalities.
1598.3.2	Examine real-world examples of point-to-point, PON, and WDM systems deployed in various industries or telecommunications networks, identifying their advantages, limitations, and applications.
1598.3.3	Utilize simulation software to model and simulate different fiber optic communication systems, adjusting parameters such as distance, data rate, and network topology to gain insights into their performance characteristics.

Installation and Maintenance

1598.4	Utilize best practices for installing, testing, and maintaining fiber optic networks to ensure optimal performance and reliability.

1598.4.1	Handle fiber optic cables carefully to avoid bending or twisting fiber optic cables beyond their specified bend radius to prevent signal attenuation or breakage.
1598.4.2	Use proper cable management such as employing cable trays, raceways, or conduit systems to organize and protect fiber optic cables from environmental hazards such as moisture, dust, and physical damage.
1598.4.3	Follow industry standards and manufacturer recommendations for cable routing, termination, and splicing to ensure compatibility and reliability.
1598.4.4	Perform end-to-end testing, comprehensive testing of the entire fiber optic link, including connectors, splices, and terminations, to identify any issues affecting signal quality or integrity.
1598.4.5	Utilize specialized equipment such as optical power meters, light sources, and OTDRs to accurately measure signal loss, reflectance, and attenuation along the fiber optic network.
1598.4.6	Document test results by keeping detailed records of testing procedures and results for future reference, troubleshooting, and maintenance purposes, ensuring transparency and accountability in network performance evaluation.
1598.4.7	Inspect fiber optic connectors, patch panels, and equipment for signs of contamination, corrosion, or damage, and clean them using approved methods and materials to maintain optimal signal transmission.
1598.4.8	Monitor environmental factors such as temperature, humidity, and vibration levels that can impact fiber optic network performance, and implement measures to mitigate their effects, such as climate control systems and protective enclosures.

Optical Signal Modulation

1598.5	Study the methods used to encode information onto light signals, including amplitude modulation, frequency modulation, and phase modulation.
1598.5.1	Analyze the effects of different modulation techniques on light signals, using equipment such as optical modulators and detectors to observe variations in amplitude, frequency, and phase.
1598.5.2	Investigate how amplitude modulation, frequency modulation, and phase modulation are employed in commercial fiber optic communication systems, such as in optical networking equipment or telecommunications infrastructure, to transmit data efficiently and reliably.
1598.5.3	Use amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM) to experiment with light signals.

Optical Networking

1598.6	Explore the principles of optical networking, including SONET/SDH, Ethernet over fiber, and optical transport networks (OTN).
1598.6.1	Research industry standards and protocols governing SONET/SDH, Ethernet over fiber, and optical transport networks (OTN) through online resources, technical publications, and standards documents.
1598.6.2	Set up a test environment to configure and deploy SONET/SDH, Ethernet over fiber, and OTN networks using simulation software or physical hardware, experimenting with different topologies and configurations.
1598.6.3	Explore various deployment scenarios where SONET/SDH, Ethernet over fiber, and OTN are utilized, such as in telecommunications backbones, data center interconnects, or metropolitan area networks (MANs), analyzing the advantages and challenges of each technology in different contexts.

Fiber Optic Sensing

1598.7	Delve into the emerging field of fiber optic sensing and its applications in various industries, such as structural health monitoring, temperature sensing, and intrusion detection.
1598.7.1	Explore Structural Health Monitoring (SHM), fiber optic sensors embedded in structures such as bridges, buildings, and pipelines can monitor parameters like strain, temperature, and vibration, providing real-time data on structural integrity and detecting potential issues or damage.
1598.7.2	Explore Environmental Monitoring, fiber optic sensors can be used to monitor environmental parameters such as temperature, humidity, pressure, and chemical concentrations in various settings, including agricultural, industrial, and natural environments, facilitating environmental assessment and management.
1598.7.3	Explore Medical Sensing and Biophotonics, fiber optic sensors enable non-invasive monitoring of physiological parameters within the human body, such as blood oxygen levels, heart rate, and glucose concentrations, supporting applications in medical diagnostics, patient monitoring, and biomedical research.
1598.7.4	Explore Geophysical Sensing, fiber optic sensors can be deployed in geophysical applications such as seismic monitoring, subsurface imaging, and geothermal reservoir monitoring, providing valuable insights into geological phenomena and natural resource exploration.
1598.7.5	Explore Security and Intrusion Detection, fiber optic sensors offer capabilities for perimeter security, intrusion detection, and surveillance by detecting changes in light intensity, pressure, or vibration along sensitive areas such as fences, borders, and critical infrastructure.
1598.7.6	Industrial Process Monitoring, fiber optic sensors can monitor parameters such as temperature, pressure, and flow in industrial processes, enabling real-time monitoring, control, and optimization of manufacturing processes and ensuring operational efficiency and safety.

This course introduces the student to the knowledge base and technical skills for concepts in Basic Control Circuits. Areas of study include mathematical concepts, technical writing skills, technical reading comprehension, career opportunities and personal and equipment safety. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

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Electrical Components

1601.1	Electrical Components
1601.1.1	Methods for troubleshooting, testing, repairing, and replacing electrical components.
1601.1.2	Troubleshoot electrical faults on series and parallel circuit and calculate unknown values.
1601.1.3	Measure resistance of open and hermetic motor windings.
1601.1.4	Analyze split phase motors (PSC, RSIR, CSCR, CSIR and Shaded Pole).
1601.1.5	Test and inspect motor starting relays (Current, potential, and solid state).
1601.1.6	Measure capacitor values (start and run).
1601.1.7	Assess contactors, switching relays, overload protectors, transformers, and resistance heaters.
1601.1.8	Classify types of thermostats and test, install, and adjust heat anticipators.
1601.1.9	Interpret electrical diagrams (schematic, ladder, and wiring).
1601.1.10	Classify and demonstrate use of specialized tools and test instruments.
1601.1.11	Compare and identify requirements of wire size.
1601.1.12	Demonstrate knowledge of Ohm's law and calculate unknown values.

This course introduces the student to the knowledge base and technical skills for concepts in Air Conditioning Applications. Areas of study include mathematical concepts, technical writing skills, technical reading comprehension, career opportunities, personal and equipment safety, fabrication operations and basic compression refrigeration. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Troubleshooting and Repairing Air Conditioning Systems

1602.1	Troubleshooting and Repairing Air Conditioning Systems
1602.1.1	Troubleshooting and repairing air conditioning systems.
1602.1.2	Test and apply psychometrics to systems.
1602.1.3	Measure superheat and subcooling.

Installing and Troubleshooting Electrical Systems

1602.2	Installing and Troubleshooting Electrical Systems
1602.2.1	Installing and troubleshooting electrical system problems.
1602.2.2	Integrate tools and test instruments.
1602.2.3	Program various thermostats.
1602.2.4	Test and troubleshoot operating and safety controls.

Maintenance Program

1602.3	Maintenance Program
1602.3.1	Initiating a maintenance program based upon frequency and task recommended by.
1602.3.2	Develop an annual maintenance schedule.
1602.3.3	Perform required maintenance tasks.
1602.3.4	Select and integrate tools required to do maintenance.

This course introduces the student to the knowledge base and technical skills for concepts in Domestic Refrigeration. Areas of study include mathematical concepts, technical writing skills, technical reading comprehension, career opportunities and personal and equipment safety. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Testing and Service Skills

1603.1	Testing and Service Skills
1603.1.1	Testing and service skills for domestic refrigeration systems.
1603.1.2	Identify all components of a domestic refrigeration system (electrical and mechanical).
1603.1.3	Test all components of domestic refrigeration systems (electrical and mechanical).
1603.1.4	Measure and record temperatures and relative humidity.
1603.1.5	Replace defective components of a domestic refrigeration system (electrical and mechanical).

This course introduces the student to the knowledge base and technical skills for concepts of Fossil Fuel Heating Systems. Areas of study include mathematical concepts, technical writing skills, technical reading comprehension, career opportunities and personal and equipment safety. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Operation of Fossil Fuel Furnaces

1604.1	Operation of Fossil Fuel Furnaces
1604.1.1	Installing fossil fuel furnaces.
1604.1.2	Determine proper sizing related to fuel line applications.
1604.1.3	Pressurize and leak test fuel lines.
1604.1.4	Perform combustion analysis.

Troubleshooting Fossil Fuel Furnace

1604.2	Troubleshooting Fossil Fuel Furnace
1604.2.1	Troubleshooting fossil fuel furnaces.
1604.2.2	Measure furnace temperature rise.
1604.2.3	Measure draft of barometric damper (draft control).
1604.2.4	Measure fuel pressures.

Fossil Fuel Furnace Safety

1604.3	Fossil Fuel Furnace Safety
1604.3.1	Safety consideration of fossil fuel furnaces.
1604.3.2	Assess venting requirements based on manufacturer's specifications.
1604.3.3	Access clearance specifications.
1604.3.4	Identify criteria for types of fossil fuel heating systems.

This course introduces the student to the knowledge base and technical skills for concepts in Heating Systems. Areas of study include mathematical concepts, technical writing skills, technical reading comprehension, career opportunities and personal and equipment safety. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Heating System Analysis and Servicing

1607.1	Heating System Analysis and Servicing
1607.1.1	The skills needed to test, service, install and repair heating systems.
1607.1.2	Test and replace all electrical and mechanical components and safety devices of heating systems.
1607.1.3	Leak test and adjust pressures of fossil fuel heating systems.
1607.1.4	Measure and adjust temperature rise of heating systems.
1607.1.5	Test and adjust combustion efficiency of fossil fuel heating systems.
1607.1.6	Check and explain the installation requirements of electric base board heat.
1607.1.7	Convert watts to B.T.U.’s and make conversions (Celsius to Fahrenheit).
1607.1.8	Compare electric heat and heat pumps to fossil fuel heating systems.
1607.1.9	Light and adjust pilot light flame.
1607.1.10	Identify considerations of heating system installations (up flow, down flow and horizontal).
1607.1.11	Connect fuel lines and filters for gas and oil furnaces (black pipe and copper tubing).
1607.1.12	Compute heat loss and heat gain, design duct system from blueprint information and measure airflow.
1607.1.13	Identify specific tools for fossil fuel heating systems.

This course introduces the student to the knowledge base and technical skills for all courses in the Commercial Air Conditioning Program of Study. Areas of study include mathematical concepts, technical writing skills, technical reading comprehension, career opportunities, personal and equipment safety, fabrication operations and compression refrigeration. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Commercial Evaporator

1608.1	Commercial Evaporator
1608.1.1	Testing, servicing, and installing commercial evaporators.
1608.1.2	Explain the operation of direct expansion evaporators.
1608.1.3	Explain the operation of indirect expansion evaporators.
1608.1.4	Describe single and multiple circuit evaporators.
1608.1.5	Repair or replace evaporator coil.

Commercial Condenser

1608.2	Commercial Condenser
1608.2.1	Testing, servicing, and installing commercial condensers.
1608.2.2	Measure performance when servicing air cooled condensers.
1608.2.3	Measure performance when servicing water cooled condensers.
1608.2.4	Test condensers for leaks.
1608.2.5	Evacuate and charge systems.

Compressor Repair and Replacement

1608.3	Compressor Repair and Replacement
1608.3.1	Compressor testing and replacement.
1608.3.2	Differentiate types of compressors.
1608.3.3	Recognize internal parts of compressors.
1608.3.4	Identify special components of compressors.
1608.3.5	Test compressor compression ratio.
1608.3.6	Judge condition of compressor motor windings.
1608.3.7	Measure for oil, acid, and moisture.

Measuring Devices and Special System Component

1608.4	Measuring Devices and Special System Component
1608.4.1	Metering devices and special system components.

1608.4.2	Compare and test metering devices.
1608.4.3	Install sensing bulbs.
1608.4.4	Perform system pump down procedures.
1608.4.5	Perform electrical, mechanical, and air flow testing and repair.
1608.4.6	Identify types of pressure controls for specific applications.

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Sectional Views

1609.1	Sectional Views
1609.1.1	Measuring and layout tools for duct system design.
1609.1.2	Identify measuring tools.
1609.1.3	Define use of measuring tools.
1609.1.4	Use measuring tools in layout process.
1609.1.5	Fabricate and install straight duct and various fittings needed for duct system.
1609.1.6	Identify requirements for installing and sealing duct systems.

Basic Metal Tools, Equipment, and Materials

1609.2	Basic Metal Tools, Equipment, and Materials
1609.2.1	Basic metal tools, equipment, and materials.
1609.2.2	Practice all safety requirements as related to tools, equipment, and material.
1609.2.3	Identify by proper name basic metal working hand tools.
1609.2.4	Identify sheet working machines and describe their basic purpose.
1609.2.5	Describe common types of metal used for duct systems.
1609.2.6	Determine gauge of material with proper tools.
1609.2.7	Calculate bill of materials used for duct installation for jobs.

Duct Fastener

1609.3	Duct Fastener
1609.3.1	Duct fastener requirements for various materials.
1609.3.2	Differentiate types of rivets and identify types of rivet tools.
1609.3.3	Identify and use threaded fasteners.
1609.3.4	Fabricate and use S-clips, drive cleats, and Pittsburgh hand seam.
1609.3.5	Identify handheld tools used for fabrication of duct board.

Duct System Blueprint

1609.4	Duct System Blueprint
1609.4.1	Interpreting blueprints of duct systems.
1609.4.2	Identify basic terms, components, and symbols of blueprints.
1609.4.3	Translate from blueprints to actual structure.
1609.4.4	List common scales used in measurement of duct blueprints.
1609.4.5	Prepare a material list for a duct system.

Automotive Technology MLR-2 continues as students are exposed to skills sets in areas such as Steering and Suspension-Diagnosis and Repair of Wheels and Tires, Brakes-Diagnosis and Repair of Hydraulic Systems, Brakes-Diagnosis and Repair of Drum Brake Systems, Brakes-Diagnosis and Repair of Disk Brake Systems, Brakes Diagnosis and Repair of Power Assist Units, Brakes Diagnosis, and Repair of Miscellaneous Automotive Items, Brakes-Diagnosis and Repair of Anti-lock Brake Systems and Steering and Suspension-Diagnosis of Steering & Suspension Systems, and Electrical Systems. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Suspension and Steering

1623.1	Perform related suspension and steering systems inspection and service.
1623.1.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
1623.1.2	Disable and enable supplemental restraint system (SRS).
1623.1.3	Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
1623.1.4	Determine proper power steering fluid type; inspect fluid level and condition.
1623.1.5	Flush, fill, and bleed power steering system.
1623.1.6	Remove, inspect, replace, and adjust power steering pump drive belt.
1623.1.7	Inspect and replace power steering hoses and fittings.
1623.1.8	Inspect pitman arm, relay (center link/intermediate) rod, idler arm and mountings, and steering linkage damper.
1623.1.9	Inspect electric power assist steering.
1623.1.10	Identify hybrid vehicle power steering system electrical circuits and safety precautions.
1623.1.11	Inspect tie rod ends (sockets), tie rod sleeves, and clamps.
1623.1.12	Inspect for power steering fluid leakage; determine necessary action.
1623.1.13	Inspect and replace rebound and jounce bumpers.
1623.1.14	Inspect upper and lower control arms, bushings, and shafts.
1623.1.15	Inspect track bar, strut rods/radius arms, and related mounts and bushings.
1623.1.16	Inspect upper and lower ball joints (with or without wear indicators).
1623.1.17	Inspect suspension system coil springs and spring insulators (silencers).
1623.1.18	Inspect suspension system torsion bars and mounts.
1623.1.19	Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links.
1623.1.20	Inspect strut cartridge or assembly.
1623.1.21	Inspect the front strut bearing and mount.
1623.1.22	Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.
1623.1.23	Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts.
1623.1.24	Inspect, remove, and replace shock absorbers; inspect mounts and bushings.

1623.1.25	Describe the function of the power steering pressure switch.
1623.2	Perform vehicle pre-alignment inspection and ride-height.
1623.2.1	Inspect suspension components such as shocks, struts, and control arms for wear or damage.
1623.2.2	Measure vehicle ride height using appropriate tools like a ride-height gauge.
1623.2.3	Assess alignment angles using precision equipment such as a laser alignment system, check camber, caster, and toe angles to identify misalignments.
1623.2.4	Evaluate tire condition, tread wear patterns, and tire pressures.
1623.2.5	Examine steering components including tie rods and ball joints for wear or looseness.
1623.2.6	Test for play in steering components that may affect alignment stability.
1623.3	Inspect and service wheels and tires.
1623.3.1	Evaluate the condition of wheels and tires.
1623.3.2	Inspect tire condition; identify tire wear patterns; check for correct size and application (load and speed ratings) and adjust air pressure; determine necessary action.
1623.3.3	Rotate tires according to manufacturer's recommendations.
1623.3.4	Dismount, inspect, and remount tire on wheel; Balance wheel and tire assembly (static and dynamic).
1623.3.5	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
1623.3.6	Inspect tire and wheel assembly for air loss; perform necessary action.
1623.3.7	Repair tire using internal patch.
1623.3.8	Identify and test tire pressure monitoring systems (indirect and direct) for operation; verify operation of instrument panel lamps.
1623.3.9	Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.
1623.3.10	Demonstrate use of 3 Cs (concern, cause, correction).

Brakes

1623.4	Inspect and service the hydraulic system.
1623.4.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
1623.4.2	Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).
1623.4.3	Install wheel and torque lug nuts.
1623.4.4	Measure brake pedal height, travel, and free play (as applicable); determine necessary action.
1623.4.5	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear; tighten loose fittings and supports; determine necessary action.
1623.4.6	Select, handle, store, and fill brake fluids to proper level.
1623.4.7	Bleed and/or flush brake system.
1623.4.8	Test brake fluid for contamination.
1623.4.9	Check master cylinder for external leaks and proper operation.
1623.4.10	Identify components of the brake warning light system
1623.5	Inspect and service drum brakes.
1623.5.1	Remove, clean, inspect, and measure brake drum diameter; determine necessary action.
1623.5.2	Refinish brake drum and measure final drum diameter; compare with specifications.
1623.5.3	Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
1623.5.4	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.

1623.5.5	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments.
1623.6	Inspect and service disc brakes.
1623.6.1	Remove and clean caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action.
1623.6.2	Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action.
1623.6.3	Remove, inspect, and replace pads and retaining hardware; determine necessary action.
1623.6.4	Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.
1623.6.5	Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action
1623.6.6	Remove and reinstall rotor.
1623.6.7	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications
1623.6.8	Refinish rotor off vehicle; measure final rotor thickness and compare with specifications
1623.6.9	Retract and re-adjust caliper piston on an integral parking brake system.
1623.6.10	Check brake pad wear indicator; determine necessary action.
1623.6.11	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.
1623.7	Inspect and service power-assist units.
1623.7.1	Summarize the elements of power assist units.
1623.7.2	Examine and analyze units.
1623.7.3	Evaluate the proper functioning of the units.
1623.7.4	Demonstrate proper repair techniques.
1623.7.5	Check brake pedal travel with, and without, engine running to verify proper power booster operation.
1623.7.6	Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
1623.8	Inspect and service miscellaneous systems (e.g., wheel bearings, parking brake, electrical).
1623.8.1	Examine and analyze automotive items.
1623.8.2	Evaluate the proper functioning of miscellaneous automotive items.
1623.8.3	Demonstrate proper repair techniques of the items.
1623.8.4	Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
1623.8.5	Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust, or replace as needed.
1623.8.6	Check parking brake operation and parking brake indicator light system operation; determine necessary action.
1623.8.7	Check operation of brake stop light system.
1623.8.8	Replace wheel bearing and race.
1623.8.9	Inspect and replace wheel studs.
1623.9	Identify and describe electronic brakes, traction, and stability control systems.
1623.9.1	Summarize the elements of Anti-lock Brake systems.
1623.9.2	Examine and analyze systems.
1623.9.3	Evaluate the proper functioning of the system.
1623.9.4	Demonstrate proper repair techniques.
1623.9.5	Identify traction control/vehicle stability control system components.
1623.9.6	Describe the operation of a regenerative braking system.
1623.9.7	Demonstrate use of 3 Cs (concern, cause, and correction).

Electrical and Electronic Systems

1623.10.1	Inspect and service general electrical/electronic systems.
1623.10.2	Evaluate automotive electrical systems.
1623.10.3	Utilize electrical system tools.
1623.10.4	Summarize battery systems.
1623.10.5	Demonstrate battery safety.
1623.10.6	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
1623.10.7	Demonstrate the proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop, (including grounds), current flow and resistance.
1623.10.8	Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
1623.11.1	Inspect and service charging batteries.
1623.11.2	Measure key-off battery drain (parasitic draw).
1623.11.3	Perform battery state-of-charge test; determine necessary action.
1612.11.4	Confirm proper battery capacity for vehicle application; perform battery capacity for vehicle application; determine necessary action.
1623.11.5	Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
1623.12	Inspect and service starting systems.
1623.12.1	Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
1623.12.2	Check operation of electrical circuits with fused jumper wires.
1623.12.3	Maintain or restore electronic memory functions.
1623.12.4	Perform slow/fast battery charge according to manufacturer's recommendations.
1623.12.5	Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
1623.13	Inspect and service charging systems.
1623.13.1	Use wiring diagrams to trace electrical/electronic circuits.
1623.13.2	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
1623.13.3	Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.
1623.14	Inspect and service lighting systems.
1623.14.1	Perform solder repair of electrical wiring.
1623.14.2	Check operation of electrical circuits with a test light.
1623.15	Inspect and service accessories.
1623.15.1	Replace electrical connectors and terminal ends.
1623.15.2	Identify electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery.
1623.15.3	Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.

Automotive Technology MLR-3 build student skill sets in the areas of Engine Performance-General Engine Diagnosis. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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General Engine Knowledge and Repair

1625.1	Inspect and service general engine issues.
1625.1.1	Summarize the elements of engines.
1625.1.2	Examine and analyze engine systems.
1625.1.3	Evaluate the proper functioning of the engines.
1625.1.4	Demonstrate proper repair techniques.
1625.1.5	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
1625.1.6	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
1625.1.7	Install engine covers using gaskets, seals and sealers as required.
1625.1.8	Perform common fastener and thread repair to include remove broken bolts, restore internal and external threads, and repair internal threads with thread insert.
1625.1.9	Verify operation of the instrument panel engine warning indicators.
1625.1.10	Remove and replace timing belt; verify correct camshaft timing.
1625.1.11	Identify hybrid vehicle internal combustion engine service precautions.
1625.2	Inspect, test, and service lubrication and cooling systems.
1625.2.1	Identify parts and condition of cooling and lubrication systems.
1625.2.2	Demonstrate proper techniques for working with the systems.
1625.2.3	Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core and galley plugs; determine necessary action.
1625.2.4	Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
1625.2.5	Remove, inspect, and replace thermostat and gasket/seal.
1625.2.6	Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.
1625.2.7	Perform engine oil and filter change.
1625.2.8	Demonstrate the use of the 3 Cs (concern, cause, and correction).
1625.3	Inspect, test, and service cylinder head and valve train.
1625.3.1	Summarize the elements of cylinder head and valve train.
1625.3.2	Demonstrate proper repair techniques.
1625.4	Perform general engine diagnosis.

1625.4.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
1625.4.2	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action
1625.4.3	Perform cylinder power balance test; determine necessary action.
1625.4.4	Perform cylinder cranking and running compression tests; determine necessary action.
1625.4.5	Perform cylinder leakage test; determine necessary action.
1625.4.6	Verify engine operating temperature.
1625.4.7	Remove and replace spark plugs; inspect secondary ignition components for wear and damage.

Engine Performance

1625.5	Inspect and service general engine performance.
1625.5.1	Diagnose and rectify engine misfires in various vehicle models by utilizing advanced diagnostic tools such as OBD scanners and oscilloscopes.
1625.5.2	Perform routine maintenance procedures to optimize engine performance and efficiency.
1625.5.3	Identify and repair worn-out timing belts or chains to prevent catastrophic engine failure and ensure smooth engine operation for extended periods.
1625.6	Identify and describe electronic engine controls.
1625.6.1	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.
1625.6.2	Describe the importance of operating all OBDII monitors for repair verification.
1625.7	Inspect and service fuel, air induction, and exhaust systems.
1625.7.1	Replace fuel filter(s) where applicable.
1625.7.2	Inspect, service, or replace air filters, filter housings, and intake duct work.
1625.7.3	Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action.
1625.7.4	Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action.
1625.7.5	Check and refill diesel exhaust fluid
1625.8	Inspect and service emissions control systems.
1625.8.1	Inspect, test, and service positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action.
1625.8.2	Utilize emission analyzers and smoke machines to diagnose the root cause of excessive exhaust emissions, such as faulty oxygen sensors or leaky exhaust pipes, and conduct necessary repairs to restore optimal system performance.

The Skill Sets in Automotive Technology AST-4 will introduce students to the skills, technology, and service of Automatic Transmission and Transaxle-Diagnosis, Maintenance, Repair and Adjustment; Manual Drive Train and Axles-Diagnosis, Maintenance, Repair and Adjustment; and Heating and Air Conditioning-Diagnosis, Maintenance, Repair and Adjustment. This course is recommended as an Elective in Automotive Technology.

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Automatic Transmission & Transaxle-Diagnosis, Maintenance, Repair and Adjustment

1627.1	Diagnosis and repair general transmission and transaxle issues.
1627.1.1	Identify and interpret transmission/transaxle concerns, differentiate between engine performance and transmission/transaxle concerns; determine needed action.
1627.1.2	Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
1627.1.3	Diagnose fluid loss and condition concerns; determine needed action.
1627.1.4	Check fluid level in a transmission or a transaxle equipped with a dipstick.
1627.1.5	Check fluid level in a transmission or a transaxle not equipped with a dipstick.
1627.1.6	Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine needed action.
1627.1.7	Diagnose noise and vibration concerns; determine needed action.
1627.1.8	Perform stall test; determine needed action
1627.1.9	Perform lock-up converter system tests; determine needed action.
1627.1.10	Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.
1627.1.11.	Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.
1627.1.12	Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).
1627.2	Demonstrate in-vehicle transmission/transaxle maintenance and repair.
1627.2.1	Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch
1627.2.2	Inspect for leakage; replace external seals, gaskets, and bushings.
1627.2.3	Inspect, test, adjust, repair, and/or replace electrical/electronic components and circuits including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses; demonstrate understanding of the relearn procedure.
1627.2.4	Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification.
1627.2.5	Inspect, replace, and align powertrain mounts.
1627.3	Perform off-vehicle transmission and transaxle repair.
1627.3.1	Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mounting surfaces.
1627.3.2	Inspect, leak test, flush, and/or replace transmission/transaxle oil cooler, lines, and fittings.

1627.3.3	Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.
1627.3.4	Describe the operational characteristics of a continuously variable transmission (CVT).
1627.3.5	Describe the operational characteristics of a hybrid vehicle drive train.
1627.3.6	Disassemble, clean, and inspect transmission/transaxle.
1627.3.7	Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, switches, solenoids, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets).
1627.3.8	Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine needed action.
1627.3.9	Assemble transmission/transaxle.
1627.3.10	Inspect, measure, and reseal oil pump assembly and components.
1627.3.11	Measure transmission/transaxle end play and/or preload; determine needed action.
1627.3.12	Inspect, measure, and/or replace thrust washers and bearings.
1627.3.13	Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls.
1627.3.14	Inspect bushings; determine needed action.
1627.3.15	Inspect and measure planetary gear assembly components; determine needed action.
1627.3.16	Inspect case bores, passages, bushings, vents, and mating surfaces; determine needed action.
1627.3.17	Diagnose and inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform needed action.
1627.3.18	Inspect measure, repair, adjust or replace transaxle final drive components.
1627.3.19	Inspect clutch drum, piston, check-balls, springs, retainers, seals, friction plates, pressure plates, and bands; determine needed action.
1627.3.20	Measure clutch pack clearance; determine needed action.
1627.3.21	Air test operation of clutch and servo assemblies.
1627.3.22	Inspect one-way clutches, races, rollers, sprags, springs, cages, retainers; determine needed action.
1627.4	Demonstrate manufacturer specific automatic transmission tasks.
1627.4.1	Install and seat torque converter to engage drive/splines.
1627.4.2	Inspect bands and drums; determine necessary action.
1627.4.3	Service product specific automatic transmissions/transaxles.
1627.4.4	Perform product specific relearn procedure.
1627.4.5	Diagnose electronic transmission control systems using appropriate test equipment, service information, technical service bulletins, and schematics; diagnose shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
1627.4.6	Differentiate between engine performance, or other vehicle systems, and transmission/transaxle related problems; determine necessary action.

Advanced Manual Drivetrain and Axle

1627.5	Diagnose general drivetrain issues.
1627.5.1	Identify and interpret drivetrain concerns; determine needed action.
1627.5.2	Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
1627.5.3	Check fluid condition; check for leaks; determine needed action.
1627.5.4	Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification.

1627.6	Diagnose and repair clutch issues.
1627.6.1	Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine needed action.
1627.6.2	Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform needed action.
1627.6.3	Inspect and/or replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing, linkage, and pilot bearing/bushing (as applicable).
1627.6.4	Bleed clutch hydraulic system.
1627.6.5	Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification.
1627.6.6	Inspect flywheel and ring gear for wear, cracks, and discoloration; determine needed action.
1627.6.7	Measure flywheel runout and crankshaft end play; determine needed action.
1627.6.8	Describe the operation and service of a system that uses a dual mass flywheel.
1627.7	Diagnose and repair transmission and transaxle issues.
1627.7.1	Inspect, adjust, lubricate, and/or replace shift linkages, brackets, bushings, cables, pivots, and levers.
1627.7.2	Describe the operational characteristics of an electronically controlled manual transmission/transaxle.
1627.7.3	Diagnose noise concerns through the application of transmission/transaxle power-flow principles.
1627.7.4	Diagnose hard shifting and jumping out of gear concerns; determine needed action.
1627.7.5	Diagnose transaxle final drive assembly noise and vibration concerns; determine needed action.
1627.7.6	Disassemble, inspect clean, and reassemble internal transmission/transaxle components.
1627.8	Diagnose and repair drive shaft, half shaft, and CV joints.
1627.8.1	Diagnose constant-velocity (CV) joint noise and vibration concerns; determine needed action.
1627.8.2	Diagnose universal joint noise and vibration concerns; perform needed action.
1627.8.3	Inspect, remove, and/or replace bearings, hubs, and seals.
1627.8.4	Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints.
1627.8.5	Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles.
1627.9	Perform ring and pinion gears and differential case assembly.
1627.9.1	Clean and inspect differential case; check for leaks; inspect housing vent.
1627.9.2	Check and adjust differential case fluid level; use proper fluid type per manufacturer specification.
1627.9.3	Drain and refill differential case; use proper fluid type per manufacturer specifications.
1627.9.4	Diagnose noise and vibration concerns; determine needed action.
1627.9.5	Inspect and replace companion flange and/or pinion seal; measure companion flange runout.
1627.9.6	Inspect ring gear and measure runout; determine needed action.
1627.9.7	Remove, inspect, reinstall and/or drive pinion and ring gear, spacers, sleeves, and bearings.
1627.9.8	Measure and adjust drive pinion depth.
1627.9.9	Measure and adjust drive pinion bearing preload.
1627.9.10	Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types).
1627.9.11	Check ring and pinion tooth contact patterns; perform needed action.
1627.9.12	Disassemble, inspect, measure, adjust, and/or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.
1627.9.13	Reassemble and reinstall differential case assembly; measure runout; determine needed action.
1627.10	Perform diagnosis and repair on limited slip differential
1627.10.1	Diagnose noise, slippage, and chatter concerns; determine needed action.
1627.10.2	Measure rotating torque; determine needed action.
1627.11	Perform diagnosis and repair on drive axles.
1627.11.1	Inspect and replace drive axle wheel studs.

1627.11.2	Remove and replace drive axle shafts.
1627.11.3	Inspect and replace drive axle shaft seals, bearings, and retainers.
1627.11.4	Measure drive axle flange runout and shaft end play; determine needed action.
1627.11.5	Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine needed action.
1627.12	Diagnose and repair four-wheel drive and all-wheel drive components.
1627.12.1	Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
1627.12.2	Inspect locking hubs; determine needed action.
1627.12.3	Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.
1627.12.4	Identify concerns related to variations in tire circumference and/or final drive ratios.
1627.12.5	Diagnose noise, vibration, and unusual steering concerns; determine needed action.
1627.12.6	Diagnose, test, adjust, and/or replace electrical/electronic components of four-wheel drive/all-wheel drive systems.
1627.12.7	Disassemble, service, and reassemble transfer case and components.
1627.13	Diagnose and repair manufacturer specific manual drivetrain and axle issues.
1627.13.1	Locate and interpret vehicle major drivetrain components and identification numbers.
1627.13.2	Diagnose fluid loss, level, and condition concerns; determine necessary action.
1627.13.3	Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action.
1627.13.4	Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action.
1627.13.5	Remove and reinstall manual transmission/transaxle.
1627.13.6	Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.
1627.13.7	Inspect, replace, and align powertrain mounts.
1627.13.8	Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.
1627.13.9	Remove and replace transaxle final drive.
1627.13.10	Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.
1627.13.11	Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.
1627.13.12	Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.
1627.13.13	Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.
1627.13.14	Inspect lubrication devices (oil pump or slingers); perform necessary action.
1627.13.15	Inspect, test, and replace transmission/transaxle sensors and switches.
1627.13.16	Inspect, service, and replace shaft center support bearings.
1627.13.17	Diagnose noise and vibration concerns; determine necessary action.
1627.13.18	Inspect and reinstall limited slip differential components.
1627.13.19	Remove and reinstall transfer case.
1627.13.20	Service product specific clutch assembly.
1627.13.21	Service product specific manual transmission/transaxles.
1627.13.22	Service product specific drive axles/driveshafts.
1627.13.23	Service product specific transfer cases.

The skill sets in Automotive Technology AST-1 will introduce students to the skills sets related to Electrical-Electrical/Electronic System Basics; and Alternative Fuels-Hybrid Vehicles. This course is recommended as an Elective in Automotive Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Electrical-Electrical/Electronic System Basics

1629.1	Evaluate automotive electrical systems.
1629.1.1	Research vehicle service information including vehicle service history, service precautions, and technical service bulletins.
1629.1.2	Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
1629.2	Utilize electrical system tools.
1629.2.1	Demonstrate proper use of a digital multi-meter (DMM) when measuring source voltage, voltage drop (including grounds), current flow and resistance.
1629.2.2	Demonstrate proper use of a test light on an electrical circuit.
1629.2.3	Use fused jumper wires to check operation of electrical circuits.
1629.3	Diagnose and repair battery systems.
1629.3.1	Perform battery state-of-charge test; determine needed action.
1629.3.2	Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine needed action.
1629.3.3	Maintain or restore electronic memory functions.
1629.3.4	Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
1629.3.5	Perform slow/fast battery charge according to manufacturer's recommendations.
1629.3.6	Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
1629.3.7	Identify electrical/electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery.
1629.3.8	Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.
1629.4	Demonstrate battery safety.
1629.4.1	Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
1629.4.2	Identify safety precautions for high voltage systems on electric, hybrid, hybrid-electric, and diesel vehicles.
1629.5	Diagnose and repair starting systems.
1629.5.1	Perform starter current draw tests; determine needed action.
1629.5.2	Perform starter circuit voltage drop tests; determine needed action.
1629.5.3	Inspect and test starter relays and solenoids; determine needed action.
1629.5.4	Remove and install starter in a vehicle.
1629.5.5	Inspect and test switches, connectors, and wires of starter control circuits; determine needed action.

1629.5.6	Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition.
1629.5.7	Demonstrate knowledge of an automatic idle-stop/start-stop system.
1629.6	Diagnose and repair charging system.
1629.6.1	Perform charging system output test; determine needed action.
1629.6.2	Diagnose (troubleshoot) charging system for causes of undercharge, no-charge, or overcharge conditions.
1629.6.3	Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.
1629.6.4	Remove, inspect, and/or replace generator (alternator).
1629.6.5	Perform charging circuit voltage drop tests; determine needed action.
1629.7	Evaluate the proper functioning of the lighting system.
1629.7.1	Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs.
1629.7.2	Diagnose (troubleshoot) the causes of brighter-than-normal, intermittent, dim, or no light operation; determine needed action.
1629.7.3	Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.
1629.7.4	Aim headlights.
1629.7.5	Identify system voltage and safety precautions associated with high-intensity discharge headlights.
1629.8	Demonstrate proper repair/replacement techniques.
1629.8.1	Inspect and test fusible links, circuit breakers, and fuses; determine needed action.
1629.8.2	Repair data bus wiring harness.

General Electrical System Diagnosis

1629.9	Use wiring diagrams during the diagnosis (troubleshooting) of electrical circuit problems.
1629.9.1	Refer to wiring diagrams when troubleshooting issues such as malfunctioning lights, inoperative power windows, or a faulty ignition system.
1629.9.2	Follow circuit paths and use multimeters or test lights to pinpoint areas of concern, identifying faulty components, damaged wiring, or poor connections accurately.
1629.9.3	Follow a step-by-step approach, starting from the power source and tracing the circuit path to the load, checking for continuity, voltage drops, or short circuits at each connection point.
1629.9.4	Use the wiring diagram to isolate potential issues and perform necessary repairs or replacements, ensuring the restoration of proper electrical function in the vehicle.
1629.10	Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.
1629.10.1	Use multimeters and amp clamps to measure electrical current draw from the battery when the vehicle is turned off.
1629.10.2	Utilize diagnostic scan tools to identify electronic modules or components that may remain active when the vehicle is supposed to be in a key-off state.
1629.10.3	Make repairs or adjustments to correct issues such as faulty electrical components, wiring harness faults, or improperly installed aftermarket accessories.
1629.11	Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; determine necessary action.
1629.11.1	Visually inspect switches, connectors, relays, solenoids, and wires for signs of wear, corrosion, or damage. Utilize continuity tests, resistance measurements, and voltage checks to
1629.11.2	Assess the functionality of components and identify any abnormalities.

1629.11.3	Employ multimeters, test lights, oscilloscopes, and scan tools to diagnose faults in electrical and electronic circuits.
1629.11.4	Recommend repairs or replacements for faulty switches, connectors, relays, solenoids, or wires to resolve circuit malfunctions.
1629.12	Repair wiring harness.
1629.12.1	Perform repairs such as soldering broken wires, splicing damaged sections, or replacing corroded connectors within wiring harnesses.
1629.12.2	Ensure proper insulation and protection of repaired areas to prevent future issues.
1629.12.3	Utilize visual inspection techniques and diagnostic tools such as multimeters or continuity testers to identify damaged wires, corroded connectors, or faulty terminals within wiring harnesses.
1629.12.4	Document repair procedures and maintain accurate records of wiring harness repairs for future reference.
1629.12.5	Conduct quality checks to verify the integrity of repaired harnesses and ensure compliance with manufacturer specifications and safety regulations.

Advanced Electrical Systems

1629.13	Diagnose and repair body electrical systems.
1629.13.1	Diagnose operation of comfort and convenience accessories and related circuits (such as: power window, power seats, pedal height, power locks, truck locks, remote start, moon roof, sunroof, sunshade, remote keyless entry, voice activation, steering wheel controls, back-up camera, park assist, cruise control, and auto dimming headlamps); determine needed repairs.
1629.13.2	Diagnose operation of security/anti-theft systems and related circuits (such as: theft deterrent, door locks, remote keyless entry, remote start, and starter/fuel disable); determine needed repairs.
1629.13.3	Diagnose operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice-activated accessories); determine needed repairs.
1629.13.4	Diagnose operation of safety systems and related circuits (such as: horn, airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, park assist, and back-up camera); determine needed repairs.
1629.13.5	Diagnose body electronic systems circuits using a scan tool; check for module communication errors (data communication bus systems); determine needed action.
1629.13.6	Describe the process for software transfer, software updates, or reprogramming of electronic modules.
1629.13.7	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
1629.14	Diagnose and repair charging system.
1629.14.1	Diagnose (troubleshoot) charging system for the cause of undercharge, no-charge, or overcharge conditions.
1629.14.2	Diagnose issues such as alternator failure, worn-out drive belts, loose or corroded connections, or faulty voltage regulators.
1629.14.3	Implement repairs such as alternator replacement, drive belt adjustment or replacement, and terminal cleaning or replacement to restore charging system functionality.
1629.14.4	Perform repairs with attention to detail, ensuring proper torque specifications and use of quality replacement parts.
1629.15	Diagnose and repair lighting systems.
1629.15.1	Diagnose (troubleshoot) the cause of brighter-than-normal, intermittent, dim, or no light operation; determine necessary action.

1629.15.2	Diagnose issues such as burnt-out bulbs, faulty switches, malfunctioning relays, or damaged wiring harnesses affecting headlights, taillights, turn signals, or interior lighting.
1629.15.3	Implement repairs such as bulb replacement, switch, or relay replacement, or repairing damaged wiring to restore lighting system functionality.
1629.15.4	Perform repairs with attention to detail, ensuring proper alignment and installation of bulbs, switches, and connectors.
1629.15.5	Test the lighting system after repairs to verify proper operation and address any remaining issues.
1629.16	Diagnosis and repair gauges, warning devices, and driver information systems.
1629.16.1	Inspect and test gauges and gauge-sending units for causes of abnormal gauge readings; determine necessary action.
1629.16.2	Diagnose (troubleshoot) the causes of incorrect operation of warning devices and other driver information systems; determine necessary action.
1629.16.3	Inspect and test gauges and gauge-sending units for causes of abnormal readings; determine needed action.
1629.16.4	Reset maintenance indicators as required.

Manufacturer Specific Electrical and Electronic Related Tasks

1629.17	Diagnose and repair product/manufacture specific systems.
1629.17.1	Service and repair product specific electrical/electronic systems.
1629.17.2	Perform product specific diagnostic procedures.
1629.17.3	Locate and interpret vehicle major electrical/electronic components and identification numbers.
1629.17.4	Identify location of hybrid vehicle high voltage circuits disconnect (service plug) location and safety procedures.
1629.17.5	Manufacturer specific battery test; determine necessary action.
1629.17.6	Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.
1629.17.7	Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action.
1629.17.8	Perform product specific electrical/electronic relearning procedures.
1629.17.9	Diagnose operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice activated accessories); determine needed repairs.
1629.17.10	Diagnose operation of heated and cooled accessories and related circuits (such as: heated/cooled seats, heated steering wheel, heated mirror, heated glass, and heated/cooled cup holders); determine needed repairs.
1629.17.11	Diagnose operation of safety systems and related circuits (such as: airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, park assist, and back up camera); determine needed repairs.
1629.17.12	Diagnose operation of comfort and convenience accessories and related circuits (such as: power windows, power seats, pedal height, power locks, truck locks, remote start, moon roof, sunroof, sunshade, remote keyless entry, voice activation, steering wheel controls, back-up camera, park assist, and auto dimming headlamps); determine needed repairs.

This course introduces the student to the knowledge base and technical skills as they relate to the field of Automotive Technology. In the Automotive Technology MLR-1 class areas of study include Automotive Service Consultant, Career Opportunities and Practices, Shop and Personal Safety, Tools, and Equipment, and preparing vehicle for service. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, SkillsUSA West Virginia. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1631.1	Adhere to safety practices and guidelines.
1631.1.1	Research OSHA "Right to Know" laws and proper handling of hazardous materials.
1631.1.2	Identify general shop safety rules and procedures.
1631.1.3	Utilize safe procedures for handling of tools and equipment.
1631.1.4	Identify and use proper placement of floor jacks and jack stands.
1631.1.5	Identify and use proper procedures for safe lift operation.
1631.1.6	Utilize proper ventilation procedures for working within the lab/shop area.
1631.1.7	Identify marked safety areas.
1631.1.8	Identify the location and use of fire blankets.
1631.1.9	Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
1631.1.10	Identify the location and use of eye wash stations.
1631.1.11	Identify the location of posted evacuation routes.
1631.1.12	Comply with the required safe use of safety glasses, ear protection, gloves, and shoes, during lab/shop activities.
1631.1.13	Identify and wear appropriate clothing for lab/shop activities.
1631.1.14	Secure hair and jewelry for lab/shop activities.
1631.1.15	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
1631.1.16	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignitions systems, injection systems, etc.).
1631.1.17	Locate and demonstrate knowledge of material safety data sheets (MSDS).

Tools

1631.2	Demonstrate correct use of appropriate tools.
1631.2.1	Identify and demonstrate proper use of necessary tools.
1631.2.2	Properly maintain all tools.
1631.2.3	Evaluate proper safety procedures.

1631.2.4	Use all measuring tools and equipment properly.
1631.2.5	Research fractional and metric layout.
1631.2.6	Identify tools and their usage in automotive applications.
1631.2.7	Identify standard and metric designation.
1631.2.8	Demonstrate safe handling and use of appropriate tools.
1631.2.9	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
1631.2.10	Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, dial-caliper).
1631.2.11	Proper vehicle identification information, Define the use and purpose of the VIN, engine numbers and data code, Locate VIN, Apply knowledge of VIN information.

Preparing Vehicle for Service

1631.3	Preparing Vehicle for Service
1631.3.1	Identify vehicle information.
1631.3.2	Prepare vehicle work order.
1631.3.3	Identify the information needed and the service requested on a repair order.
1631.3.4	Identify purpose and demonstrate proper use of fender covers and mats.
1631.3.5	Demonstrate use of 3 C's (concern, cause, and correction).
1631.3.6	Review vehicle service history.
1631.3.7	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
1631.3.8	Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover etc.).

Customer Relations and Shop Procedures

1631.4	Interpret and estimate repair and work orders.
1631.4.1	Examine vehicles to determine the extent of damage or malfunctions.
1631.4.2	Follow checklists to ensure all important parts are examined, including belts, hoses, steering systems, brake and fuel systems, wheel bearings, and other potentially troublesome areas.
1631.4.3	Examine vehicles, compile estimates of repair costs, and secure customers' approval to perform repairs.
1631.4.4	Plan work procedures, using charts, technical manuals, and experience.
1631.5	Utilize vehicle service information.
1631.5.1	Assess and adjust repaired systems to meet manufacturers performance specifications.
1631.5.2	Proper vehicle identification information, Define the use and purpose of the VIN, engine numbers and data code, Locate VIN, Apply knowledge of VIN information.
1631.5.3	Identify automotive body styles.
1631.5.4	Review vehicle service history.
1631.6	Exhibit understanding of appropriate customer interactions.
1631.6.1	Demonstrate appropriate greeting skills.
1631.6.2	Obtain, confirm, and document pertinent vehicle/customer contact information.
1631.6.3	Provide clear explanations of repair processes and options to customers, fostering transparency and trust.
1631.6.4	Offer personalized recommendations based on customer needs and vehicle condition, enhancing customer satisfaction and loyalty.

1631.6.5	Communicate effectively with customers throughout the repair process, keeping them informed of progress and any unexpected issues.
1631.7	Exhibit understanding of automotive, environmental, and hazardous materials.
1631.7.1	Implement sustainable manufacturing in automotive production, using recycled materials like plastics and metals.
1631.7.2	Develop eco-friendly automotive technologies, such as hybrids or electric powertrains, to reduce emissions.
1631.7.3	Ensure safe handling and disposal of hazardous materials such as batteries, oils, and paints following environmental regulations.
1631.8	Display understanding of safe work environment, shop procedures, and proper handling of a customer vehicle.
1631.8.1	Maintain cleanliness of work area.
1631.8.2	Follow checklists to ensure all important parts are examined, including belts, hoses, steering systems, spark plugs, brake and fuel systems, wheel bearings, and other potentially troublesome areas.
1631.8.3	Verify availability of parts.
1631.8.4	Implement proper handling techniques for customer vehicles to prevent damage and ensure their safety.
1631.8.5	Conduct thorough inspections and quality checks before returning vehicles to customers, verifying that all repairs have been completed.

The Skill Sets in Automotive Technology AST-2 will concentrate on the skills sets related to Steering and Suspension, and Brakes. This course is recommended as an Elective in Automotive Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Steering & Suspension Systems

1633.1	Summarize the elements of steering systems.
1633.1.1	Identify key components of steering systems and their functions.
1633.1.2	Explain the operational principles of common steering system types.
1633.1.3	Discuss advancements in steering technology and their impact on vehicle performance.
1633.2	Summarize the elements of suspension systems.
1633.2.1	Recognize components such as springs, shock absorbers (or struts), control arms, sway bars, and bushings.
1633.2.2	Describe how springs support the vehicle's weight and provide compliance over bumps, while shock absorbers dampen oscillations and control body motion.
1633.2.3	Discuss advancements in suspension technology and their impact on vehicle performance.
1633.3	Examine and analyze steering and suspension systems.
1633.3.1	Inspect components such as tie rods, ball joints, control arms, and bushings for signs of wear, damage, or corrosion.
1633.3.2	Employ wheel alignment machines, suspension testers, and diagnostic scan tools to measure and evaluate parameters such as camber, caster, toe, and ride height.
1633.3.3	Recommend repairs such as alignment adjustments, replacement of worn components, or suspension system upgrades to improve handling, stability, and ride comfort.
1633.4	Evaluate the proper functioning of the system.
1633.4.1	Inspect all components, including sensors, actuators, and control modules, to ensure they are operating within specified parameters.
1633.4.2	Execute test procedures outlined in service manuals or manufacturer guidelines to verify the functionality of individual components and subsystems.
1633.4.3	Interpret diagnostic trouble codes (DTCs) and system data to pinpoint underlying issues affecting system performance.
1633.5	Summarize the elements of adjust wheel systems.
1633.5.1	Recognize components such as camber bolts, caster shims, adjustable control arms, and adjustable tie rods.
1633.5.2	Explain the importance of proper wheel alignment and its impact on vehicle performance and tire wear.
1633.5.3	Outline procedures for measuring and adjusting camber, caster, and toe angles using alignment equipment and specialized tools.
1633.6	Evaluate the condition of wheels and tires.
1633.6.1	Inspect wheels for signs of damage, such as cracks, bends, or corrosion, and evaluate tire condition, including tread depth, wear patterns, and sidewall damage.

1633.6.2	Employ tools such as tread depth gauges, tire pressure gauges, and wheel balancers to measure tire wear, check inflation pressures, and assess wheel balance.
1633.6.3	Recommend tire rotations, alignments, or replacements to ensure optimal performance, safety, and longevity of wheels and tires.
1633.7	Demonstrate proper repair techniques.
1633.7.1	Illustrate correct repair techniques for various automotive components and systems.
1633.7.2	Visually inspect all steering and suspension components for signs of wear, damage, or corrosion, including tie rods, ball joints, control arms, bushings, shocks, and struts.
1633.7.3	Use diagnostic tools such as pry bars or ball joint separators to check for play or looseness in joints and connections.
1633.7.4	Utilize wheel alignment equipment to measure camber, caster, and toe angles accurately.
1633.7.5	Adjust alignment angles as per manufacturer specifications using adjustment bolts, shims, or adjustable control arms.
1633.7.6	Ensure proper torque settings and secure fasteners after alignment adjustments.
1633.7.7	Replace worn or damaged components such as ball joints, tie rods, control arm bushings, shocks, or struts with quality OEM or aftermarket parts.
1633.7.8	Use proper tools and techniques for component removal and installation to prevent damage to surrounding parts.
1633.7.9	Replace worn or deteriorated bushings and mounts to restore stability and reduce noise and vibration.
1633.7.10	Ensure proper alignment and seating of bushings and mounts during installation to prevent premature wear and failure.
1633.7.11	Lubricate suspension components such as ball joints, tie rod ends, and control arm bushings as per manufacturer recommendations.
1633.7.12	Use appropriate lubricants and ensure thorough application to extend component life and prevent squeaks or binding.
1633.7.13	Use diagnostic tools such as suspension testers or diagnostic scan tools to identify issues with electronic suspension components or sensors.
1633.7.14	Perform road tests to evaluate steering responsiveness, suspension damping, and overall ride quality.
1633.7.15	Use jack stands and wheel chocks to secure the vehicle before working on steering and suspension components.
1633.7.16	Follow proper lifting techniques and use safety equipment such as gloves and eye protection to prevent injuries.
1633.7.17	Always refer to manufacturer service manuals and guidelines for specific repair procedures and torque specifications.

Steering Diagnosis and Repair

1633.8	Diagnose and repair steering system.
1633.8.1	Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
1633.8.2	Identify and interpret suspension and steering system concerns; determine needed action.
1633.8.3	Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.
1633.8.4	Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).
1633.8.5	Diagnose steering column noises, looseness, and binding concerns (including tilt/telescoping mechanisms); determine needed action.
1633.8.6	Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action.

1633.8.7	Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action.
1633.8.8	Inspect steering shaft universal joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; determine needed action.
1633.8.9	Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.
1633.8.10	Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.
1633.8.11	Inspect power steering fluid level and condition.
1633.8.12	Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification.
1633.8.13	Inspect for power steering fluid leakage; determine needed action.
1633.8.14	Remove, inspect, replace, and/or adjust power steering pump drive belt.
1633.8.15	Remove and reinstall power steering pump.
1633.8.16	Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.
1633.8.17	Inspect, remove and/or replace power steering hoses and fittings.
1633.8.18	Inspect, remove and/or replace pitman arm, relay (center-link/intermediate) rod, idler arm, mountings, and steering linkage damper.
1633.8.19	Inspect, replace, and/or adjust tie rod ends (sockets), tie rod sleeves, and clamps.
1633.8.20	Inspect, test, and diagnose electrically- assisted power steering systems (including using a scan tool); determine needed action.
1633.8.21	Identify hybrid vehicle power steering system electrical circuits and safety precautions.
1633.8.22	Test power steering system pressure; determine needed action.

Steering and Suspension Inspection and Repair

1633.9	Suspension Systems Diagnosis and Repair.
1633.9.1	Inspect for power steering fluid leakage; determine necessary action.
1633.9.2	Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.
1633.9.3	Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.
1633.9.4	Inspect, remove, and install upper and lower control arms, bushings, shafts, and rebound bumpers.
1633.9.5	Inspect, remove, and install strut rods and bushings.
1633.9.6	Inspect, remove, and install upper and/or lower ball joints (with or without wear indicators).
1633.9.7	Inspect, remove, and install steering knuckle assemblies.
1633.9.8	Inspect, remove, and install short and long arm suspension system coil springs and spring insulators.
1633.9.9	Inspect, remove, and install torsion bars and mounts.
1633.9.10	Inspect, remove, and install stabilizer bar (sway bar) bushings, brackets, and links.
1633.9.11	Inspect, remove, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
1633.9.12	Inspect rear suspension system leaf spring(s), bushings, center pins/bolts, and mounts.
1633.9.13	Inspect, remove, and install track bar, strut rods/radius arms, and related mounts and bushings.
1633.10	Understand related suspension and steering services.
1633.10.1	Remove, inspect, and service or replace front and rear wheel bearings.
1633.10.2	Identify and test tire pressure monitoring system (indirect and direct) for operation; calibrate system; verify operation of instrument panel lamps.
1633.11	Perform wheel alignment diagnosis, adjustment, and repair.
1633.11.1	Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.

1633.11.2	Prepare vehicle for wheel alignment on the alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber; and toe as required; center steering wheel.
1633.11.3	Check toe-out-on-turns (turning radius); determine necessary action.
1633.11.4	Check SAI (steering axis inclination) and included angle; determine necessary action.
1633.11.5	Check rear wheel thrust angle; determine necessary action.
1633.11.6	Check for front wheel setback; determine necessary action.
1633.11.7	Check front and/or rear cradle (subframe) alignment; determine necessary action.
1633.11.8	Reset steering angle sensor.
1633.12	Perform wheel and tire diagnosis and repair.
1633.12.1	Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.
1633.12.2	Measure wheel, tire, axle flange, and hub runout; determine necessary action.
1633.12.3	Diagnose tire pull problems; determine necessary action.
1633.12.4	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.

Brakes

1633.13	Understand braking systems.
1633.13.1	Summarize the elements of hydraulic systems.
1633.13.2	Summarize the elements of drum brake systems.
1633.13.3	Summarize the elements of disk brake systems.
1633.13.4	Summarize the elements of power assist units.
1633.13.5	Summarize the elements of anti-lock brake systems.
1633.13.6	Examine and analyze systems.
1633.13.7	Evaluate the proper functioning of the system.
1633.13.8	Demonstrate proper repair techniques.
1633.14	Diagnose braking systems.
1633.14.1	Identify and interpret brake system concerns; determine necessary action.
1633.14.2	Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.
1633.14.3	Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).
1633.14.4	Install wheel and torque lug nuts.
1633.15	Diagnose and repair hydraulic systems.
1633.15.1	Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).
1633.15.2	Measure brake pedal height, travel, and free play (as applicable); determine necessary action.
1633.15.3	Check master cylinder for internal/external leaks and proper operation; determine necessary action.
1633.15.4	Remove, bench bleed, and reinstall master cylinder.
1633.15.5	Diagnose poor stopping, pulling, or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.
1633.15.6	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear; tighten loose fittings and supports; determine necessary action.
1633.15.7	Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).
1633.15.8	Replace brake lines, hoses, fittings, and supports.
1633.15.9	Select, handle, store, and fill brake fluids to proper level.
1633.15.10	Inspect, test, and/or replace components of brake warning light system.
1633.15.11	Bleed and/or flush brake system.

1633.15.12	Test brake fluid for contamination.
1633.15.13	Identify components of the brake warning light system.
1633.16	Diagnose and repair disc brakes.
1633.16.1	Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.
1633.16.2	Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.
1633.16.3	Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.
1633.16.4	Remove, inspect, and replace pads and retaining hardware; determine necessary action.
1633.16.5	Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.
1633.16.6	Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
1633.16.7	Remove and reinstall rotor.
1633.16.8	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.
1633.16.9	Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.
1633.16.10	Retract and re-adjust caliper piston on an integral parking brake system.
1633.16.11	Check brake pad wear indicator; determine necessary action.
1633.16.12	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.
1633.17	Diagnose and repair power assist units.
1633.17.1	Check brake pedal travel with, and without, engine running to verify proper power booster operation.
1633.17.2	Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
1633.17.3	Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action.
1633.17.4	Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.
1633.17.5	Measure and adjust master cylinder pushrod length.
1633.18	Diagnose and repair miscellaneous issues.
1633.18.1	Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.
1633.18.2	Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
1633.18.3	Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust, or replace as needed.
1633.18.4	Check parking brake operation and parking brake indicator light system operation; determine necessary action.
1633.18.5	Check operation of brake stop light system.
1633.18.6	Replace wheel bearing and race.
1633.18.7	Inspect and replace wheel studs.
1633.18.8	Remove and reinstall sealed wheel bearing assembly.
1633.19	Diagnose and repair electronic brake, traction, and stability control systems.
1633.19.1	Identify and inspect electronic brake control system components; determine necessary action.
1633.19.2	Identify traction control/vehicle stability control system components.
1633.19.3	Describe the operation of a regenerative braking system.

The Skill Sets in Automotive Technology AST-3 will introduce students to Engines-General Engines: Engine Diagnosis; Removal and Re-installation (R&R); Engines-Diagnosis and Repair of Cooling and Lubrication Systems; and Engine Performance-General Engine Diagnosis. This course is recommended as an Elective in Automotive Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Engines-General Engines: Engine Diagnosis; Removal and Re-installation (R & R)

1635.1	Diagnose and repair general engine issues.
1635.1.1	Identify and interpret engine performance concerns; determine needed action.
1635.1.2	Research vehicle service information including vehicle service history, service precautions, and technical service bulletins.
1635.1.3	Diagnose abnormal engine noises or vibration concerns; determine needed action.
1635.1.4	Diagnose the cause of excessive oil consumption, coolant consumption, unusual exhaust color, odor, and sound; determine needed action.
1635.1.5	Perform engine absolute manifold pressure tests (vacuum/boost); determine needed action.
1635.1.6	Perform cylinder power balance test; determine needed action.
1635.1.7	Perform cylinder cranking and running compression tests; determine needed action.
1635.1.8	Perform cylinder leakage test; determine needed action.
1635.1.9	Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine needed action.
1635.1.10	Verify engine operating temperature; determine needed action.
1635.1.11	Verify correct camshaft timing including engines equipped with variable valve timing systems (VVT).
1635.1.12	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. ☐
1635.1.13	Demonstrate knowledge of using a 4 or 5 gas analyzer, interpreting readings, and determining necessary action.
1635.1.14	Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.
1635.2	Diagnosis and repair fuel, air induction and exhaust systems.
1635.2.1	Diagnose (troubleshoot) hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine needed action.
1635.2.2	Check fuel for contaminants; determine needed action.
1635.2.3	Inspect and test fuel pump(s) and pump control system for pressure, regulation, and volume; perform needed action.
1635.2.4	Replace fuel filter(s) where applicable.
1635.2.5	Inspect, service, or replace air filters, filter housings, and intake duct work.
1635.2.6	Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
1635.2.7	Inspect, test, and/or replace fuel injectors.
1635.2.8	Verify idle control operation.
1635.2.9	Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform needed action.

1635.2.10	Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine needed action.
1635.2.11	Perform exhaust system back-pressure test; determine needed action.
1635.2.12	Check and refill diesel exhaust fluid (DEF).
1635.2.13	Test the operation of turbocharger/supercharger systems; determine needed action.
1635.2.14	Check for module communication (including CAN/BUS systems) errors using a scan tool.

Computerized Controls

1635.3	Diagnose and repair computerized controls.
1635.3.1	Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable.
1635.3.2	Access and use service information to perform step-by-step (troubleshooting) diagnosis.
1635.3.3	Perform active tests of actuators using a scan tool; determine needed action.
1635.3.4	Describe the use of OBD monitors for repair verification.
1635.3.5	Diagnose the causes of emissions or drive-ability concerns with stored or active diagnostic trouble codes (DTC); obtain, graph, and interpret scan tool data.
1635.3.6	Diagnose emissions or drive-ability concerns without stored or active diagnostic trouble codes; determine needed action.
1635.3.7	Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multi-meter (GMM)/digital storage oscilloscope (DSO); perform needed action.
1635.3.8	Diagnose drivability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, HVAC, automatic transmissions, non-OEM installed accessories, or similar systems); determine needed action.
1635.3.9	Check for module communication (including CAN/BUS systems) errors using a scan tool.

Ignition Systems

1635.4	Diagnose and repair ignition systems.
1635.4.1	Diagnose (troubleshoot) ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns; determine needed action.
1635.4.2	Inspect and test crankshaft and camshaft position sensor(s); determine needed action.
1635.4.3	Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram/initialize as needed.
1635.4.4	Remove and replace spark plugs; inspect secondary ignition components for wear and damage.
1635.4.5	Inspect and test ignition primary and secondary circuit wiring and solid-state components; test ignition coil(s); perform necessary action.

Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

1635.5	Diagnose and repair auxiliary systems.
1635.5.1	Diagnose (troubleshoot) hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine needed action.
1635.5.2	Check fuel for contaminants; determine needed action.
1635.5.3	Inspect and test fuel pump(s) and pump control system for pressure, regulation, and volume; perform needed action.

1635.5.4	Replace fuel filter(s) where applicable.
1635.5.5	Inspect, service, or replace air filters, filter housings, and intake duct work.
1635.5.6	Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
1635.5.7	Inspect, test, and/or replace fuel injectors.
1635.5.8	Verify idle control operation.
1635.5.9	Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform needed action.
1635.5.10	Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine needed action.
1635.5.11	Perform exhaust system back-pressure test; determine needed action.
1635.5.12	Check and refill diesel exhaust fluid (DEF).
1635.5.13	Test the operation of turbocharger/supercharger systems; determine needed action.

Emissions Control Systems Diagnosis and Repair

1635.6	Diagnose and repair emission control systems.
1635.6.1	Diagnose oil leaks, emissions, and drive-ability concerns caused by the positive crankcase ventilation (PCV) system; determine needed action.
1635.6.2	Inspect, test, service, and/or replace positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform needed action.
1635.6.3	Diagnose emissions and drive-ability concerns caused by the exhaust gas recirculation (EGR) system; inspect, test, service and/or replace electrical/electronic sensors, controls, wiring, tubing, exhaust passages, vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; determine needed action.
1635.6.4	Diagnose emissions and drive-ability concerns caused by the secondary air injection system; inspect, test, repair, and/or replace electrical/electronically operated components and circuits of secondary air injection systems; determine needed action.
1635.6.5	Diagnose emissions and drive-ability concerns caused by the evaporative emissions control (EVAP) system; determine needed action.
1635.6.6	Diagnose emission and drive-ability concerns caused by catalytic converter system; determine needed action
1635.6.7	Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine needed action.
1635.6.8	Inspect and test mechanical components of secondary air injection systems; perform necessary action.
1635.6.9	Adjust valves on engines with mechanical or hydraulic lifters; as applicable. ☐
1635.6.10	Remove and replace timing belt; verify correct camshaft timing.
1635.6.11	Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.
1635.6.12	Inspect engine oil and/or filter for condition and determine necessary action.
1635.6.13	Identify hybrid vehicle internal combustion engine service precautions.

Automotive Technology MLR-4 completes the Program of Study with skills sets in the areas Automatic Transmission and Transaxle-Diagnosis Maintenance, and Adjustment; Manual Drive Train and Axles-Diagnosis, Maintenance, and Adjustment; and Heating and Air Conditioning-Diagnosis, Maintenance, and Adjustment. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real-world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Automatic Transmission and Transaxle

1637.1	Check fluids on transmission/transaxle.
1637.1.1	Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.
1637.1.2	Check fluid level in a transmission or a transaxle equipped with a dipstick.
1637.1.3	Check fluid level in a transmission or a transaxle not equipped with a dipstick.
1637.1.4	Check transmission fluid condition; check for leaks.
1637.2	Perform in-vehicle transmission/transaxle inspections and service.
1637.2.1	Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch.
1637.2.2	Inspect for leakage at external seals, gaskets, and bushings.
1637.2.3	Inspect, replace, and align power train mounts.
1637.2.4	Drain and replace fluid and filter(s).
1637.3	Describe and identify operational characteristics of transmission/transaxle for CVT and hybrids.
1637.3.1	Diagnose problems such as belt slipping, fluid leaks, or abnormal noise during acceleration, by conducting thorough inspections and utilizing diagnostic tools like scan tools and transmission pressure gauges.
1637.3.2	Utilize diagnostic tools such as the battery pack, electric motors, and power control modules, and identify any issues affecting overall drivetrain operation, such as battery degradation or motor malfunctions.

Manual Drive Train and Axles

1637.4	Check fluid condition and service transmissions and transaxles.
1637.4.1	Check fluid condition; check for leaks.
1637.4.2	Drain and fill manual transmission/transaxle and final drive unit.
1637.5	Perform clutch master cylinder inspections and service.
1637.5.1	Check and adjust clutch master cylinder fluid level.
1637.5.2	Check for system leaks.
1637.6	Identify, describe, inspect, and service manual transmission and transaxle issues.
1637.6.1	Describe the operational characteristics of an electronically controlled manual transmission/transaxle.

1637.6.2	Use visual inspection to detect leaks and worn components, and diagnostic tools to pinpoint issues like clutch slippage or gear synchronization problems.
1637.6.3	Perform clutch adjustments or replacements, inspect, and replace worn synchro rings or bearings, and service transmission fluid according to manufacturer specifications.
1637.7	Inspect and service drive shaft, half shafts, universal, and constant-velocity (CV) Joints.
1637.7.1	Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals.
1637.7.2	Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.
1637.8	Drive axle diagnosis and repair.
1637.8.1	Clean and inspect differential housing; check for leaks; inspect housing vent.
1637.8.2	Check and adjust differential housing fluid level.
1637.8.3	Drain and refill differential housing.
1637.8.4	Inspect and replace drive axle wheel studs.
1637.9	Inspect and service four-wheel drive and all-wheel drive systems.
1637.9.1	Inspect front-wheel bearings and locking hubs.
1637.9.2	Check for leaks at drive assembly seals; check vents; check lube level.

Heating and Air Conditioning

1637.10	Demonstrate general HVAC skills.
1637.10.1	Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.
1637.10.2	Identify heating, ventilation, and air conditioning (HVAC) components and configuration.
1637.11	Inspect and service refrigeration system components.
1637.11.1	Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action.
1637.11.2	Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions.
1637.11.3	Inspect A/C condenser for airflow restrictions; determine necessary action.
1637.12	Inspect and service heating, ventilation, and engine cooling systems.
1637.12.1	Inspect engine cooling and heater systems hoses and pipes; determine necessary action.
1637.12.2	Visually inspect hoses and pipes for cracks or bulges and use pressure testing equipment to detect leaks.
1637.12.3	Replace worn hoses, repair corroded pipes, and conduct post-repair pressure tests to confirm system integrity.
1637.13	Inspect and service operating systems and related controls.
1637.13.1	Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; perform necessary action.
1637.13.1	Identify the source of A/C system odors.

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 4700, 7030, 7031, 7035, 7037, 7038, 7121, 7123, 7131, 7132, 7134, 7212, 7954

This course introduces the students to the knowledge and technical skills in order to prepare for CCNA certification. In CCNA1, students will explore scaling Networks, LAN Redundancy Link Aggregation, Wireless LANs and Adjusting and Troubleshoot Single-Area OSPF. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. This course is recommended as an Elective in the CISCO Networking Academies Program of Study. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to occupations in the IT industry. Students are encouraged to become active members of the student organization, SkillsUSA. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

PC Principles

1654.1	Identify different types and standards of processors.
1654.1.1	Identify physical and equipment safety and maintenance principles and practices.
1654.1.2	Demonstrate understanding of storage methods.
1654.1.3	Exhibit understanding of memory.
1654.1.4	Demonstrate uses of eSATA, Bluetooth®, and USB.
1654.1.5	Identify different types and standards of processors.
1654.1.6	Develop an understanding of various client operating systems.

Network Connections

1654.2	Identifying network connections and communication.
1654.2.1	Demonstrate understanding of Network Interface Cards (NICs).
1654.2.2	Identify different physical and logical characteristics of network connections.
1654.2.3	Demonstrate use of remote access.
1654.2.4	Exhibit understanding of wired and wireless communications and standards.

Physical Connection Types

1654.3	Identify physical connection types.
1654.3.1	Identify cable components and uses, including twisted pair and fiber.
1654.3.2	Demonstrate understanding of signal characteristics and transmission among various media types.

Network Standards and Devices

1654.4	Demonstrate understanding of networking and devices.
1654.4.1	Demonstrate understanding of OSI model layers.
1654.4.2	Demonstrate familiarity with TCP/IP model.
1654.4.3	Identify IEEE, EIA/TIA standards and common Port numbers.
1654.4.4	Distinguish various types and uses of wired network devices.
1654.4.5	Distinguish various types and uses of wireless network devices.

Network Troubleshooting

1654.5	Perform appropriate troubleshooting methods.
1654.5.1	Utilize ping, ipconfig, tracert, and netstat commands.
1654.5.2	Maintain and troubleshoot cabling.
1654.5.3	Perform local and remote loopback.
1654.5.4	Identify various troubleshooting methodologies.
1654.5.5	Utilize, perform, and analyze a packet capture.

Routing and Switching

1654.6	Master CISCO routing, WANs, routers, switches, and protocols.
1654.6.1	Explain the difference between static, dynamic, default, and gateway routes.
1654.6.2	Demonstrate an understanding of WAN connection types.
1654.6.3	Recognize and implement basic router operations and configurations.
1654.6.4	Demonstrate understanding of switch operations and configurations.
1654.6.5	Compare and contrast routed vs. routing protocols.
1654.6.5	Differentiate between a collision domain and a broadcast domain.

Network Terminology

1654.7	Learn terminology related to networking.
1654.7.1	Demonstrate familiarity with various protocols and architecture terminology.
1654.7.2	Demonstrate familiarity with DHCP and DNS.
1654.7.3	Identify various network operating systems.
1654.7.4	Identify various network types.

Network Architecture

1654.8	Exhibit understanding of various LAN, MAN, PAN, WLAN, and WAN topologies.
1654.8.1	Exhibit understanding of physical and logical networking topologies.
1654.8.2	Exhibit understanding of various LAN, MAN, PAN, WLAN, and WAN topologies.

Network Addressing

1654.9	Utilize IP addressing and subnet.
1654.9.1	Exhibit knowledge of IP network addressing.
1654.9.2	Differentiate between classful and classless IP addressing.
1654.9.3	Demonstrate understanding of Media Access Control (MAC) addressing.
1654.9.4	Convert binary, hexadecimal, and decimal numbering systems.
1654.9.5	Create subnets from a network address.

Security

1654.10	Understand IP addressing, MAC addressing, and numbering systems.
1654.10.1	Identify and troubleshoot basic organizational and acceptable use policies.

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 4700, 7030, 7031, 7035, 7037, 7038, 7121, 7123, 7131, 7132, 7134, 7212, 7954

1654.10.2	Implement and maintain device security procedures.
1654.10.3	Explain the defense in-depth approach to security.
1654.10.4	Identify and troubleshoot network security attacks and breaches.
1654.10.5	Identify and troubleshoot viruses, worms, and other forms of malware.
1654.10.6	Install and maintain appropriate firewalls, including NAT.
1654.10.7	Explain general cryptography concepts.

Network Planning and Design

1654.11	Demonstrate network analysis, design, installation, and troubleshooting.
1654.11.1	Exhibit understanding of analysis and planning concepts.
1654.11.2	Compare and contrast principles of logical and physical design.
1654.11.3	Identify various forms of power protection, backups, and UPS.
1654.11.4	Explain the appropriate use and benefits of thin clients.
1654.11.5	Install, maintain, and troubleshoot physical and wireless networks according to design specifications.
1654.11.6	Describe various access methods (e.g., ISP, DSL, broadband/cable, satellite, wireless, mobile).
1654.11.7	Explain the principles of virtualization.

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 4700, 7030, 7031, 7035, 7037, 7038, 7121, 7123, 7131, 7132, 7134, 7212, 7954

This course introduces the students to the knowledge and technical skills in order to prepare for CCNA certification. In CCNA2, students will explore Multi-area OSPF, EIGRP, EIGRP Advanced Configurations and IOS Images and Licensing. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. This course is recommended as an Elective in the CISCO Networking Academies Program of Study. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to occupations in the IT industry. Students are encouraged to become active members of the student organization, SkillsUSA. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

PC Principles

1658.1	Identify different types and standards of processors.
1658.1.1	Compile a summary of CPU, GPU, and ASIC processors, detailing their architectures and applications.
1658.1.2	Analyze standards like x86, ARM, and RISC-V for their impact on compatibility and performance.
1658.1.3	Investigate emerging processor tech like quantum and neuromorphic computing and their potential implications for CISCO systems.

Network Connections

1658.2	Identifying network connections and communication.
1658.2.1	Identify different physical and logical characteristics of network connections.
1658.2.2	Demonstrate use of remote access (e.g., Windows® terminal services, terminal emulation software, VPN, telephone connections, SSH).
1658.2.3	Exhibit understanding of wired and wireless communications and standards.

Physical Connection Types

1658.3	Identify physical connection types.
1658.3.1	Identify cable components and uses, including twisted pair and fiber.
1658.3.2	Demonstrate understanding of signal characteristics and transmission among various media types.

Network Standards and Devices

1658.4	Demonstrate understanding of networking and devices.
1658.4.1	Demonstrate understanding of OSI model layers.
1658.4.2	Demonstrate familiarity with TCP/IP model.
1658.4.3	Identify IEEE, EIA/TIA standards and common Port numbers.
1658.4.4	Distinguish various types and uses of wired network devices.
1658.4.5	Distinguish various types and uses of wireless network devices.

Network Troubleshooting

1658.5	Perform appropriate troubleshooting methods.
1658.5.1	Utilize ping, ipconfig, tracert, and netstat commands.
1658.5.2	Maintain and troubleshoot cabling.
1658.5.3	Perform local and remote loopback.
1658.5.4	Identify various troubleshooting methodologies (e.g., top-down, bottom-up, divide and conquer).

Routing and Switching

1658.6	Master CISCO routing, WANs, routers, switches, and protocols.
1658.6.1	Explain the difference between static, dynamic, default, and gateway routes.
1658.6.2	Demonstrate an understanding of WAN connection types.
1658.6.3	Recognize and implement basic router operations and configurations.
1658.6.4	Demonstrate understanding of switch operations and configurations (e.g., VLAN, interVLAN).
1658.6.5	Compare and contrast routed vs. routing protocols.
1658.6.6	Differentiate between a collision domain and a broadcast domain.

Networking Terminology

1658.7	Learn terminology related to networking.
1658.7.1	Demonstrate familiarity with various protocols and architecture terminology.
1658.7.2	Demonstrate familiarity with DHCP and DNS.
1658.7.3	Identify various network operating systems (e.g., Windows®, Linux®).
1658.7.4	Identify various network types.

Network Architecture

1658.8	Exhibit understanding of various LAN, MAN, PAN, WLAN, and WAN topologies.
1658.8.1	Demonstrate understanding of LAN, MAN, PAN, WLAN, and WAN topologies in CISCO networks.
1658.8.2	Optimize connectivity in CISCO setups by evaluating network configurations.
1658.8.3	Explore SDN and NFV's roles in enhancing efficiency across CISCO infrastructures.

Network Addressing

1658.9	Utilize IP addressing and subnet.
1658.9.1	Exhibit knowledge of IP network addressing (e.g., IPv4, IPv6).
1658.9.2	Differentiate between classful and classless IP addressing.
1658.9.3	Demonstrate understanding of Media Access Control (MAC) addressing.
1658.9.4	Convert binary, hexadecimal, and decimal numbering systems.
1658.9.5	Create subnets from a network address.

Security

1658.10	Understand IP addressing, MAC addressing, and numbering systems.
1658.10.1	Identify and troubleshoot basic organizational and acceptable use policies.
1658.10.2	Implement and maintain device security procedures.
1658.10.3	Explain the defense in-depth approach to security (e.g., DMZ, Bastion Host).
1658.10.4	Identify and troubleshoot network security attacks and breaches.

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 4700, 7030, 7031, 7035, 7037, 7038, 7121, 7123, 7131, 7132, 7134, 7212, 7954

1658.10.5	Identify and troubleshoot viruses, worms, and other forms of malware.
1658.10.6	Install and maintain appropriate firewalls, including NAT.
1658.10.7	Explain general cryptography concepts.

Networking Planning and Design

1658.11	Demonstrate network analysis, design, installation, and troubleshooting.
1658.11.1	Exhibit understanding of analysis and planning concepts.
1658.11.2	Compare and contrast principles of logical and physical design.
1658.11.3	Identify various forms of power protection, backups, and UPS.
1658.11.4	Install, maintain, and troubleshoot physical and wireless networks according to design specifications.
1658.11.5	Describe various access methods (e.g., ISP, DSL, broadband/cable, satellite, wireless, mobile).
1658.11.6	Explain the principles of virtualization.

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 4700, 7030, 7031, 7035, 7037, 7038, 7121, 7123, 7131, 7132, 7134, 7212, 7954

This course introduces the students to the knowledge and technical skills in order to prepare for CCNA certification. In CCNA3, students will explore Hierarchical Network Design, connect to the WAN, explore Point-to-Point Connections, configure Frame Relay and configure/troubleshoot Network Address Translation for IPv4. This course is recommended as an Elective in the CISCO Networking Academies Program of Study. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. Students will utilize problem solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to occupations in the IT industry. Students are encouraged to become active members of the student organization, SkillsUSA. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Network Connections

1659.1	Identifying network connections and communication.
1659.1.1	Demonstrate use of remote access (e.g., Windows® terminal services, terminal emulation software, VPN, telephone connections, SSH).

Physical Connection Types

1659.2	Identify physical connection types.
1659.2.2	Identify cable components and uses, including twisted pair and fiber.

Network Standards and Devices

1659.3	Demonstrate understanding of networking and devices.
1659.3.1	Demonstrate understanding of OSI model layers.
1659.3.2	Distinguish various types and uses of wired network devices.

Network Troubleshooting

1659.4	Perform appropriate troubleshooting methods.
1659.4.1	Utilize ping, ipconfig, tracert, and netstat commands.
1659.4.2	Maintain and troubleshoot cabling.
1659.4.3	Identify various troubleshooting methodologies (e.g., top-down, bottom-up, divide and conquer).
1659.4.4	Utilize, perform, and analyze a packet capture.

Routing and Switching

1659.5	Master CISCO routing, WANs, routers, switches, and protocols.
1659.5.1	Explain the difference between static, dynamic, default, and gateway routes.
1659.5.2	Demonstrate an understanding of WAN connection types.
1659.5.3	Recognize and implement basic router operations and configurations.
1659.5.4	Demonstrate understanding of switch operations and configurations (e.g., VLAN, interVLAN).
1659.5.5	Compare and contrast routed vs. routing protocols
1659.5.6	Differentiate between a collision domain and a broadcast domain.

Network Terminology

1659.6	Learn terminology related to networking.
1659.6.1	Demonstrate familiarity with various protocols and architecture terminology.
1659.6.2	Demonstrate familiarity with DHCP and DNS.
1659.6.3	Identify various network types.

Network Architecture

1659.7	Exhibit understanding of various LAN, MAN, PAN, WLAN, and WAN topologies.
1659.7.1	Exhibit understanding of various LAN, MAN, PAN, WLAN, and WAN topologies.

Network Addressing

1659.8	Utilize IP addressing and subnet.
1659.8.1	Exhibit knowledge of IP network addressing (e.g., IPv4, IPv6).
1659.8.2	Differentiate between classful and classless IP addressing.
1659.8.3	Demonstrate understanding of Media Access Control (MAC) addressing.
1659.8.4	Convert binary, hexadecimal, and decimal numbering systems.
1659.8.5	Create subnets from a network address.

Security

1659.9	Understand IP addressing, MAC addressing, and numbering systems.
1659.9.1	Identify and troubleshoot basic organizational and acceptable use policies.
1659.9.2	Implement and maintain device security procedures.
1659.9.3	Explain the defense in-depth approach to security (e.g., DMZ, Bastion Host).
1659.9.4	Identify and troubleshoot network security attacks and breaches.
1659.9.5	Identify and troubleshoot viruses, worms, and other forms of malware.
1659.9.6	Install and maintain appropriate firewalls, including NAT.
1659.9.7	Explain general cryptography concepts.

Networking Planning and Design

1659.10	Demonstrate network analysis, design, installation, and troubleshooting.
1659.10.1	Exhibit understanding of analysis and planning concepts.
1659.10.2	Compare and contrast principles of logical and physical design.
1659.10.3	Identify various forms of power protection, backups, and UPS.
1659.10.4	Explain the appropriate use and benefits of thin clients.
1659.10.5	Install, maintain, and troubleshoot physical and wireless networks according to design specifications.
1659.10.6	Describe various access methods (e.g., ISP, DSL, broadband/cable, satellite, wireless, mobile).
1659.10.7	Explain the principles of virtualization.

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 4700, 7030, 7031, 7035, 7037, 7038, 7121, 7123, 7131, 7132, 7134, 7212, 7954

This course introduces the students to the knowledge and technical skills in order to prepare for CCNA certification. In CCNA4, students will explore Broadband Solutions, Secure Site-to-Site Connectivity, Monitor the Network and Troubleshoot the Network. This course is recommended as an Elective in the CISCO Networking Academies Program of Study. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to occupations in the IT industry. Students are encouraged to become active members of the student organization, SkillsUSA. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Network Connections

1660.1	Identify network connections and communication.
1660.1.1	Demonstrate use of remote access (e.g., Windows® terminal services, terminal emulation software, VPN, telephone connections, SSH).

Physical Connection Types

1660.2	Identify physical connection types.
1660.2.1	Identify cable components and uses, including twisted pair and fiber.

Network Standards and Devices

1660.3	Demonstrate understanding of networking and devices.
1660.3.1	Demonstrate understanding of OSI model layers.
1660.3.2	Distinguish various types and uses of wired network devices.

Network Troubleshooting

1660.4	Perform appropriate troubleshooting methods.
1660.4.1	Utilize ping, ipconfig, tracert, and netstat commands.
1660.4.2	Identify various troubleshooting methodologies (e.g., top-down, bottom-up, divide and conquer).

Routing and Switching

1660.5	Master CISCO routing, WANs, routers, switches, and protocols.
1660.5.1	Explain the difference between static, dynamic, default, and gateway routes.
1660.5.2	Demonstrate an understanding of WAN connection types.
1660.5.3	Recognize and implement basic router operations and configurations.
1660.5.4	Demonstrate understanding of switch operations and configurations (e.g., VLAN, interVLAN).
1660.5.5	Compare and contrast routed vs. routing protocols.
1660.5.6	Differentiate between a collision domain and a broadcast domain.

Network Terminology

1660.6	Learn terminology related to networking.
1660.6.1	Demonstrate familiarity with various protocols and architecture terminology.
1660.6.2	Demonstrate familiarity with DHCP and DNS.
1660.6.3	Identify various network types.

Network Architecture

1660.7	Exhibit understanding of various LAN, MAN, PAN, WLAN, and WAN topologies.
1660.7.1	Exhibit understanding of LAN, MAN, PAN, WLAN, and WAN topologies in CISCO networks.
1660.7.2	Analyze and compare network configurations for CISCO infrastructure.
1660.7.3	Optimize connectivity in CISCO setups using diverse network topologies.

Network Addressing

1660.8.	Utilize IP addressing and subnet.
1660.8.1	Exhibit knowledge of IP network addressing (e.g., IPv4, IPv6).
1660.8.2	Demonstrate understanding of Media Access Control (MAC) addressing.
1660.8.3	Convert binary, hexadecimal, and decimal numbering systems.
1660.8.4	Create subnets from a network address.

Security

1660.9	Understand IP addressing, MAC addressing and numbering systems.
1660.9.1	Identify and troubleshoot basic organizational and acceptable use policies.
1660.9.2	Implement and maintain device security procedures.
1660.9.3	Explain the defense in-depth approach to security (e.g., DMZ, Bastion Host).
1660.9.4	Identify and troubleshoot network security attacks and breaches.
1660.9.5	Identify and troubleshoot viruses, worms, and other forms of malware.
1660.9.6	Install and maintain appropriate firewalls, including NAT.

Network Planning and Design

1660.10	Demonstrate network analysis, design, installation, and troubleshooting.
1660.10.1	Exhibit understanding of analysis and planning concepts.
1660.10.2	Compare and contrast principles of logical and physical design.
1660.10.3	Identify various forms of power protection, backups, and UPS.
1660.10.4	Explain the appropriate use and benefits of thin clients.
1660.10.5	Install, maintain, and troubleshoot physical and wireless networks according to design specifications.
1660.10.6	Describe various access methods (e.g., ISP, DSL, broadband/cable, satellite, wireless, mobile).
1660.10.7	Explain the principles of virtualization.

This course will introduce students to basic blueprint reading fundamentals. Areas of study include blueprints and symbols. Students will demonstrate knowledge and technical expertise in interpreting blueprints.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Blueprints

1661.1	Blueprints
1661.1.1	The terms, components, and symbols applicable to blueprint reading.
1661.1.2	Examine the function and use of various types of drawings.
1661.1.3	Examine the alphabet of lines.
1661.1.4	Differentiate between notes and specifications.
1661.1.5	Examine information from title blocks, revision blocks, release blocks, and tolerance blocks.
1661.1.6	Write a bill of materials/parts list for a given drawing.

Symbols

1661.2	Symbols
1661.2.1	Blueprint symbols.
1661.2.2	Recognize drawing symbols.
1661.2.3	Recognize common blueprint abbreviation.
1661.2.4	Prepare working copies of original drawings.

This course covers PC hardware and peripherals, mobile device hardware, networking and troubleshooting hardware and network connectivity issues. Content Skill Sets are based on testing objectives for the CompTIA A+ 220-901 certification. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1664.1	Implement appropriate safety procedures.
1664.1.1	Identify and implement proper personal and equipment safety procedures, including ESD events.
1664.1.2	Identify proper disposal and recycling procedures (PC components).
1664.1.3	Identify industry standards and federal regulations.
1664.1.4	Recognize proper body mechanics and ergonomic principles.

Installing Configuring and Upgrading

1664.2	Understand the processes of processors.
1664.2.1	Install, configure, optimize, and upgrade system board, power supplies, and cooling systems.
1664.2.2	Differentiate characteristics of various processor and memory types.
1664.2.3	Identify and configure CMOS setup and BIOS.
1664.2.4	Identify functionality, install, and configure storage device options.
1664.2.5	Identify and describe characteristics of various peripherals and ports used.
1664.2.6	Display knowledge of different operating systems and licensing requirements.

Diagnosing and Troubleshooting

1664.3	Assess and correct technical issues.
1664.3.1	Diagnose and identify processor and memory faults.
1664.3.2	Demonstrate ability to isolate and resolve power supply and battery failures on the system board.
1664.3.3	Display ability to identify and resolve storage device issues.
1664.3.4	Identify uses of troubleshooting utilities.
1664.3.5	Troubleshoot and resolve expansion card issues (drivers).
1664.3.6	Demonstrate ability to set up and troubleshoot external display.
1664.3.7	Identify tools, diagnostic procedures, and troubleshooting techniques for operating system recovery and upgrade.
1664.3.8	Demonstrate ability to isolate and resolve peripheral connectivity failures.
1664.3.9	Utilize command line techniques for diagnosing and troubleshooting.
1664.3.10	Demonstrate the proper use of multimeters and other test equipment.
1664.3.11	Identify basic electrical, transmission, and storage units of measurement.

Preventive Maintenance

1664.4	Ensure equipment protection, data integrity, and system efficiency.
1664.4.1	Differentiate between an electrical line conditioner, uninterruptible power supply, (UPS), and surge protector.
1664.4.2	Select and perform proper file backup procedures.
1664.4.3	Identify the use of system monitoring and various system utilities.
1664.4.4	Install and maintain current software patches, service packs, and upgrades.
1664.4.5	Maintain current antivirus, spyware, and/or malware software.
1664.4.6	Use appropriate methods to clean and maintain Physical computer components:

System Boards, Storage, Processors, and Memory

1664.5	Understanding hardware essentials.
1664.5.1	Identify processor compatibility, architecture, and upgrade issues.
1664.5.2	Identify and differentiate memory characteristics and upgrade issues.
1664.5.3	Identify and differentiate system board characteristics and upgrade issues.
1664.5.4	Install and troubleshoot RAID 0, 1, 5.
1664.5.5	Differentiate the characteristics and components of mobile devices.

Input-Output (I/O) Devices

1664.6	Identifying I/O basics.
1664.6.1	Identify uses of various input devices.
1664.6.2	Identify various I/O connectivity methods.

Printing

1664.7	Learn printing issues.
1664.7.1	Identify and differentiate various printers and printer processes.
1664.7.2	Identify various printer connectivity methodologies.
1664.7.3	Install and troubleshoot printers.
1664.7.4	Become familiar with diverse types of printers and consumables such as laser, inkjet, 3D, and thermal printers.
1664.7.5	Explore printer parts such as print head, tractor feed, impact paper, ribbon, and paper feeds.

Basic Networking

1664.8	Develop basic networking skills.
1664.8.1	Install, configure, and troubleshoot Network Interface Cards (NICs).
1664.8.2	Install, configure, and troubleshoot wired and wireless network connections.
1664.8.3	Identify various network topologies.
1664.8.4	Identify various network access methods.
1664.8.5	Differentiate between a client/server and a peer-to-peer network.
1664.8.7	Convert units between binary, decimal, and hexadecimal.
1664.8.6	Identify the seven layers of the OSI model.
1664.8.7	Explain the properties and characteristics of the TCP/IP model.
1664.8.8	Install and troubleshoot email.

Security

1664.9	Understand physical and digital security.
1664.9.1	Identify and implement physical security.
1664.9.2	Identify and implement digital security.

Customer Support and Ethics

1664.10	Develop an understanding of customer support and ethics.
1664.10.1	Practice professional behavior, including communication and customer service skills.
1661.10.2	Practice ethical use of software and hardware.
1664.10.3	Demonstrate an awareness of emerging technologies.

Mobile Devices

1664.11	Install and configure laptop hardware and components.
1664.11.1	Replace hardware and components of a laptop to include battery, keyboard/keys, RAM, HDD, SSD, and wireless cards.
1664.11.2	Ensure physical privacy and security components such as biometrics and near-field scanner features.
1664.12	Compare and contrast the display components of mobile devices.
1664.12.1	Discern between various types of display to include LCD, IPS, TN, VA, and OLED.
1664.12.2	Identify mobile display components such as Wi-Fi antenna connector/replacement, camera/webcam, microphone, touch screen/digitizer and inverter.
1664.13	Set up and configure accessories and ports of mobile devices.
1664.13.1	Understand connection methods, USB/USB-C/microUSB/miniUSB, lightning, serial interfaces, near field communications (NFC), Bluetooth and hotspot.
1664.13.2	Explain accessories for mobile devices, touch pens, headsets, speakers, webcam, docking station, port replicator, trackpad/drawing pad.
1664.14	Configure basic mobile-device network connectivity and application support.
1664.14.1	Enable and disable a wireless/cellular data network, 2G/3G/4G/5G, hotspot, GSM vs CDMA and PRL updates.
1664.14.2	Demonstrate knowledge of Bluetooth pairing and connectivity, GPS, MDM, MAM, and mobile device synchronization.

Networking

1664.15	Compare and contrast Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) ports, protocols, and their purposes.
1664.15.1	Understand ports and protocols – FTP, SSH, Telnet, SMTP, DNS, DHCP, HTTP, POP3, NetBIOS over TCP/IP, IMAP, SNMP, LDAP, HTTPS, SMB, CIFS and RDP.
1664.15.2	Explain TCP vs UDP – Connectionless DHCP and TFTP and connection-oriented HTTPS and SSH.
1664.16	Compare and contrast common networking hardware.
1664.16.1	Demonstrate knowledge of routers, switches, access points, patch panel, firewall, PoE, hub, cable modem, DSL, ONT, NIC and SDN.
1664.17	Compare and contrast protocols for wireless networking.
1664.17.1	Develop an understanding of frequencies, channels, Bluetooth, 802.11, long range fixed wireless, NFC, and RFID.
1664.18	Summarize services provided by networked hosts.

1664.18.1	Explain server roles, internet appliances, legacy/embedded systems and IoT devices.
1664.19	Install and configure basic wired/wireless small office/home office (SOHO) networks.
1664.19.1	Demonstrate the ability to set up Ipv4, private and public, IPv6, APIPA, static, dynamic and gateway networks.
1664.20	Compare and contrast common network configuration concepts.
1664.20.1	Explore DNS, MX, TXT, DHCP VLAN and VPN network concepts.
1664.21	Compare and contrast Internet connection types, network types, and their features.
1664.21.1	Learn internet connection and network types.
1664.22	Use networking tools.
1664.22.1	Become proficient in using tools such as crimpers, cable stripper, Wi-Fi analyzer, toner probe, punchdown tool, cable tester, loopback plug and network tap.

Hardware

1664.23	Explain basic cable types and their connectors, features, and purposes.
1664.23.1	Explain network cables, peripheral cables, video cables, hard drive cables adaptors and connection types.
1664.24	Install the appropriate RAM.
1664.24.1	Learn RAM types to include virtual RAM SODIMM, DDR3, DDR4, DDR5, ECC, single-channel, dual-channel, triple-channel, and quad channel.
1664.25	Select and install storage devices.
1664.25.1	Install appropriate storage devices such as hard drives, SSDs, drive configuration and removable storage.
1664.26	Install and configure motherboards, central processing units (CPUs), and add-on cards.
1664.26.1	Demonstrate proficiency in identifying motherboard form factors and identify motherboard components. Correctly install and configure appropriate motherboards based on client need and expandability
1664.27	Install or replace the appropriate power supply.
1664.27.1	Determine appropriate power supply including input 110-120 VAC vs 220-240 VAC, Output 3.3V vs 5V vs 12 V, 20 pin to 24 pin motherboard adapter, redundant power supply, modular power supply, and wattage rating.
1664.28	Deploy and configure multifunction devices/ printers and settings.
1664.28.1	Properly unbox a device.
1664.28.2	Select appropriate location.
1664.28.3	Use appropriate drivers for a given OS such as PCL vs postscript.
1664.28.4	Determine device connectivity from USB, Ethernet or wireless.
1664.28.5	Configure public/shared devices either printer share or print server.
1664.28.6	Set configuration settings like duplex, orientation, tray settings, quality.
1664.28.7	Set up security configurations considering user authentication, badging, audit logs and secured prints.
1664.28.8	Develop network scan services to include email SMB, and cloud services.
1664.28.9	Configure automatic document feeder or flatbed scanner.

Printer Consumables

1664.29	Install and replace printer consumables.
1664.29.1	Understand the setup of printers and the installation of replacement consumables for printers

Virtualization and Cloud Computing

1664.30	Summarize cloud-computing concepts.
1664.30.1	Explore common cloud models, cloud characteristics and desktop virtualization.
1664.30.2	Learn the purpose of virtual machines, resource requirements and security requirements.
1664.31	Summarize aspects of client-side virtualization.
1664.31.1	Install client-side a virtual machine

Hardware and Network Troubleshooting

1664.32	Apply the best practice methodology to resolve problems.
1664.32.1	Always consider corporate policies, procedures, and impacts before implementing changes.
1664.32.2	Identify the problem by gathering information from the user.
1664.32.3	Perform backups before making changes.
1664.32.4	Inquire regarding environmental or infrastructure changes.
1664.32.5	Establish a theory of probable cause.
1664.32.6	Conduct external or internal research based on symptoms.
1664.32.7	Test the theory to determine the cause.
1664.32.8	Establish a plan of action to resolve the problem and implement the solution.
1664.32.9	Refer to the vendor's instructions for guidance.
1664.32.10	Verify full system functionality and implement preventive measures.
1664.32.11	Document the findings, actions, and outcomes.
1664.33	Troubleshoot problems related to motherboards, RAM, CPU, and power.
1664.33.1	Provide analysis and solutions for common symptoms such as POST beeps, BSOD/crash screens, black screen, no power, low performance, overheating, burning smells, intermittent shutdowns, app crashes, noises, capacitor swelling and inaccurate system data.
1664.34	Troubleshoot and diagnose problems with storage drives and RAID arrays.
1664.34.1	Provide analysis and solutions for common symptoms such as LED status, noises, bootable devices not found, data loss/corruption, RAID failure, S.M.A.R.T failure, extended read/write times, IOPS issues, missing OS drives.
1664.35	Troubleshoot video, projector, and display issues.
1664.35.1	Provide analysis and solutions for common symptoms such as incorrect video source, physical cabling issues, bulbs, fuzzy image, display burn-in, dead pixels, flashing screen, color display issues, audio issues, dim images, intermittent projector shutdown.
1664.36	Troubleshoot common issues with mobile devices.
1664.36.1	Provide analysis and solutions for common symptoms such as battery health, swollen battery, broken screen, improper charging, connectivity issues, liquid damage, overheating, digitizer issues, damaged ports, malware, cursor/calibration issues.
1664.37	Troubleshoot and resolve printer issues.
1664.37.1	Provide analysis and solutions for common symptoms such as lines on page, garbled print, paper jams, faded print, incorrect paper size, misfeeds, print image issues, finishing issues such as staple jams and hole punch issues, incorrect page orientation.
1664.38	Troubleshoot problems with wired and wireless networks.
1664.38.1	Provide analysis and solutions for common symptoms such as wireless connectivity issues, slow network speeds, jitter, poor VoIP quality, port flapping, high latency, and external interference.

This course covers installing and configuring operating systems including Windows, iOS, Android, Apple OS X and Linux. It also addresses security, the fundamentals of cloud computing and operational procedures. Content Skill Sets are based on testing objectives for the CompTIA A+ 220-902 certification. Students utilize problem-solving techniques and participate in hands on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Operating Systems

1665.1	Identify basic features of Microsoft Windows editions.
1665.1.1	Compare and contrast common operating system types and their purposes.
1665.1.2	Compare and contrast features of Microsoft Windows versions.
1665.1.3	Delineate between feature differences such as domain access vs workgroup, desktop styles,/user interface, RDP, RAM, BitLocker and gpedit.msc.
1665.1.4	Summarize general OS installation considerations and upgrade methods and paths.
1665.1.5	Use appropriate Microsoft command line tools.
1665.1.6	Use Microsoft operating system features and tools.
1665.1.7	Use Microsoft Windows Control Panel utilities.
1665.1.8	Summarize application installation and configuration concepts.
1665.1.9	Configure Microsoft Windows networking on a client/desktop.
1665.1.10	Use features and tools of the Mac OS and Linux client/desktop operating systems.
1665.2	Use the appropriate Microsoft command-line tool.
1665.2.1	Master line commands for features such as cd, dir, md, rmdir and drive inputs as well as other command line tools.
1665.3	Use features and tools of the Microsoft Windows operating system (OS).
1665.3.1	Use task manager for services, startup, performance, processes, and users.
1665.3.2	Explore Microsoft management console snap in.
1665.3.3	Utilize additional tools such as system information, resource monitor, system configuration, disk cleanup disk defragment and registry editor.
1665.4	Use the appropriate Microsoft Windows OS control panel utility.
1665.4.1	Develop an understanding of internet options, devices and printers, programs and features, network and sharing center, windows defender firewall, mail, sound, user accounts, device manager, indexing options, administrative tools, file explorer options, power options and ease of access.
1665.5	Use the appropriate Windows settings.
1665.5.1	Use Windows settings such as time and language, update and security, personalization, apps, privacy, system, devices, network and internet, gaming, and accounts.
1665.6	Configure Microsoft Windows networking features on a client/desktop.

1665.6.1	Determine workgroup vs domain set up.
1665.6.2	Configure local OS firewall settings.
1665.6.3	Establish client network configuration.
1665.6.4	Establish network connections.
1665.6.5	Determine proxy settings, public vs private network, file explorer navigation and metered connections and limitations.
1665.7	Apply application installation and configuration concepts.
1665.7.1	Ascertain system requirements for application i.e., 32-bit vs 64-bit.
1665.7.2	Research OS requirements for applications.
1665.7.3	Determine distribution methods.
1665.7.4	Consider impact of new applications to device, network, operation, and business.
1665.8	Explain common OS types and their purposes.
1665.8.1	Explain the difference between Windows, Linux, macOS and Chrome.
1665.8.2	Compare iPadOS, IOS and Android cell phone and tablets.
1665.8.3	Learn various filesystem types including NRFS, FAT 32, ext3, ext4, APFS, and exFAT.
1665.8.4	Demonstrate knowledge of vendor life-cycle limitations such as end-of-life cycle and update limitations and compatibility concerns between OS's.
1665.9	Perform OS installations and upgrades in a diverse OS environment.
1665.9.1	Utilize various boot methods to include USB, optical media, network, PXE –boot, solid-state/flash drives, internet-based, external/hot-swappable drive and internal hard drive (partition).
1665.9.2	Explain the types of installations, upgrade, recovery partition, clean install, image deployment, repair installation, remote network installation and other considerations such as third-party drivers.
1665.10	Identify common features and tools of the macOS/desktop OS.
1665.10.1	Demonstrate installation and uninstallation for applications including file types.
1665.10.2	Review Apple ID and corporate restrictions.
1665.10.3	Utilize best practices regarding backups, antivirus and updates or patches.
1665.10.4	Summarize system preferences such as displays, networks, printers, scanners, privacy, accessibility, and time machine.
1665.10.5	Understand features like multiple desktops, mission control, keychain, spotlight, iCloud, gestures, finder, remote disc, and dock.
1665.10.6	Discuss other factors such as disk utility, file vault, terminal and force quit.
1665.11	Identify common features and tools of the Linux client/desktop OS.
1665.11.1	Use common commands including ls, pwd, mv, cp, rm, chmod, chown, su/sudo, apt-get, yum, ip, df, grep, ps, man, top, find, dig, cat, cano.
1665.11.2	Use best practices for backups, antivirus, updates, and patches.
1665.11.3	Use tools such as shell/terminal and samba.

Security

1665.12	Summarize various security measures and their purposes.
1665.12.1	Describe the importance of physical security measures such as access control vestibule, badge reader, video surveillance, alarm systems, motion sensors, door locks, equipment locks, guards, bollards and fences, key fobs, smart cards, keys biometrics, retina, fingerprint and pam scanners, lighting, and magnetometers.
1665.12.2	Explain logical security concepts including principle of least privilege, ACLs, MFA, email, hard token, soft token, SMS, voice call, and authenticator application.

1665.12.3	Compare and contrast wireless security protocols and authentication methods.
1665.12.4	Detect, remove, and prevent malware using appropriate tools and methods.
1665.12.5	Compare and contrast social engineering, threats, and vulnerabilities.
1665.12.6	Compare and contrast the differences of basic Microsoft Windows OS security settings.
1665.12.7	Implement security best practices to secure a workstation.
1665.12.8	Implement methods for securing mobile devices using login script, domain, group policy/updates, organizational units, home folder, folder redirection and security groups.
1665.12.9	Implement appropriate data destruction and disposal methods.
1665.12.10	Configure security on SOHO wireless and wired networks.
1665.13	Compare and contrast wireless security protocols and authentication methods.
1665.13.1	Demonstrate the use of protocols and encryption like WPA2, WPA 3, TKIP and AES.
1665.13.2	Explain authentication to include RADIUS, TACACS+, Kerberos and multifactor.
1665.14	Detect, remove, and prevent malware using the appropriate tools and methods.
1665.14.1	Understand malware such as trojan, rootkit, virus, spyware, ransomware, keylogger, boot sector virus and cryptominers.
1665.14.2	Use tools and methods like recovery mode, antivirus, anti-malware, software firewalls, anti-phishing training, common threads, and OS reinstallation.
1665.15	Explain common social-engineering attacks, threats, and vulnerabilities.
1665.15.1	Research social engineering – phishing, vishing, shoulder surfing, whaling, tailgating, impersonation, dumpster diving and evil twin.
1665.15.2	Understand threats like distributed denial of service (DDoS), Denial of service (DoS), zero-day attack, spoofing, on-path attack, brute-force attack, dictionary attack, insider threat, SQL injection, Cross-site scripting (XSS).
1665.15.3	Learn vulnerabilities such as non-compliant systems, unpatched systems, unprotected systems, EOL Oss, and bring your own device (BYOD).
1665.16	Manage and configure basic security settings in the Microsoft Windows OS.
1665.16.1	Demonstrate knowledge of Defender anti-virus, firewall, users and groups, login OS options, NTFS vs share permissions, run as administrator vs standard user, BitLocker, BitLocker To Go, Encrypting File System (EFS).
1665.17	Configure a workstation to meet best practices for security.
1665.17.1	Utilize data-at-rest encryption.
1665.17.2	Research password best practices like complexity, length, and character types.
1665.17.3	Research end-user best practices like screensaver locks, log off, secure, and protect critical hardware like laptops, secure personally identifiable information, and passwords.
1665.17.4	Practice account management techniques like restricting user permissions, restricting login times, disabling guest accounts, use failed attempt lockouts, and timeout/screen lock.
1665.17.5	Change default administrator's user account/password, disable autorun and disable autoplay.
1665.17.6	Explain common methods for securing mobile and embedded devices.
1665.17.7	Describe the importance of screen locks, remote wipes locator applications, OS updates, device encryption, remote backup applications, failed login attempts restrictions, antivirus/anti-malware, firewalls, policies and procedures and internet of things (IoT).
1665.18	Use common data destruction and disposal methods.
1665.18.1	Demonstrate knowledge of physical destruction techniques, recycling and repurposing best practices and outsourcing concepts.

1665.19	Configure appropriate security settings on small office/home office (SOHO) wireless and wired networks.
1665.19.1	Configure home router settings, wireless specific settings, and firewall settings.
1665.20	Install and configure browsers and relevant security settings.
1665.20.1	Ensure correct installation and configuration of browser download and installation, extensions and plug-ins, password managers, secure connections/sites-valid certificates, and settings for pop-up blockers, clearing browser data and cache, private-browsing mode, sign-in/browser data synchronization and ad blockers.

Software Troubleshooting

1665.21	Troubleshoot common Windows OS problems.
1665.21.1	Troubleshoot Microsoft Windows OS common symptoms such as BSOD, sluggish performance, boot problems, frequent shutdowns, services not starting, application crashes, low memory warnings, USB controller resource warnings, system inability, no OS found warning, slow profile load, time drift.
1665.21.2	Demonstrate common troubleshooting techniques like reboot, restart services, uninstall/reinstall /update applications, add resources, verify requirements, system file check, repair Windows, restore, reimaging, roll back updates and rebuild Windows profiles.
1665.21.3	Troubleshoot and resolve common PC security issues including unable to access the network, desktop alerts, false alerts regarding antivirus protection, altered system or missing/renamed personal files, unwanted notifications with OS. OS system failures, and browser-related symptoms such as random/frequent pop-ups, certification warnings and redirection.
1665.21.4	Use best practice procedures for malware removal to include investigating and verifying malware symptoms, quarantine infected systems, disable system restore in Windows, remediate infected system, schedule scans, and run updates, enable system restore and create a restore point in Windows, and educating end user.
1665.21.5	Troubleshoot mobile OS and application issues. Common symptoms include application launch failure, failure to close or crashes, fails to update, slow to respond, OS fails to update, battery life issues, random reboots, connectivity issues and screen does not autorotate.
1665.21.6	Troubleshoot common mobile OS and application security issues such as APK source, developer mode, root access/jailbreak, and bootleg/malicious application. Common symptoms include high network traffic, sluggish response time, data usage limit notification, limited/zero internet connectivity, excessive ads, fake security warnings, unexpected application behavior and leaked personal files/data.

Operational Procedures

1665.22	Implement best practices associated with documentation and support systems information management.
1665.22.1	Compare and contrast best practices associated with types of documentation such as ticketing systems, asset management, AUP's, regulatory compliance documents, incident reports, new-user setup checklists and end-user termination checklists.
1665.23	Implement basic change management best practices.
1665.23.1	Explain basic change-management best practices like documented business process to include rollback plan, sandbox testing and ensuring responsible staff members. Change management should include request forms with purpose and scope of change as well as the date and time of change, affect systems/impact, risk analysis, end-user acceptance and change board approvals.
1665.24	Implement basic disaster prevention and recovery methods.

1665.24.1	Demonstrate various backup and recovery methods like full, incremental, differential, and synthetic. Other methods to include would be frequency of backup testing and backup rotation schemes like on-site vs off-site, GFS and 3-2-1 backup rule.
1665.25	Use common safety procedures.
1665.25.1	Understand common workplace safety procedures and demonstrate safe working habits
1665.26	Summarize environmental impacts and local environmental controls.
1665.26.1	Understand the environmental impacts of the IT industry and demonstrate a knowledge of safe and ethical disposal of equipment and consumables
1665.27	Explain the importance of prohibited content/activity, and privacy, licensing, and policy concepts.
1665.27.1	Understand the components of incident response such as chain of custody, inclusion of management or law enforcement as necessary, copy of drive (data integrity and preservation) documentation of incident. Also consider licensing/digital rights management (DRM)/end-user license agreement (EULA) and regulated data such as credit cards PII healthcare data and data retention requirements.
1665.28	Use proper communication techniques and professionalism.
1665.28.1	Show professionalism by assuring appropriate dress, language, and attitude, be culturally sensitive, avoid distractions, set, and meet expectations/timeline and maintain confidentiality for client's data/information.
1665.29	Identify the basics of scripting.
1665.29.1	Understand script file acronyms, use cases for scripting and other considerations such as unintentionally introducing malware, inadvertently changing system settings and browser/system crashes due to mishandling of resources.
1665.30	Use remote access technologies.
1665.30.1	Demonstrate knowledge of methods/tools to include RDP, VPN, VNC, SSH, RMM, MSRA, third-party tools and security considerations of each access method.

This course introduces the student to the knowledge base and technical skills as they relate to the field of Collision Repair Technology. In the Fundamentals of Collision Repair Technology class areas of study include career opportunities and practices, integrated academics, knowledge of tools and equipment, panel straightening techniques, and introduction to vehicle preparation. Safety instruction is integrated into all activities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Safety

1671.1	Demonstrate knowledge of safety and environmental requirements in the collision repair industry.
1671.1.1	Identify general shop safety rules and procedures.
1671.1.2	Identify marked safety areas.
1671.1.3	Demonstrate knowledge of all relevant safety procedures.
1671.1.4	Comply with the required safe use of safety glasses, ear protection, gloves, and shoes, during lab/shop activities.
1671.1.5	Recognize the main causes of accidents.
1671.1.6	Research agencies that are responsible for emergencies in the workplace.
1671.1.7	Demonstrate understanding of operating instructions and procedures before using any equipment.
1671.1.8	Follow all safety and security procedures.
1671.1.9	Demonstrate use of proper PPE as required for specified tasks.
1671.1.10	Select personal protection equipment (PPE); inspect to insure fit, operation, and maintenance.
1671.1.11	Utilize proper ventilation procedures for working within the lab/shop area.
1671.1.12	Identify the location and use of eye wash stations.
1671.1.13	Identify and wear appropriate clothing for lab/shop activities.
1671.1.14	Locate and demonstrate knowledge of material safety data sheets (MSDS).
1671.1.15	Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
1671.1.16	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignitions systems, injection systems, etc.).
1671.1.17	Demonstrate complete understanding and compliance with OSHA standards at all times.
1671.2	Demonstrate appropriate care and maintenance of shop tools and equipment.
1671.2.1	Identify and safely use hand and power tools, such as hammers, drills, and wrenches, including electrical and electronic testing devices.
1671.2.2	Identify and explain how to use and maintain various air tools and grinders.
1671.2.3	Use all measuring tools and equipment properly.
1671.2.4	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
1671.3	Identify proper safety techniques for the use of shop equipment, including PPE.
1671.3.1	Identify the hand tools commonly used for collision repair.

1671.3.2	Demonstrate how to safely use various types of hand and power tools.
1671.3.3	Identify the various power tools and equipment used for collision repair.
1671.3.4	Demonstrate proper selection and use of appropriate PPE as required.

Business Fundamentals

1671.4	Demonstrate knowledge of estimating terminology.
1671.4.1	Describe how to prepare and complete a repair estimate using the proper terminology.
1671.4.2	Prepare an estimate using the proper format and terminology.
1671.4.3	Follow checklists to ensure that all relevant parts are examined and documented.
1671.4.4	Examine vehicles, compile estimates of repair costs, and secure customers' approval to perform repairs.
1671.5	Identify employability skills within the collision repair industry.
1671.5.1	Explain methods of goal development.
1671.5.2	Practice professionalism in punctuality, appropriate dress, task completion, etc.
1671.5.3	Discuss methods of time management and task coordination.
1671.5.4	Identify methods of supervision such as giving and receiving feedback and instruction.
1671.5.5	Develop and present a statement of their personal work ethic beliefs.
1671.5.6	Prepare an application, cover letter, resume and thank you letter.
1671.5.7	Create a personal portfolio for use when applying for employment.
1671.5.8	Practice simulated job interviews.
1671.6	Calculate estimates and costs related to repair procedures.
1671.6.1	Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, and assembly plant.
1671.6.2	Perform visual inspection of structural components and members; determine if repair or replacement is needed.
1671.6.3	Review damage reports, prepare or review repair cost estimates, and plan work to be performed.
1671.6.4	Determine and apply appropriate estimating sequence.
1671.6.5	Identify body repair and refinishing materials and supplies.
1671.6.6	Justify repair or replace decision using OEM components.
1671.6.7	Justify repair or replace decision using aftermarket components.

Painting and Refinishing

1671.7	Demonstrate masking and taping application techniques.
1671.7.1	Demonstrate how to mask and protect areas that will not be refinished.
1671.7.2	Demonstrate different masking techniques (recess/back masking, foam, door type, etc.).
1671.8	Identify and demonstrate surface preparation techniques.
1671.8.1	Describe how to properly prepare a damaged panel. ☐
1671.8.2	Explain how to identify and remove surface corrosion.
1671.8.3	Demonstrate how to remove dirt, road grime, wax, adhesive residue, mold release agents, tree sap, markings, or other contaminants from the area to be refinished and any adjacent vehicle surfaces.
1671.8.4	Inspect and identify substrate, substrate condition, type of finish, film thickness and surface condition; develop a plan for refinishing.
1671.8.5	Remove small pits and dimples in body metal using pick hammers and punches.
1671.8.6	Remove the existing paint finish.
1671.8.7	Demonstrate the process for sanding areas to be refinished.

1671.8.8	Define featheredge of areas to be refinished.
1671.8.9	Identify type of substrate and apply suitable treatment or undercoat.
1671.8.10	Apply finishing putty to minor surface imperfections.
1671.8.11	Block sand area to which primer-surfacer and/or finishing putty have been applied.
1671.8.12	Remove dust residue from area to be refinished.
1671.8.13	Demonstrate how to clean the area to be refinished using proper cleaning solution.
1671.8.14	Remove, with a tack rag, any dust or lint particles from the area to be refinished.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Collision Repair Technology Program of Study. Incorporated into this course are elements of introductory knowledge and skills necessary in detailing and interior parts for those enrolled in Collision Repair Technology. This course is recommended as an Elective in Collision Repair Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Vehicle Detailing

1672.1	Vehicle Detailing
1672.1.1	Identifying, replacing, or repairing various types of interior parts.
1672.1.2	Performing proper detailing techniques to the interior and exterior of a vehicle.
1672.1.3	Recognize and follow general collision lab safety guidelines, including the wearing of appropriate protective equipment and handling of supplemental restraint system components.
1672.1.4	Use service manuals for proper removal and installation procedures for interior parts.
1672.1.5	Locate and understand vehicle trim code labels.
1672.1.6	Evaluate and demonstrate the proper selection and use of interior specialty tools.
1672.1.7	Identify general attachment methods for interior components.
1672.1.8	Demonstrate the removal and installation procedures for interior parts.
1672.1.9	Identify the difference between OEM and aftermarket bolt on and adhered interior accessories.
1672.1.10	Demonstrate proper repair procedures for damage interior parts.
1672.1.11	Identify various products and materials associated with the detailing process.
1672.1.12	Utilize a detailer checklist and recognize why a checklist is important.
1672.1.13	Inspect parts, equipment, or vehicles for cleanliness, damage, and compliance with standards or regulations.
1672.1.14	Determine the exterior touch-up procedures involved in the detailing process.
1672.1.15	Identify odor sources and become familiar with the elimination procedures.
1672.1.16	Scrub, scrape, or spray machine parts, equipment, or vehicles, using scrapers, brushes, clothes, cleaners, disinfectants, insecticides, acid, abrasives, vacuums, or hoses.
1672.1.17	Rinse objects and place them on drying racks or use cloth, squeegees, or air compressors to dry surfaces.
1672.1.18	Analyze types of finish damage that can be repaired in the detailing process.
1672.1.19	Describe the types of finish defects that are beyond the detailing process.
1672.1.20	Apply waxes and sealants as it relates to the detailing process.
1672.1.21	Utilize all steps involved in the exterior detailing of a vehicle (wash body, tires, degrease engine).
1672.1.22	Remove excess polish or wax from emblems, moldings, door jams, etc.
1672.1.23	Clean and polish vehicle windows.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Collision Repair Technology Program of Study. Incorporated into this course are elements of introductory knowledge and skills necessary for mechanical and electrical repairs as they apply to Collision Repair Technology. This course is recommended as an Elective in Collision Repair Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Steering and Suspension

1673.1	Steering and Suspension
1673.1.1	Identifying, inspecting, and diagnosing suspension and steering systems.
1673.1.2	Identify, inspect, and diagnose steering components.
1673.1.3	Inspect, identify, and diagnose alignment angles and suspension components.
1673.1.4	Diagnose steering drivability problems related to collision repair.

Supplemental Restraint System

1673.2	Supplemental Restraint System
1673.2.1	Inspecting and servicing supplemental airbag restraint systems.
1673.2.2	Disarm airbag system in accordance with manufacturer's procedures.
1673.2.3	Inspect and replace damaged sensors and wiring in accordance with manufacturer's procedures and insure proper sensor orientation.
1673.2.4	Verify that system is armed and operational in accordance with manufacturer's procedures.
1673.2.5	Determine removal and installation process of non-deployed airbag and observe manufacturer's safety procedures.
1673.2.6	Use fault codes to diagnose and repair airbag system.

Active/Passive Restraint System

1673.3	Active/Passive Restraint System
1673.3.1	Inspecting and servicing restraint systems.
1673.3.2	Examine removal and installation process of seatbelt and shoulder harness assembly in accordance with manufacturer's procedures.
1673.3.3	Inspect anchorages for deformation, repair as required.
1673.3.4	Verify proper operation of seatbelt in accordance with manufacturer's procedures.
1673.3.5	Determine removal and installation process of track and drive assembly, lap retractor, torso retractor assembly, inboard buckle-lap retractor, and knee blocker.

Air Conditioning

1673.4	Air Conditioning
1673.4.1	Inspecting and servicing air conditioner systems.
1673.4.2	Inspect, determine removal, and installation process of damaged air conditioner system hoses, lines, fittings, and related components (compressor, condenser, evaporator).
1673.4.3	Recharge air conditioner according to manufacturer's recommendations.

Hydraulic Brake Systems

1673.5	Hydraulic Brake Systems
1673.5.1	Inspecting and diagnosing hydraulic brake systems.
1673.5.2	Inspect brake system components for collision repair damage.
1673.5.3	Determine removal and installation process of damaged brake system components.

Cooling Systems

1673.6	Cooling Systems
1673.6.1	Inspecting and servicing the cooling systems.
1673.6.2	Inspect cooling system components for collision repair damage.

Electrical Components

1673.7	Electrical Components
1673.7.1	Analyzing, repairing, and replacing electrical components.
1673.7.2	Demonstrate the knowledge of electrical concepts as related to collision repair.
1673.7.3	Inspect electrical components for collision repair damage.
1673.7.4	Diagnose body related electrical components for problems.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Collision Repair Technology Program of Study. Incorporated into this course are elements of advanced refinishing skills necessary for a career in the collision repair industry. This course is recommended as an Elective in Collision Repair Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Color Definition and Tinting Process

1674.1	Color Definition and Tinting Process
1674.1.1	Composition of light as it relates to vehicle finish.
1674.1.2	Using the color wheel for plotting, mapping, and tinting procedures.
1674.1.3	View color and determine how light affects color.
1674.1.4	Use a spectrophotometer to obtain a bendable match.
1674.1.5	Examine the differences in OEM color standards with the use of a manufacturer's variance deck.
1674.1.6	Describe color theory and how it relates to matching point.
1674.1.7	Explain the color wheel and the three dimensions of color.
1674.1.8	Perform the tinting process.
1674.1.9	Explain when tinting may be necessary based on spray out panels.
1674.1.10	Plot solid and metallic colors.
1674.1.11	Map solid and metallic colors.
1674.1.12	Adjust spray gun patterns and air pressure to accommodate advance spraying techniques.

Application of Specialty Paints

1674.2	Application of Specialty Paints
1674.2.1	Mixing, matching, and applying metallic, mica, pearl, and prism effects.
1674.2.2	Analyze blending techniques and methods.
1674.2.3	Identify topcoat additives and materials.
1674.2.4	Make and evaluate test panels.
1674.2.5	Mix and apply metallic, mica, and pearl refinish systems.
1674.2.6	Create a letdown panel.
1674.2.7	Mix and apply a tri-coat/multi-stage refinish system.
1674.2.8	Use a tri-coat/multi-stage refinish system to achieve a bendable match.

Non-Structural Analysis and Damage Repair will continue to build student skill sets in non-structural analysis and repair of metal and composite parts. Students will utilize integrated academics, problem-solving techniques, and manipulative skills while completing lab activities to develop an understanding of course concepts. Safety instruction is integrated into all activities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1675.1	Demonstrate knowledge of safety and environmental requirements in the collision repair industry.
1675.1.1	Demonstrate knowledge and understanding of all shop safety rules and procedures.
1675.1.2	Identify the main causes of accidents in the collision repair industry.
1675.1.3	Identify safety and potential health hazards according to OSHA guidelines and the "Right to Know Law."
1675.1.4	Select and identify a NIOSH approved supplied air (Fresh Air Make-up) respirator system. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulations.
1675.1.5	Identify safety and personal health hazards according to OSHA guidelines and the Federal Law as recorded in (29 CFR-1910.1200).
1675.1.6	Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.
1675.2	Demonstrate appropriate care and maintenance of shop tools and equipment.
1675.2.1	Identify tools and their usage in automotive collision repair applications.
1675.2.2	Demonstrate the ability to safely use and maintain all collision repair tools and equipment.
1675.2.3	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
1675.2.4	Identify standard and metric designation.
1675.3	Identify proper safety techniques for the use of shop equipment, including PPE.
1675.3.1	Demonstrate complete understanding of operating instructions before using any equipment.
1675.3.2	Identify the procedures for safe evacuation of the worksite in the event of an emergency.
1675.3.3	Demonstrate the ability to follow safety and security procedures.
1675.3.4	Demonstrate how to properly use and maintain all Personal Protective Equipment (PPE).
1675.3.5	Select and use proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (glove, suits, hoods, eye, and ear protection, etc.); take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.

Business Fundamentals

1675.4	Apply basic business practices within the collision repair industry, including estimating.
1675.4.1	Confer with customers by telephone or in person to provide information about products or services, take or enter orders, cancel accounts, or obtain details of complaints.

1675.4.2	Keep records of customer interactions or transactions, recording details of inquiries, complaints, or comments, as well as actions taken.
1675.4.3	Check to ensure that appropriate changes were made to resolve customers' problems.
1675.4.4	Determine charges for services requested, collect deposits or payments, or arrange for billing.
1675.4.5	Refer unresolved customer grievances to designated departments for further investigation.
1675.5	Identify employability skills within the collision repair industry.
1675.5.1	Practice professionalism in punctuality, appropriate dress, task completion, etc.
1675.5.2	Discuss methods of time management and task coordination.
1675.5.3	Identify methods of supervision such as giving and receiving feedback and instruction.
1675.5.4	Develop and present a statement of their personal work ethic beliefs.
1675.5.5	Practice simulated job interviews.

Non-Structural

1675.6	Demonstrate understanding of metal straightening and finishing.
1675.6.1	Identify safety considerations: Personal Protective Equipment (PPE), shock hazards, fumes, material safety data sheets (MSDS) before beginning any repairs.
1675.6.2	Explain how to identify different types of damages. ☐
1675.6.3	Differentiate repair areas used to repair non-structural and structural damage.
1675.6.4	Determine repair plan, procedures, and methods of overall repairs in accordance with the vehicle manufacturer's specifications and industry procedures.
1675.6.5	Identify types of hardware and its correct uses.
1675.6.6	Remove damaged or undamaged interior and exterior trim and moldings/claddings as necessary; document missing or broken one-time use parts/fasteners/components, store removed parts/fasteners/components.
1675.6.7	Remove undamaged, non-structural body panels and components that may interfere with or be damaged during the repair process.
1675.6.8	Remove, replace, and align bumpers, brackets, reinforcements, guards, absorbers, isolators, and mounting hardware.
1675.6.9	Remove and replace bolted, riveted, adhesive/bonded, and welded panels or panel assemblies.
1675.6.10	Remove, replace, and align deck lid, lid hinges, supports, and lid latch/lock.
1675.6.11	Remove, replace, and align doors, tailgates, hatches, supports, lift gates, latch/lock assemblies, handles, and hinges.
1675.6.12	Remove, replace, and align front fenders; check and adjust gaps and clearances.
1675.7	Identify automotive plastics and proper repair procedures.
1675.7.1	Identify the types of plastic(s); determine reparability.
1675.7.2	Identify the proper plastic repair/cleaning procedures; clean and prepare the surfaces of plastic parts.
1675.7.3	Repair plastic parts by welding or using adhesive repair materials; use reinforcing materials as required.
1675.7.4	Reshape plastic parts.
1675.7.5	Perform single or two-sided repairs in plastic panels.
1675.7.6	Replace bonded plastic body panels; straighten or align mounting locations.
1675.7.7	Replace mechanically fastened plastic body panels; straighten or align mounting locations if necessary; torque fasteners to specifications.
1675.8	Diagnose primary and secondary non-structural damage.
1675.8.1	Demonstrate how to identify different types of damage. ☐

1675.8.2	Determine repair plan, procedures, and methods of overall repairs in accordance with the vehicle manufacturer's specifications and industry procedures.
1675.8.3	Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.
1675.8.4	Inspect/locate direct, indirect, or hidden damage and direction of impact.
1675.8.5	Determine the extent of damage to aluminum body panels; repair or replace.
1675.9	Demonstrate knowledge of movable and stationary glass.
1675.9.1	Inspect, adjust, remove and/or replace moveable, electrically heated, stationary, mechanically fastened, bonded, and hinged glass.
1675.9.2	Inspect, adjust, repair, or replace window regulators, run channels, power mechanisms, and related controls. reset automatic features and clear stored codes if necessary.
1675.9.3	Inspect, adjust, repair, remove or replace power glass roof panels and related controls.
1675.9.4	Inspect, adjust, repair, remove, or replace removable, manually operated glass roof panels and hardware.
1675.9.5	Diagnose and repair water leaks, dust leaks, wind noises; rattles, and vibrations; inspect, repair, or replace weather stripping.
1675.9.6	Inspect, adjust, and install convertible or retractable roof and related mechanisms.
1675.10	Utilize basic corrosion protection procedures
1675.10.1	Remove corrosion protection, undercoating, sealers, and other protective coatings as necessary to perform repairs.
1675.10.2	Record repairs and maintenance performed.
1675.10.3	Record parts or materials used and order or requisition new materials, as necessary.
1675.10.4	Apply protective coatings to restore corrosion protection.
1675.10.5	Maintain cleanliness of work area.
1675.11	Use adhesive bonding procedures.
1675.11.1	Identify the types of plastics; determine repair-ability.
1675.11.2	Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures.
1675.11.3	Repair rigid, semi-rigid, or flexible plastic panels.
1675.11.4	Replace bonded rigid exterior composite panels; straighten or align panel supports.
1675.11.5	Repair plastic parts by welding (nitrogen, airless).
1675.11.6	Perform a single-sided adhesively bonded cosmetic repair.
1675.11.7	Perform a double-sided adhesively bonded repair.
1675.11.8	Perform an adhesively bonded or welded tab repair.
1675.11.9	Shape or reform damaged plastic.
1675.12	Remove and replace automotive trim.
1675.12.1	Inspect, remove, store, protect, and replace exterior trim and components necessary for proper surface preparation.
1675.12.2	Inspect, remove, label, store, and reinstall necessary trim and moldings.
1675.12.3	Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
1675.13	Remove, install, replace, align, or repair non-structural panels.
1675.13.1	Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations.
1675.13.2	Locate OEM procedures to identify material and composition of the vehicle being repaired (mild steel, high strength steel, ultra-high strength steel, and aluminum, etc.).
1675.13.3	Locate procedures and precautions that may apply to the vehicle being repaired.

1675.13.4	Inspect, remove, and replace mechanically fastened welded steel panel or panel assemblies.
1675.13.5	Inspect, remove, replace, and align hood, hood hinges, and hood latch. (when available)
1675.13.6	Inspect, remove, replace, and align deck lid, lid hinges, and lid latch.
1675.13.7	Inspect, remove, replace, and align doors, latches, hinges, and related hardware. (when available)
1675.13.8	Inspect, remove, replace, and align tailgates, hatches, lift-gates and sliding doors. (when available)
1675.14	Remove, install, and replace ancillary components (e.g., headlamps, under-hood fuse boxes).
1675.14.1	Verify status of instrument panel warning lights and gauges.
1675.14.2	Reset automatic features and clear stored codes if necessary.
1675.14.3	Test and replace fuses; confirm proper circuit operation.
1675.14.4	Inspect and replace exterior and courtesy lamps.
1675.14.5	Document damage, unusual conditions, and concerns.
1675.14.6	Inspect, remove, protect label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
1675.14.7	Inspect, remove, replace, and align bumper bars, covers, reinforcements, guards, impact absorbers, and mounting hardware.
1675.14.8	Identify procedures to replace door skins.
1675.14.9	Identify procedures to restore sound deadeners and foam materials.
1675.14.10	Identify one-time use fasteners.

Mechanical and Electrical Systems

1675.15	Verify functions of electrical system and basic wiring repair (e.g., soldering, quick connectors).
1675.15.1	Demonstrate an understanding of Ohm's Law.
1675.15.2	Proper vehicle identification information, Define the use and purpose of the VIN, engine numbers and data code, Locate VIN, Apply knowledge of VIN information.
1675.15.3	Check for available voltage, voltage drop and current, and resistance in electrical wiring circuits and components with a digital multimeter (DMM).
1675.15.4	Identify processes and procedures to repair wiring and connectors.
1675.15.5	Identify processes and procedures to inspect, test, and replace fusible links, circuit breakers, and fuses.
1675.15.6	Identify processes and procedures to perform battery state-of-charge test and slow/fast battery charge.
1675.15.7	Identify processes and procedures to inspect, clean, repair or replace battery, battery cables, connectors, and clamps.
1675.15.8	Identify programmable electrical/electronic components and check for malfunction indicator lamp (MIL) and fault codes; record data for reprogramming before disconnecting battery.
1675.16	Perform basic mechanical and electrical diagnostic operations.
1675.16.1	Identify processes and procedures to inspect alignment, adjust, remove, and replace alternator (generator), drive belts, pulleys, and fans.
1675.16.2	Dispose of batteries according to local, state, and federal requirements.
1675.16.3	Check operation and aim headlamp assemblies and fog/driving lamps; determine needed repairs.
1675.16.4	Identify processes and procedures to inspect, test, and repair or replace bulbs, sockets, connectors, and ground wires of interior and exterior light circuits.
1675.16.5	Identify processes and procedures to remove and replace horn(s); check operation.
1675.16.6	Identify processes and procedures to check operation of wiper/washer systems; determine needed repairs.

1675.16.7	Identify processes and procedures to check operation of power side and tailgate window; determine needed repairs.
1675.16.8	Identify processes and procedures to inspect, remove and replace power seats, motors, linkages, cables, etc.
1675.16.9	Identify processes and procedures to inspect, remove and replace components of electric door and hatch/trunk lock.
1675.16.10	Identify processes and procedures to inspect, remove and replace components of keyless lock/unlock devices and alarm systems.
1675.16.11	Identify processes and procedures to inspect, remove and replace components of electrical sunroof and convertible/retractable hard top.
1675.16.12	Identify processes and procedures to identify processes and procedures to check operation of electrically heated mirrors, windshields, back lights, panels, etc.; determine needed repairs.
1675.16.13	Identify processes and procedures to demonstrate the proper self-grounding procedures (anti-static) for handling electronic components.
1675.16.14	Identify processes and procedures to check for module communication errors using a scan tool.
1675.16.15	Identify processes and procedures to identify safe disabling techniques of high voltage systems on hybrid/electric vehicles.
1675.16.16	Identify processes and procedures to identify potential safety and material handling concerns associated with high voltage hybrid/electric vehicle battery systems.
1675.16.17	Identify processes and procedures to use wiring diagrams, component location, and diagnostic flow charts during diagnosis of electrical circuit problems.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Collision Repair Technology Program of Study. Incorporated into this course are elements of advanced custom finishing processes and skills necessary for a career in the collision repair industry. This course is recommended as an Elective in Collision Repair Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Custom Refinishing and Paint Application

1676.1	Custom Refinishing and Paint Application
1676.1.1	Inspecting, operating, and cleaning custom spray equipment.
1676.1.2	Using various techniques as it relates to custom finish.
1676.1.3	Mixing, matching, and applying various custom refinish systems.
1676.1.4	Determine types of colors to be used for specific color schemes (flames, marbelizing, scallops, etc.).
1676.1.5	Check, adjust, and determine condition of all refinishing equipment used in a custom refinishing process.
1676.1.6	Shake, stir, and reduce custom paints according to manufacturer's recommendation.
1676.1.7	Develop proper techniques for application of custom finishes (flame layout, two-tones, striping, card masking, marble effect, cobweb, multi-layered paint, and spider web painting).
1676.1.8	Monitor painting operations to identify flaws such as blisters or streaks and correct their causes.
1676.1.9	Apply candies and pearls according to manufacturer's specification.
1676.1.10	Understand and develop techniques for spraying special effect and prismatic paints.
1676.1.11	Evaluate proper techniques for color blending.
1676.1.12	Utilize abilities needed to apply artwork (pictures, lettering, designs, etc.).
1676.1.13	Utilize abilities needed for use of pin striping brushes and wheels.
1676.1.14	Color, sand, and buff to achieve maximum gloss.
1676.1.15	Remove swirl marks and surface imperfections using compounds and final glazing materials.
1676.1.16	Clean and detail final project.
1676.1.17	Dispose of hazardous waste according to EPA regulations.
1676.1.18	Clean, lubricate, and store equipment properly.

Structural Analysis and Damage Repair will continue to build student skill sets in frame and unibody type vehicles using welding techniques, measuring equipment, and frame machines. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

MIG/GMAW and STRSW

1677.1	Demonstrate vehicle protection procedures.
1677.1.1	Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations.
1677.1.2	Locate OEM procedures to identify materials and composites of the vehicle being repaired (mild steel, high strength steel, ultra-high strength steel, aluminum, etc.).
1677.1.3	Locate procedures and precautions that may apply to the vehicle being repaired.
1677.1.4	Identify vehicle systems precautions and/or inspections to include but not limited to supplemental restraint system (SRS), advanced driver assistance systems (ADAS), hybrid/alternative fuel vehicles, locations and recommended procedures before inspecting or replacing components.
1677.1.5	Select and use a NIOSH approved air purifying respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA regulation 1910.134 and applicable state and local regulation.
1677.1.6	Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations.
1677.1.7	Identify hazards; foam coatings and flammable materials prior to welding/cutting procedures.
1677.1.8	Protect computers and other electronics/wires during welding procedures.
1677.2	Describe various cutting and weld removal processes.
1677.2.1	Identify the considerations for cutting, removing, and welding various types of steel, aluminum, and other metals.
1677.2.2	Store, handle, and install high-pressure gas cylinders; test for leaks.
1677.2.3	Identify cutting process for different substrates and locations; perform cutting operation
1677.2.4	Perform vehicle clean-up; complete quality control using a checklist on operations performed.
1677.3	Describe and differentiate various types and uses of welding processes.
1677.3.1	Determine the correct GMAW welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation
1677.3.2	Set up, attach work clamp (ground), and adjust the GMAW welder to "tune" for proper electrode stick-out, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.
1677.3.3	Determine the proper angle of the gun to the joint and direction of gun travel for the type of weld being made.
1677.3.4	Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp or tack as required.
1677.3.5	Determine the joint type (butt weld with backing, lap, etc.) for weld being made.
1677.3.6	Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation.

1677.3.7	Perform the following welds: plug, butt weld with and without backing, and fillet, etc., in the flat, horizontal, vertical, and overhead positions.
1677.3.8	Perform visual evaluation and destructive test on each weld type.

Structural

1677.4	Select, set-up, and utilize manual measuring systems.
1677.4.1	Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations.
1677.4.2	Measure and diagnose structural damage using a tram gauge.
1677.4.3	Identify processes and procedures to Attach vehicle to anchoring devices
1677.4.4	Identify processes and procedures to Analyze, straighten and align mash (collapse) damage.
1677.4.5	Identify processes and procedures to Analyze, straighten and align sag damage.
1677.4.6	Identify processes and procedures to Analyze, straighten and align side sway damage.
1677.4.7	Identify processes and procedures to Analyze, straighten and align twist damage.
1677.4.8	Identify processes and procedures to Analyze, straighten and align diamond frame damage.
1677.4.9	Identify processes and procedures to Remove and replace damaged structural components.
1677.4.10	Identify processes and procedures to Replace protective coatings, restore corrosion protection to repaired or replaced frame areas and anchoring locations.
1677.4.11	Identify processes and procedures to Analyze and identify misaligned or damaged steering, suspension, and powertrain mounting points.
1677.4.12	Identify processes and procedures to Align or replace misaligned or damaged steering, suspension, and powertrain mounting points that can cause vibration, steering, and wheel alignment problems.
1677.4.13	Identify heat limitations and monitoring procedures for structural components.
1677.5	Explain and identify computerized 3-D measuring systems (Add).
1677.5.1	Analyze and identify misaligned or damaged steering, suspension, and powertrain mounting points that can cause vibration, steering and chassis alignment problems.
1677.5.2	Measure and diagnose unibody damage using a metric tape and tram gauge.
1677.5.3	Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system.
1677.5.4	08.25 Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, and laser, etc.).
1677.6	Demonstrate set up and operation of various pulling systems.
1677.6.1	Attach anchoring devices to vehicle; remove or reposition components as necessary.
1677.6.2	Identify processes and procedures to straighten and align roof rails/headers and roof panels.
1677.6.3	Straighten and align rocker panels and pillars.
1677.6.4	Straighten and align vehicle openings and floor pans.
1677.4.5	Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points).
1677.4.6	Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/powertrain mounting points).
1677.4.7	Identify substrate and repair or replacement recommendations.
1677.7	Diagnose primary and secondary structural damage.
1677.7.1	Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair.
1677.7.2	Determine the extent of damage to aluminum structural components; repair, weld, or replace.
1677.7.3	Analyze and identify crush/collapse zones.

1677.8	Demonstrate knowledge of working with high strength steel.
1677.8.1	Locate OEM procedures to identify materials and composites of the vehicle being repaired (mild steel, high strength steel, ultra-high strength steel, aluminum, etc.).
1677.9	Replace and/or repair structural components.
1677.9.1	Analyze and identify misaligned or damaged steering, suspension, and powertrain mounting points that can cause vibration, steering and chassis alignment problems.
1677.9.2	Measure and diagnose unibody damage using a metric tape and tram gauge.
1677.9.3	Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system.
1677.9.4	Straighten and align rocker panels and pillars.
1677.9.5	Straighten and align vehicle openings and floor pans.
1677.9.6	Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points).
1677.9.7	Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/powertrain mounting points).
1677.9.8	Repair damage using power tools and hand tools to restore proper contours and dimensions.
1677.9.9	Determine sectioning procedures of a steel body structure.
1677.9.10	Identify processes and procedures to restore corrosion protection to repaired or replaced structural areas, and anchoring locations.
1677.9.11	Determine the extent of damage to aluminum structural components; repair, weld, or replace.

Mechanical and Electrical Systems

1677.10	Identify basic steering and suspension components (e.g., tie rod ends, ball joints, steering racks).
1677.10.1	Perform visual inspection and measuring checks to identify steering and suspension collision damage.
1677.10.2	Identify one-time use fasteners.
1677.10.3	Clean, inspect, and prepare reusable fasteners.
1677.10.4	Identify processes and procedures to remove, replace, and adjust shift or clutch linkage as required.
1677.10.5	Identify processes and procedures to remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings and pump mounts.
1677.10.6	Identify processes and procedures to remove and replace power steering gear (non-rack and pinion type).
1677.10.7	Identify processes and procedures to inspect, remove, and replace power rack and pinion steering gear and related components.
1677.10.8	Identify processes and procedures to inspect and replace parallelogram steering linkage components.
1677.10.9	Identify processes and procedures to inspect, remove and replace upper and lower control arms and related components.
1677.10.10	Identify processes and procedures to inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc.).
1677.10.11	Identify processes and procedures to inspect, remove and replace front suspension system coil springs and spring insulators (silencers).
1677.10.12	Identify processes and procedures to inspect, remove, replace, and adjust suspension system torsion bars, and mounts.
1677.10.13	Identify processes and procedures to inspect, remove and replace stabilizer bar bushings, brackets, and links.

1677.10.14	Identify processes and procedures to inspect, remove and replace MacPherson strut or assembly, upper bearing, and mount.
1677.10.15	Identify processes and procedures to inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts.
1677.10.16	Identify processes and procedures to inspect, remove, and replace suspension system leaf spring(s) and related components.
1677.10.17	Identify processes and procedures to inspect axle assembly for damage and misalignment.
1677.10.18	Identify processes and procedures to remove and replace drive axle assembly.
1677.10.19	Identify processes and procedures to inspect, remove and replace half shafts and axle constant velocity (CV) joints.
1677.10.20	Identify processes and procedures to inspect, remove and replace drive shafts and universal joints.
1677.10.21	Demonstrate an understanding of safe handling procedures associated with high voltage powertrain components.
1677.10.22	Identify processes and procedures to inspect, remove and replace shock absorbers.
1677.10.23	Identify processes and procedures to diagnose, inspect, adjust, repair or replace active suspension systems and associated lines and fittings.
1677.10.24	Identify processes and procedures to measure vehicle ride height and wheelbase; determine necessary action.
1677.10.25	Identify processes and procedures to inspect, remove, replace, and align front and rear frame (cradles/sub).
1677.10.26	Identify processes and procedures to diagnose and inspect steering wheel, steering column, and components.
1677.10.27	Identify processes and procedures to verify proper operation of steering systems including electronically controlled, hydraulic and electronically assisted steering systems.
1677.10.28	Identify processes and procedures to diagnose front and rear suspension system noises and body sway problems; determine necessary action.
1677.10.29	Diagnose vehicle wandering, pulling, hard steering, bump steer, memory steering, torque steering, and steering return problems; determine necessary action.
1677.10.30	Demonstrate an understanding of wheel suspension and steering alignments (caster, camber, toe, SAI etc.).
1677.10.31	Diagnose tire wear patterns; determine cause.
1677.10.32	Identify processes and procedures to inspect tires; identify direction of rotation and location; check tire size, tire pressure monitoring system (TPM) and adjust air pressure.
1677.11	Identify service and operation of air conditioning (AC) and cooling systems.
1677.11.1	Identify processes and procedures to comply with environmental regulations relating to refrigerants and coolants.
1677.11.2	Maintain and verify correct operation of certified refrigerant recovery and recharging equipment.
1677.11.3	Locate and identify A/C system service ports.
1677.11.4	Identify processes and procedures to identify refrigerant contamination, recover, label, store, and recycle refrigerant from an A/C system.
1677.11.5	Identify processes and procedures to select refrigerant, evacuate, and recharge an A/C system; check for leaks.
1677.11.6	Identify processes and procedures to select oil type and install correct amount in A/C system.
1677.11.7	Identify processes and procedures to inspect, adjust, and replace A/C compressor drive belts; check pulley alignment.

1677.11.8	Identify processes and procedures to remove and replace A/C compressor; inspect, repair or replace A/C compressor mount.
1677.11.9	Identify processes and procedures to inspect, repair or replace A/C system mufflers, hoses, lines, fittings, orifice tube, expansion valve, and seals.
1677.11.10	Identify processes and procedures to inspect, test, and replace A/C system condenser and mounts.
1677.11.11	Identify processes and procedures to inspect and replace receiver/drier or accumulator/drier.
1677.11.12	Identify processes and procedures to inspect and repair A/C component wiring.
1677.11.13	Demonstrate an understanding of safe handling procedures associated with high voltage A/C compressors and wiring.
1677.11.14	Identify processes and procedures to inspect and protect open A/C system components from contaminants during repairs.
1677.12	Identify a basic safety restraint system (SRS).
1677.12.1	Identify processes and procedures to inspect, remove, and replace seatbelt and shoulder harness assembly and components.
1677.12.2	Identify processes and procedures to inspect restraint system mounting areas for damage; repair as needed.
1677.12.3	Identify processes and procedures to inspect the operation of the seatbelt system.
1677.12.4	Identify processes and procedures to disable and enable Supplemental Restraint System (SRS).
1677.12.5	Identify processes and procedures to inspect, protect, remove and replace Supplemental Restraint Systems (SRS) sensors and wiring; ensure sensor orientation.
1677.12.6	Identify processes and procedures to verify that Supplemental Restraint System (SRS) is operational.
1677.12.7	Identify processes and procedures to inspect, remove, replace and dispose of deployed and non-deployed airbag(s) and pre-tensioners.
1677.12.8	Identify processes and procedures to use Diagnostic Trouble Codes (DTC) to diagnose and repair the Supplemental Restraint System (SRS).
1677.12.9	Demonstrate an understanding of advanced restraint systems.
1677.12.10	Identify components of Supplemental Restraint Systems (SRS).
1677.12.11	Demonstrate an understanding of advanced restraint and occupant classification systems (OCS).
1677.12.12	Identify processes and procedures to disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.
1677.12.13	Perform vehicle clean-up; complete quality control checklist on operations performed

Surface Preparation and Refinishing will continue to build student skill sets in preparing a surface for refinishing; inspect, clean, and operate spraying equipment; detail a vehicle; and diagnose finish defects. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Safety

1679.1	Demonstrate knowledge of safety and environmental requirements in the collision repair industry.
1679.1.1	Identify safety considerations: Personal Protective Equipment (PPE), shock hazards, fumes, material safety data sheet (MSDS) before beginning any repairs.
1679.1.2	Identify potential health, safety, and environmental concerns associated with vehicle components and systems, i.e., ABS, air bags (SRS), refrigerants, hybrid electric vehicles, coolants, paints, and thinners.
1679.1.3	Explain requirements of the EPA regulations and evaluate how they apply to specific businesses.
1679.1.4	Identify EPA rules for compliance requirements for refinishing materials.
1679.1.5	Identify hazardous air pollutants (HAP) and how they can affect public health and the environment.
1679.1.6	Explain proper storage and disposal of hazardous waste.
1679.1.7	Review and maintain proper hazardous waste records
1679.2	Demonstrate appropriate care and maintenance of shop tools and equipment.
1679.2.1	Describe spray gun cleaning requirements.
1679.2.2	Explain spray booth requirements and filter maintenance schedules.
1679.2.3	Inspect spray environment and equipment to ensure compliance with federal, state, and local regulations, and for safety and cleanliness hazards.
1679.2.4	Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).
1679.2.5	Select spray gun setup (fluid needle, nozzle, and cap) for product being applied.
1679.2.6	Test and adjust spray guns using fluid, air, and pattern control valves.
1679.2.7	Demonstrate an understanding of the operation and maintenance of pressure spray equipment.
1679.3	Identify proper safety techniques for the use of shop equipment, including PPE.
1679.3.1	Demonstrate how to use personal protection equipment.
1679.3.2	Identify equipment that reduces the amount of HAP.
1679.3.3	Identify hazardous waste associated with painting and refinishing.
1679.3.4	Identify ways to reduce the amount of methylene chloride (MeCl) paint stripper.

Corrosion Protection

1679.4	Demonstrate vehicle protection procedures.
1679.4.1	Explain causes of corrosion and understand the corrosion protection processes of manufacturers.

1679.4.2	Identify the steps required in determining where to apply anti-corrosion compounds and undercoating.
1679.4.3	Review and understand the considerations for properly preparing parts for corrosion protection coatings.
1679.4.4	Explain how to apply corrosion protection materials.
1679.4.5	Identify the function and location of chip-resistant coating and how to replace it during the repair process.
1679.4.6	Identify seam sealer characteristics and applications.
1679.4.7	Identify the different corrosion protection recommendations from the different vehicle makers.

Painting and Refinishing

1679.5	Identify and demonstrate paint materials preparation techniques.
1679.5.1	Identify color code by manufacturer's vehicle information label.
1679.5.2	Shake, stir, reduce, catalyze/activate, and strain refinish materials.
1679.5.3	Artistically apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied.
1679.5.4	Artistically apply selected product on test or let-down panel; check for color match.
1679.5.5	Artistically apply single stage topcoat.
1679.5.6	Artistically apply basecoat/clearcoat for panel blending and panel refinishing.
1679.5.7	Artistically apply basecoat/clearcoat for overall refinishing.
1679.5.8	Remove nibs or imperfections from basecoat.
1679.5.9	Identify product expiration dates as applicable.
1679.5.10	Artistically refinish plastic parts.
1679.5.11	Artistically apply multi-stage coats for panel blending and overall refinishing.
1679.5.12	Identify and mix paint using a formula.
1679.5.13	Identify poor hiding colors; determine necessary action.
1679.5.14	Creatively and artistically tint color using formula to achieve a blendable match.
1679.5.15	Identify alternative color formula to achieve a blendable match.
1679.5.16	Identify the materials equipment, and preparation differences between solvent and waterborne technologies.
1679.6	Identify causes and remedies for paint defects.
1679.6.1	Identify blistering (raising of the paint surface, air entrapment); correct the cause(s) and the condition.
1679.6.2	Identify a dry spray appearance in the paint surface; correct the cause(s) and the condition.
1679.6.3	Identify the presence of fisheyes (crater-like openings) in the finish; correct the cause(s) and the condition.
1679.6.4	Identify lifting; correct the cause(s) and the condition.
1679.6.5	Identify clouding (mottling and streaking in metallic finishes); correct the cause(s) and the condition.
1679.6.6	Identify orange peel; correct the cause(s) and the condition.
1679.6.7	Identify overspray; correct the cause(s) and the condition.
1679.6.8	Identify solvent popping in freshly painted surface; correct the cause(s) and the condition.
1679.6.9	Identify sags and runs in paint surface; correct the cause(s) and the condition.
1679.6.10	Identify sanding marks or sand scratch swelling; correct the cause(s) and the condition.
1679.6.11	Identify contour mapping/edge mapping; correct the cause(s) and the condition.
1679.6.12	Identify color difference (off-shade); correct the cause(s) and the condition.
1679.6.13	Identify tape tracking; correct the cause(s) and the condition.
1679.6.14	Identify low gloss condition; correct the cause(s) and the condition.
1679.6.15	Identify poor adhesion; determine the cause(s) and correct the condition.

1679.6.16	Identify paint cracking (shrinking, splitting, crow's-feet, or line-checking, micro-checking, etc.); correct the cause(s) and the condition.
1679.7	Identify and demonstrate paint materials application techniques.
1679.7.1	Explain why waterborne products are used and which waterborne products are available.
1679.7.2	Explain the difference between waterborne and solvent-borne refinishing materials, including waterborne characteristics and benefits.
1679.7.3	Identify the environmental impact and reasons for converting to waterborne refinishing materials.
1679.7.4	Explain preparation, mixing, and application considerations.
1679.7.5	Explain the facility requirements for making the conversion to waterborne refinishing materials.
1679.7.6	Identify proper storage and disposal procedures of waterborne materials.

This course introduces the student to the knowledge base and technical skills for all courses in the *Broadcasting Technology* program of study. Areas of study include fundamentals of broadcasting, broadcasting equipment, on-air presentation skills, and student organizations. Emphasis will be placed on career exploration, job-seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Safety

1681.1	Demonstrate understanding of fire safety.
1681.1.1	Display knowledge of fire prevention measures and protocols.
1681.1.2	Execute proper procedures in case of a fire emergency.
1681.2	Demonstrate knowledge of equipment safety.
1681.2.1	Read operating instructions before using any equipment.
1681.2.2	Understand proper handling of cables in a dry environment.
1681.2.3	Recognize proper equipment handling such as lifting techniques, secure mounting, and ergonomics.
1681.2.4	Understanding lighting safety such as studio light heat management, securing light fixtures, and avoiding direct eye exposure.
1681.2.5	Demonstrate appropriate camera safety such as tripod stability and battery safety.
1681.2.6	Research audio safety such as volume levels and microphone placement.
1681.2.7	Apply fundamentals of ladder and step stool safety.
1681.2.8	Demonstrate appropriate emergency and first aid knowledge and procedures for arts and communication occupations.

Pre-Production

1681.4	Define target audience, including demographics and ratings.
1681.4.1	Analyze and interpret news and information received from various sources to broadcast the information.
1681.4.2	Examine news items of local, national, and international significance to determine topics to address or obtain assignments from editorial staff members.
1681.4.3	Understand rating levels such as interest level, learning style, motivation, and engagement.
1681.4.4	Demonstrate an awareness of the arts within a cultural context to understand the nature and scope of art in society (e.g., how film, theatre, television, electronic, and print media productions influence values and behaviors).
1681.5	Create or prepare production schedule/timeline.
1681.5.1	Demonstrate ability to plan and organize various stages of production, including pre-production, production, and post-production.
1681.6	Identify various budget/financial issues.
1681.6.1	Determine formats, approaches, content, levels, and mediums to effectively meet objectives within budgetary constraints, utilizing research, knowledge, and training.
1681.6.2	Assess the financial implications of different decisions and resource allocations throughout the project lifecycle.
1681.7	Demonstrate knowledge of concept development.

1681.7.1	Gather information and develop perspectives about news subjects through research, interviews, observation, and experience.
1681.7.2	Demonstrate the ability to plan a broadcast production.
1681.8	Demonstrate knowledge of various script formats, including storyboarding.
1681.8.1	Study scripts to become familiar with production concepts and requirements.
1681.8.2	Apply knowledge of script formats and storyboarding to effectively communicate narrative elements and visualize production sequences.
1681.8.3	Demonstrate the writing processes used in journalism and broadcasting media (e.g., cultivating ideas, comparing, and contrasting different writing styles, using pictures/video to support stories, editing content).
1681.9	Determine technical requirements and site survey/location scout.
1681.9.1	Determine the number, type, and approximate location of microphones, cameras and equipment needed for best sound recording or transmission quality and position them appropriately.
1681.10	Identify and describe various communication delivery methods.
1681.10.1	Prepare slates that describe the scenes being filmed.
1681.10.2	Recognize diverse communication delivery methods such as verbal, written, and visual.
1681.10.3	Describe the characteristics and applications of each communication delivery method.
1681.11	Design and construct sets and lighting.
1681.11.1	Understand layout and design of creative set designs tailored to production requirements.

Production

1685.12	Prepare graphics appropriate to production.
1685.12.2	Produce graphics for broadcasts.
1685.12.3	Design graphics that align with the visual style and message of the production.
1681.13	Identify parts of cameras, accessories, and camera support systems.
1681.13.1	Identify and explain the purpose of each component of the camera.
1681.13.2	Recognize essential components like lenses, sensors, and tripods.
1681.13.3	Understand the roles of accessories such as filters and gimbals.
1681.13.4	Differentiate between camera mounts and grips.
1681.13.5	Learn about additional tools like external monitors and remote controls.
1681.13.6	Use cameras in several different camera mounts such as stationery, track-mounted, or crane-mounted.
1681.13.7	Practice with camera support systems like dollies, sliders, and cranes for stable and dynamic shots.
1681.14	Perform camera movements (e.g., tilt, pan, truck, dolly).
1681.14.1	Demonstrate the types of angles and camera movements in shooting video.
1681.14.2	Demonstrate mastery in performing dynamic camera motions to enhance visual storytelling.
1681.15	Properly adjust cameras (i.e., exposure, white balance).
1681.15.1	Read charts and compute ratios to determine variables such as lighting, shutter angles, filter factors, and camera distances.
1681.15.2	Ensure proper calibration of cameras to achieve balanced exposure and accurate color representation, control brightness, and contrast levels.
1681.16	Demonstrate appropriate lens operation and framing.
1681.16.1	Demonstrate proficiency in adjusting lenses for optimal framing, focusing, and zooming.
1681.16.2	Develop skillful handling of lenses to achieve desired visual composition.
1681.16.3	Demonstrate versatility in lens selection to adapt to various shooting scenarios.
1681.16.4	Ensure precise framing to convey intended emotions and messages effectively.
1681.17	Identify various live distribution methods.

1681.17.1	Explore diverse live distribution methods for content dissemination.
1681.17.2	Research different techniques for broadcasting live content.
1681.17.3	Become familiar with various avenues for live content distribution.
1681.18	Identify and maintain various recording and file management systems.
1681.18.1	Understand various file management systems commonly used in media production, such as file hierarchies, naming conventions, and metadata organization.
1681.18.2	Organize recorded files systematically, employing folder structures and labeling techniques to facilitate easy retrieval and management.
1681.18.3	Apply metadata tags to recorded files, including relevant information such as date, location, and content description, to enhance searchability and organization.
1681.18.4	Implement measures to protect recorded files from loss, corruption, or unauthorized access, such as regular backups and password protection.
1681.19	Determine microphone selection and application.
1681.19.1	Assess audio requirements to select appropriate microphones.

Post-Production

1681.20	Identify and describe proper editing techniques.
1681.20.1	Select material most pertinent to presentation and organize this material into appropriate formats.
1681.20.2	Recognize various editing techniques suitable for the project's narrative and style.
1681.20.3	Describe the application of proper editing techniques to enhance storytelling and maintain continuity.
1681.21	Demonstrate editing aesthetics.
1681.21.1	Apply editing techniques to enhance visual appeal and coherence.
1681.21.2	Show proficiency in creating aesthetically pleasing transitions and effects.
1681.21.3	Demonstrate skill in maintaining a consistent and polished visual style throughout the editing process.
1681.22	Identify and manage various file formats.
1681.22.1	Recognize different file formats commonly used in multimedia production.
1681.22.2	Manage file formats efficiently to ensure compatibility across platforms.
1681.22.3	Convert and optimize file formats as needed to maintain quality and accessibility.
1681.23	Import, capture, and export media appropriately.
1681.23.1	Import media files seamlessly into the editing software for further processing.
1681.23.2	Capture media content from external sources with precision and clarity.
1681.23.3	Export media in the appropriate format and settings for optimal compatibility and quality.
1681.24	Describe and apply motion graphics and video compositing.
1681.24.1	Explain the principles and techniques of motion graphics and video compositing.
1681.24.2	Apply motion graphics to enhance visual storytelling and engage the audience.
1681.24.3	Utilize video compositing to seamlessly integrate multiple visual elements for a cohesive and polished final product.
1681.25	Evaluate the finished product with the client/audience.
1681.25.1	Solicit feedback from the client/audience to assess their perception of the finished product.
1681.25.2	Analyze reactions and opinions to gauge the effectiveness of the production in meeting its objectives.
1681.25.3	Incorporate constructive criticism and suggestions to refine the final product for enhanced satisfaction and impact.
1681.26	Identify and describe essential computer hardware and software.
1681.26.1	Use software such as word processors and spreadsheets to perform common business applications.
1681.26.2	Use software such as databases to track and maintain company information.

Ethics, Communications, and General Field Knowledge

1681.27	Identify and define various career paths in the video production/broadcasting field.
1681.27.1	Demonstrate employability skills related to a career in arts and communication.
1681.27.2	Identify diverse career paths in video production and broadcasting.
1681.27.3	Recognize opportunities in television, film, advertising, and online media.
1681.27.4	Discuss the skill sets and qualifications required for each career path.
1681.27.5	Pursue career development skills to advance in arts and communication careers.
1681.28	Exhibit knowledge of copyrights, contracts, ethics, images, talent, and industry legalities.
1681.28.1	Maintain programming logs, as required by station management and the FCC.
1681.28.2	Organize and maintain compliance, license, and warranty information related to audio and video facilities.
1681.28.3	Keep daily program logs to provide information on all elements aired during broadcast, such as musical selections and station promotions.
1681.28.4	Analyze current issues related to the arts and communication fields.
1681.28.5	Apply appropriate laws and regulations to arts and communication situations.
1681.28.6	Exhibit ethical conduct in conducting business and making decisions.
1681.28.7	Demonstrate knowledge of copyright laws relevant to the video production and broadcasting industry, including principles of intellectual property, fair use, and licensing requirements for using copyrighted material.
1681.28.8	Explore different types of contractual agreements commonly used in the industry, such as talent contracts, licensing agreements, and production contracts.
1681.28.9	Understand the key elements of contracts, rights and obligations of parties involved, and legal implications of contractual breaches.
1681.28.10	Analyze ethical considerations in video production and broadcasting, including issues such as accuracy, privacy, representation, and bias.
1681.28.11	Identify ethical dilemmas and make informed decisions in accordance with professional ethical standards and industry best practices.
1681.29	Demonstrate knowledge of the business aspects of the video/broadcasting field and professional behavior with clients, coworkers, and supervisors.
1681.29.1	Develop manuals, texts, workbooks, or related materials for use with production materials or for training.
1681.29.2	Exhibit leadership qualities to improve the quality of work and the work environment.
1681.29.3	Work effectively in a team environment to improve the quality of work and the work environment.
1681.29.4	Apply reading skills in an arts and communication environment.
1681.29.5	Apply writing skills in an arts and communication environment.
1681.29.6	Locate, organize, and reference written information from reliable sources to communicate with coworkers and clients/participants.
1681.29.7	Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences.
1681.29.8	Apply listening skills and interpret verbal and nonverbal behaviors to enhance communication with coworkers and clients.
1681.29.9	Interpret and use tables, charts, and figures to support written and oral communication.

This course will provide students with the knowledge to perform, either in a live or mock setting, a radio broadcast. Areas of study include on-air news presentations, deejay presentations, radio production and management, and student organizations. Students will demonstrate knowledge and technical expertise in the preproduction and performance of a live 30-minute show. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to broadcasting occupations. Safety instruction is integrated into all activities. Students are encouraged to become active members of Skills USA for additional co-curricular opportunities that enhance student achievement, develop student leadership, and support experiential learning.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Pre-Production

1683.1	Define target audience, including demographics and ratings.
1683.1.1	Define target audience demographics for radio broadcasting, including factors such as age, gender, geographic location, income level, and interests, to tailor content and programming effectively.
1683.1.2	Understanding of audience ratings and measurement methods used in radio broadcasting, including techniques such as Nielsen Audio ratings, surveys, and listener analytics, to assess audience preferences and engagement.
1683.1.3	Explore strategies for developing audience-centric content for radio broadcasting.
1683.2	Create or prepare production schedule/timeline.
1683.2.1	Understand the chronological flow of tasks involved in planning and executing a radio broadcast.
1683.2.2	Create a detailed production timeline for a radio broadcast, including identifying tasks, setting deadlines, and allocating resources, to ensure efficient project management and timely completion of the broadcast.
1683.3	Identify various budget/financial issues
1683.3.1	Identify various budget and financial issues relevant to radio broadcasting projects
1683.3.2	Analyze budget constraints, revenue sources, cost allocation, and financial planning considerations to make informed decisions in managing financial aspects of radio broadcasting operations.
1683.4	Demonstrate knowledge of concept development.
1683.4.1	Understand the fundamentals of radio broadcasting, including the history, principles, and key components of radio production.
1683.4.2	Analyze and critique radio broadcasts, to identify strengths, weaknesses, and areas for improvement, fostering continuous learning and growth.
1683.5	Demonstrate knowledge of various script formats, including storyboarding
1683.5.1	Write engaging scripts tailored for radio, focusing on storytelling techniques, concise messaging, and maintaining audience interest.
1683.5.2	Demonstrate storytelling techniques.
1683.5.3	Demonstrate concise message and audience interest.
1683.6	Determine technical requirements and site survey/location scout
1683.6.1	Explore different radio formats such as music, talk, news, and sports, understanding the unique characteristics and requirements of each format.

1683.6.2	Gain practical experience in radio production techniques, including recording, editing, mixing, and mastering audio content using digital audio workstations (DAWs) or specialized radio software
1683.7	Identify and describe various communication distribution methods.
1683.7.1	Identify and describe various communication distribution methods used in radio broadcasting, including terrestrial radio, internet streaming, podcasting, satellite radio, and social media platforms, to comprehend the diverse channels available for reaching audiences.
1683.7.2	Explore emerging trends and technologies in communication distribution, such as mobile apps, smart speakers, and on-demand audio platforms
1683.7.3	Explore innovations shaping the future of radio broadcasting and adapt to evolving audience preferences and consumption habits.
1683.7.4	Enhance communication skills, including speaking clearly, enunciating words, modulating voice tone, and conveying messages effectively for radio audiences.
1683.7.5	Develop interviewing skills, including conducting research, formulating relevant questions, active listening, and engaging interviewees to elicit informative and entertaining responses.
1683.8	Select crew and cast talent for appropriate production requirements.
1683.8.1	Identify and analyze production requirements for radio broadcasting projects, including content, format, style, and target audience preferences
1683.8.2	Develop skills in assessing the skills, experience, and suitability of potential crew members and cast talent for radio broadcasting projects, considering factors such as expertise, availability, interpersonal skills, and compatibility with project objectives and team dynamics.
1683.8.3	Locate guests to appear on talk or interview shows.
1683.8.4	Inform users of audio and videotaping service policies and procedures.
1683.9	Design and construct sets and lighting.
1683.9.1	Gain hands-on experience in constructing sets for radio broadcasting projects, utilizing tools, materials, and equipment effectively to bring their design concepts to life and create immersive and engaging environments for listeners.
1683.9.2	Understand the fundamental principles of set design such as space, composition, mood, atmosphere for guests and speakers in radio broadcasting.

Production

1683.10	Direct and produce studio production.
1683.10.1	Comment on music and other matters, such as weather or traffic conditions.
1683.10.2	Interview show-guests about their lives, their work, or topics of current interest.
1683.10.3	Discuss various topics over the telephone with viewers or listeners.
1683.10.4	Announce musical selections, station breaks, commercials, or public service information, and accept requests from listening audience.
1683.10.5	Coordinate games, contests, or other on-air competitions, performing such duties as asking questions and awarding prizes.
1683.10.6	Perform narration of productions, or present announcements.
1683.11	Direct and produce a field production.
1683.11.1	Comment on music and other matters, such as weather or traffic conditions.
1683.11.2	Provide commentary and conduct interviews during sporting events, parades, conventions, and other events.
1683.11.3	Perform narration of productions, or present announcements.
1683.12	Produce or select appropriate music for production.

1683.12.1	Reproduce and duplicate sound recordings from original recording media, using sound editing and duplication equipment.
1683.12.2	Prepare for recording sessions by performing activities such as selecting and setting up microphones.
1683.12.3	Separate instruments, vocals, and other sounds, and combine sounds later during the mixing or postproduction stage.
1683.12.4	Record needed sounds or obtain them from sound effects libraries.
1683.13	Identify various live transmission methods.
1683.13.1	Play and record broadcast programs using automation systems.
1683.13.2	Record sound onto tape or film for radio or television, checking its quality and adjusting where necessary.
1683.14	Identify and maintain various recording and file management systems.
1683.14.1	Keep logs of recordings.
1683.14.2	Analyze and maintain data logs for audiovisual activities.
1683.15	Determine microphone selection and application.
1683.15.1	Set up, test, and adjust recording equipment for recording sessions and live performances.
1683.16	Identify and operate various audio devices in a recording environment.
1683.16.1	Control audio equipment to regulate the volume and sound quality during radio and television broadcasts.
1683.16.2	Regulate volume level and sound quality during recording sessions, using control consoles.
1683.16.3	Mix and edit voices, music, and taped sound effects for live performances and for prerecorded events, using sound mixing boards.
1683.16.4	Operate control consoles.

Post-Production

1683.17	Identify and describe proper editing techniques.
1683.17.1	Recognize concepts such as pacing, rhythm, continuity, storytelling, and audio manipulation, to develop a solid understanding of the role of editing in shaping the narrative and overall quality of radio productions.
1683.17.2	Explore various editing tools and software commonly used in radio broadcasting, such as digital audio workstations (DAWs), editing software, and sound effects libraries
1683.17.3	Demonstrate and understanding of various editing tools, their features, functionalities, and capabilities for enhancing audio content.
1683.17.4	Apply proper editing techniques to audio recordings, including trimming, splicing, crossfading, volume adjustment, equalization, and adding sound effects, to refine and polish audio content for clarity, coherence, and impact in radio broadcasting productions.
1683.18	Demonstrate editing aesthetics.
1683.18.1	Understanding of editing aesthetics in radio broadcasting, including principles such as rhythm, pacing, timing, and emotional impact.
1683.18.2	Identify techniques used to evoke mood, convey information, and engage listeners effectively.
1683.18.3	Demonstrate appropriate timing, sequencing, and audio manipulation to achieve desired emotional effects, maintain audience interest, and ensure coherence and flow.
1683.19	Identify and manage various file formats.
1683.19.1	Identify various file formats used in radio broadcasting.
1683.19.2	Manage file formats effectively, ensuring compatibility with different software, hardware, and distribution platforms.

1683.19.3	Establish naming conventions, creating organized folder structures, and maintaining backups, to ensure efficient workflow, easy retrieval, and long-term preservation of media assets.
1683.20	Import, capture, and export media appropriately.
1683.20.1	Understand the technical settings and procedures required to ensure high-quality media acquisition and maintain file integrity.
1683.20.2	Export media in appropriate formats and settings for various platforms and purposes, including broadcast, online streaming, and archival.
1683.21	Evaluate the finished product with the client/audience.
1683.21.1	Gather and analyze feedback.
1683.21.2	Assess the effectiveness of the content in meeting the project's goals and audience expectations
1683.21.3	Create recommendations for improvements or future projects.
1683.22	Identify and describe essential computer hardware for editing.
1683.22.1	Identify and describe essential computer hardware components for editing media.
1683.22.2	Understand the roles of key hardware elements such as processors, RAM, storage devices, graphics cards, and monitors in ensuring efficient and effective media editing workflows.

Ethics, Communications, and General Field Knowledge

1683.23	Identify and define various career paths in the video production/broadcasting field.
1683.23.1	Identify and define various career paths in the radio broadcasting field.
1683.24	Exhibit knowledge of copyrights, contracts, ethics, and industry legalities.
1683.24.1	Understand the principles of intellectual property, the key elements of media contracts, ethical standards in media production, and relevant legal regulations,
1683.24.2	Organize and maintain compliance, license, and warranty information related to audio and video facilities.
1683.24.3	Create daily program logs to provide information on all elements aired during broadcast, such as musical selections and station promotions.
1683.25	Cooperate professionally with clients, coworkers, and supervisors.
1683.25.1	Collaborate effectively with clients to understand their vision and requirements, actively listening to their feedback and integrating it into project plans to ensure deliverables meet or exceed expectations.
1683.25.2	Foster a supportive and respectful work environment by actively engaging with coworkers, helping when needed, and openly communicating ideas and concerns to promote teamwork and achieve collective goals.
1683.25.3	Demonstrate proactive communication with supervisors by providing regular progress updates, seeking guidance when facing challenges, and implementing constructive feedback to continually improve performance and contribute to the overall success of projects and initiatives.
1683.26	Demonstrate knowledge of the business aspects of the video/broadcasting field.
1683.26.1	Collaborate effectively with clients to understand their vision and requirements..
1683.26.2	Analyze market trends and competitor strategies within the video/broadcasting industry.
1683.26.3	develop strategies for successful media business operations.
1683.26.4	Implement effective marketing and promotional strategies tailored to target audiences and platforms..

This course is an introduction to the techniques, equipment, and applications used in Video Editing. Areas of study include the production process, ingestion, non-linear editing, final package distribution, and student organizations. Students will demonstrate technical expertise in non-linear video editing techniques. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to broadcasting occupations. Safety instruction is integrated into all activities. Students are encouraged to become active members of Skills USA for additional co-curricular opportunities that enhance student achievement, develop student leadership, and support experiential learning. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Composition and Editing Basics

1684.1	Apply Composition Techniques to Projects and Presentations.
1684.1.1	Identify composition techniques used in photos, videos, and other visual media.
1684.1.2	Analyze the purpose behind the use of certain composition techniques in visual media.
1684.1.3	Apply composition techniques to their own photos and videos.
1684.1.4	Upload, label, and organize footage/assets.
1684.1.5	Download and import footage/assets into computer software/media.
1684.1.6	Edit and sequence video clips.
1684.1.7	Create and add text to video projects.
1684.1.8	Add transitions to video project.
1684.1.9	Add music tracks to video projects.
1684.1.10	Export finished projects.

Cinematography

1684.2	Understanding and Applying Cinematic Techniques.
1684.2.1	Identify and analyze the types of shots in visual media, as well as the purpose behind the selection of each shot.
1684.2.2	Create storyboards to plan and communicate their vision for video projects.
1684.2.3	Apply purposeful and effective camera shots to their own film work.
1684.2.4	Identify and analyze the types of angles in visual media, as well as the purpose behind the selection of each angle.
1684.2.5	Apply purposeful and effective camera angles to their own film work.
1684.2.6	Identify and analyze the types of camera movement in film, as well as the purpose behind the selection of each movement.
1684.2.7	Apply purposeful and effective camera movement to their own film work.
1684.2.8	Identify and analyze the types of light design techniques in film and the purpose behind each technique's selection.
1684.2.9	Write reflections to evaluate their work and progress.

Production

1684.3	Explore Screenwriting and Production.
1684.3.1	Write screenplays in the standard format, focusing on communicating action.
1684.3.2	Break down a script to plan for production.
1684.3.3	Craft shooting scripts/shot lists with camera setups in mind to ensure an efficient shoot.
1684.3.4	Slat each shot with a film marker.
1684.3.5	Direct on set.
1684.3.6	Capture proper sound during production using production sound equipment such as external microphones, boom poles, and recorders.
1684.3.7	Edit and mix sound to proper levels to avoid clipping and pops.

This course will provide students with the knowledge to perform, either in a live or mock setting, or a television broadcast. Areas of study include writing television news, conducting interviews, preproduction, production, and student organizations. Students will show knowledge and technical expertise in television production equipment and applications.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Pre-Production

1685.1	Define target audience, including demographics and ratings.
1685.1.2	Examine news items of local, national, and international significance to determine topics to address or obtain assignments from editorial staff members.
1685.1.3	Study background information to prepare for programs or interviews.
1685.2	Create or prepare production schedule/timeline.
1685.2.1	Prepare a detailed timeline that facilitates efficient workflow and project management.
1685.2.2	Develop a comprehensive production schedule outlining key milestones and deadlines.
1685.2.3	Coordinate tasks and resources to ensure timely completion of each stage of the production process.
1685.3	Identify various budget/financial issues.
1685.3.1	Recognize budget constraints and financial limitations pertinent to the project.
1685.3.2	Identify potential cost overruns or budgetary discrepancies early on.
1685.4	Demonstrate knowledge of concept development.
1685.4.1	Plan and develop pre-production ideas into outlines, scripts, story boards, and graphics.
1685.5	Demonstrate knowledge of various script formats, including storyboarding.
1685.5.1	Write commentaries, columns, or scripts, using appropriate technology.
1685.5.2	Exhibit proficiency in standard script formats such as screenplay, stage play, or teleplay.
1685.5.3	Utilize storyboarding techniques to visually outline scenes and sequences.
1685.6	Determine technical requirements and site survey/location scout.
1685.6.1	Organize recording sessions and prepare areas such as television stations for recording.
1685.6.2	Set up and operate portable field transmission equipment outside the studio.
1685.6.3	Monitor strength, clarity, and reliability of incoming and outgoing signals, and adjust equipment as necessary to maintain quality broadcasts.
1685.6.4	Recognize various digital video signal formats such as HDMI, DisplayPort, and DVI.
1685.6.5	Describe the characteristics and transmission methods of digital video signals.
1685.6.6	Explain the advantages and limitations of different digital video signal standards.
1685.7	Select crew and cast talent for appropriate production requirements.
1685.7.1	Compare and contrast the roles of creators, performers, and others involved in the production and presentation of broadcasting/journalism, performing arts, and visual arts.
1685.7.2	Locate guests to appear on talk or interview shows.
1685.7.3	Inform users of audio and videotaping service policies and procedures.
1685.8	Select crew and cast talent for appropriate production requirements.
1685.8.1	Locate guests to appear on talk or interview shows.

1685.8.2	Inform users of audio and videotaping service policies and procedures.
1685.8.3	Select crew members and cast talent based on their suitability and proficiency for the project.
1685.8.4	Ensure alignment between the selected crew and cast talent with the specific demands and objectives of the production.
1685.8.5	Assess production requirements to identify the necessary skills and talents.
1685.9	Design and construct set and lighting.
1685.9.1	Assemble studio sets, and select and arrange cameras, film stock, audio, or lighting equipment to be used during filming.
1685.9.2	Develop innovative set designs tailored to the production's aesthetic and thematic requirements.
1685.9.3	Execute precise lighting arrangements to enhance mood, atmosphere, and visual impact.
1685.9.4	Coordinate with the production team to construct sets and install lighting fixtures in alignment with artistic vision and technical specifications.

Production

1685.10	Prepare graphics appropriate to production.
1685.10.1	Create visually engaging graphics tailored to specific scenes or segments.
1685.10.2	Ensure graphics are prepared and integrated seamlessly into the production timeline and format requirements.
1685.11	Execute various lighting designs.
1685.11.1	Implement diverse lighting setups to achieve desired atmospheres and moods.
1685.11.2	Execute precise lighting adjustments to enhance visual composition and narrative emphasis.
1685.11.3	Coordinate with the production team to execute lighting designs that complement the overall aesthetic and thematic elements of the production.
1685.11.4	Demonstrate appropriate studio and general lighting for television production, including back, key, fill, natural light, three-point lighting and camera lighting functions.
1685.11.5	Apply directional lighting to highlight specific subjects or objects.
1685.12	Direct and produce a studio production.
1685.12.1	Set up and perform live shots for broadcast.
1685.12.2	Setup and ensure proper maintenance and upkeep of props, set dressings, and scenery throughout rehearsals and performances.
1685.12.3	Coordinate with the production team to plan and organize all aspects of the studio production.
1685.12.4	Demonstrate effective directing skills by coordinating camera shots, directing talent, and managing the flow of the production to maintain coherence and engagement.
1685.12.5	Assign roles and responsibilities to crew members, ensure effective communication, and oversee their performance to achieve production goals.
1685.12.6	Analyze character descriptions and production requirements to determine makeup and costume needs.
1685.13	Direct and produce a field production.
1685.13.1	Develop a comprehensive plan for a field production, including location scouting, scheduling, and logistics management.
1685.13.2	Demonstrate the ability to direct a field production by managing crew roles, providing clear instructions, and overseeing the shooting process to ensure the project vision is realized.
1685.13.3	Set up and operate field production equipment, including cameras, audio gear, and lighting, ensuring all technical aspects are managed effectively.
1685.14	Produce or select appropriate music for production.
1685.14.1	Record speech, music, and other sounds on recording media, using recording equipment.
1685.14.2	Evaluate production requirements to determine suitable musical styles and tones.

1685.14.3	Curate a selection of music that enhances the mood, atmosphere, and narrative of the production.
1685.14.4	Ensure copyright compliance and secure necessary licensing for the selected music tracks.
1685.15	Perform on-camera production skills.
1685.15.1	Develop confidence and poise in front of the camera, demonstrating effective posture, facial expressions, and body language.
1685.15.2	Communicate effectively on camera, employing appropriate tone, pacing, and articulation to convey messages clearly and captivate the audience.
1685.15.3	Demonstrate versatility in on-camera performance, adjusting delivery and demeanor to suit different genres, formats, and audience preferences.
1685.15.4	Respond promptly to direction from the director or production crew during filming.
1685.16	Perform camera movements.
1685.16.1	Operate television or motion picture cameras to record scenes for television broadcasts, advertising, or motion pictures.
1685.16.2	Instruct camera operators regarding camera setups, angles, distances, movement, and variables and cues for starting and stopping filming.
1685.16.3	Execute precise camera movements including tilts, pans, and zooms.
1685.16.4	Navigate the camera smoothly to capture dynamic shots and perspectives.
1685.16.5	Coordinate with the production team to achieve desired framing and composition through controlled camera movements.
1681.17	Determine microphone selection and application.
1681.17.2	Apply chosen microphones effectively for optimal sound capture.
1681.17.3	Implement proper microphone placement techniques for desired audio results.
1681.18	Identify and operate various audio devices in a recording environment.
1681.18.1	Install, adjust, and operate electronic equipment to record, edit, and transmit radio and television programs, motion pictures, video conferencing, or multimedia presentations.

Post-Production

1685.19	Identify and describe proper editing techniques.
1685.19.1	Identify and describe fundamental editing techniques used in television broadcasting, including cutting, transitioning, and sequencing.
1685.19.2	Understand how techniques contribute to narrative flow and visual coherence.
1685.19.3	Apply advanced editing techniques such as color correction, audio synchronization, and special effects.
1685.19.4	Enhance the visual and auditory quality of television broadcasts.
1685.19.5	Evaluate edited content for continuity, pacing, and overall effectiveness.
1685.19.6	Identify areas for improvement and make necessary adjustments to ensure a polished final product.
1685.20	Demonstrate editing aesthetics.
1685.20.1	Outline steps for finalizing media files and ensuring they meet distribution standards.
1685.20.2	Detail quality control measures to verify the readiness of the production for distribution.
1685.20.3	Apply principles of rhythm, pacing, continuity, and visual storytelling to create visually engaging and emotionally impactful edited content for television broadcasts.
1685.20.4	Employ smooth transitions between shots to maintain continuity and flow.
1685.20.5	Pace shots appropriately to enhance storytelling and maintain audience engagement.
1685.20.6	Select background music that complements the mood and enhances the narrative.
1685.20.7	Incorporate visual and auditory elements seamlessly to create a cohesive editing aesthetic.
1685.20.8	Ensure consistency in editing choices to establish a unified and polished final product.
1685.20.9	Discuss the principles of match cutting, montage, and parallel editing in creating compelling narratives.

1685.22	Identify and manage various file formats.
1685.22.1	Understand the basic characteristics of various file formats used in television broadcasting, including video, audio, image, and document formats.
1685.22.2	Differentiate the differences between commonly used formats and their appropriate applications in media production.
1685.22.3	Manage various file formats to ensure compatibility across different software platforms and broadcasting systems.
1685.22.4	Explore methods for converting, compressing, and exporting files to maintain quality while optimizing compatibility.
1685.22.5	Develop skills in organizing and managing files effectively to maintain a structured and efficient workflow.
1685.22.6	Demonstrate proper procedures with file naming conventions, folder structures, metadata tagging, and backup strategies to ensure accessibility, organization, and security of media assets
1685.23	Import, capture, and export media appropriately.
1685.23.1	Demonstrate different techniques for importing and capturing media into editing software, including importing files from external devices such as cameras and microphones, and capturing live footage or audio directly into editing interfaces.
1685.23.2	Adjust export settings such as file format, resolution, and compression to ensure optimal quality and compatibility with different playback devices and distribution channels.
1685.23.3	Demonstrate proficiency managing media throughout the production process.
1685.24	Describe and apply motion graphics and video compositing (including computer graphics and chromakey).
1685.24.1	Define motion graphics and compositing concepts, including computer-generated imagery (CGI) and chroma keying.
1685.24.2	Apply motion graphics and compositing techniques to enhance visual storytelling and production quality.
1685.24.3	Integrate CGI and chroma key techniques to create seamless visual effects.
1685.24.4	Demonstrate proficiency in industry-standard software.
1685.24.5	Use motion graphics to support narrative structure and visual engagement.
1685.24.6	Apply chroma keying to replace backgrounds and enhance scene composition.
1685.25	Evaluate the finished product with the client/audience.
1685.25.1	Gather feedback from clients and audience to assess the finished product.
1685.25.2	Analyze reactions and opinions to gauge the effectiveness of the production.
1685.25.3	Incorporate constructive criticism to refine the final product.
1685.25.4	Identify areas of improvement based on client and audience input.
1685.25.5	Ensure satisfaction and alignment with project objectives through evaluation.
1685.24	Identify and describe essential computer hardware for editing.
1685.24.1	Recognize CPU, GPU, RAM, and storage as crucial for editing.
1685.24.2	Describe their roles in processing, rendering, and storage.
1685.24.3	Identify recommended specs for smooth editing.
1685.24.4	Highlight GPUs and multicore CPUs for complex tasks.
1685.24.5	Evaluate hardware based on editing needs and budget.

Students will explore the dynamic world of broadcast media, learning about the technical, ethical, and social aspects of producing content for television and radio. Through hands-on projects and real-world simulations, students will develop essential skills in studio production, field reporting, editing, and broadcasting techniques. They will also examine the role of broadcast media as a public service, understanding its responsibility to serve diverse communities and promote civic engagement. By collaborating with local organizations and community stakeholders, students will have the opportunity to address pressing community issues and amplify diverse voices through broadcast media platforms.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Media Literacy and Ethics

1687.1	Understand ethical considerations in broadcasting.
1687.1.1	Understand ethical principles in broadcasting, such as accuracy, fairness, impartiality, accountability, and transparency.
1687.1.2	Analyze real-world case studies where ethical principles in broadcasting were challenged or upheld.
1687.1.3	Apply ethical principles to hypothetical scenarios, making decisions on how to handle ethical dilemmas in broadcasting.
1687.2	Analyze the role of media in shaping public opinion, perceptions, and societal values.
1687.2.1	Understand how various types of media content, including news reports, entertainment shows, documentaries, and advertisements are designed to inform, entertain, persuade, or influence audiences.
1687.2.2	Examine examples of media content, identifying specific elements such as framing, tone, language, and visual presentation that contribute to shaping audience perceptions.
1687.2.3	Discuss the ways in which these examples have influenced societal attitudes, beliefs, and behaviors, drawing on case studies and current events.
1687.2.4	Explore the concept of media as a mirror of society, reflecting cultural norms, values, and traditions.
1687.2.5	Evaluate the positive impacts of media on societal values, such as promoting social awareness, cultural diversity, and positive role models.
1687.2.6	Examine examples of media content that have been criticized for their harmful effects on society, including sensationalist news, unrealistic portrayals, and biased reporting.
1687.2.7	Analyze the potential for bias in media content, considering factors such as ownership interests, political affiliations, and commercial pressures.
1687.2.8	Examine case studies that illustrate the agenda-setting role of media in shaping public attention and priorities.
1687.2.9	Practice identifying bias, evaluating sources, and considering multiple perspectives to form informed opinions about media messages and their societal implications.
1687.3	Evaluate the influence of advertising, sponsorship, and commercial interests on broadcast content and audience perceptions
1687.3.1	Analyze the ways in which advertising and sponsorship influence the content and programming decisions of broadcast media.
1687.3.2	Identify and discuss instances where commercial interests have led to changes in programming, editorial choices, or the inclusion/exclusion of certain topics.

1687.3.3	Assess the impact of commercial content on audience behavior, such as purchasing decisions, brand loyalty, and lifestyle choices.
1687.3.4	Explore editorial policies and guidelines that broadcasters use to balance commercial interests with journalistic standards and creative integrity.
1687.3.5	Propose strategies for balancing commercial interests with editorial integrity and audience trust in broadcast operations.

Regulatory Compliance and Legal Issues

1687.4	Demonstrate knowledge of FCC regulations and guidelines governing broadcast operations, including content standards, licensing requirements, and compliance procedures.
1687.4.1	Identify and explain key FCC regulations and guidelines that govern broadcast content standards, including indecency, obscenity, and profanity rules.
1687.4.2	Understand the FCC's licensing requirements for broadcasters, including the qualifications needed to obtain a broadcast license and the different types of licenses available (e.g., commercial, non-commercial).
1687.4.3	Explore the steps involved in the application process, from submitting initial applications to undergoing public and regulatory review.
1687.4.4	Discuss the conditions for maintaining a broadcast license, such as meeting public service requirements, adhering to technical standards, and addressing complaints and violations.
1687.4.5	Understand FCC's requirements for maintaining public files, including the types of documents that must be included (e.g., ownership reports, political files, EEO reports) and the accessibility of these files to the public.
1687.4.6	Explore the FCC's Emergency Alert System (EAS) requirements, including the purpose of EAS, the types of alerts broadcasters must transmit, and the technical and operational standards for EAS participation.
1687.4.7	Discuss the consequences of failing to meet reporting obligations and the steps broadcasters can take to ensure compliance with FCC reporting requirements.
1687.5	Understand legal issues related to defamation, copyright infringement, privacy rights, and libel laws in broadcasting
1687.5.1	Define defamation, libel, and slander.
1687.5.2	Explain the legal criteria for proving defamation in a broadcasting context, including key defenses against defamation claims.
1687.5.3	Describe the basics of copyright law as it pertains to broadcasting, including the concepts of fair use and public domain, and the consequences of copyright infringement.
1687.5.4	Analyze privacy rights and the legal considerations related to invasion of privacy and the use of personal information in broadcasting.
1687.6	Analyze case studies and real-world examples of legal challenges faced by broadcasters and the implications for industry practices and policies.
1687.6.1	Identify the key legal issues involved in defamation and libel lawsuits against broadcasters.
1687.6.2	Propose strategies that broadcasters can implement to minimize the risk of defamation lawsuits and ensure compliance with legal standards.
1687.6.3	Understand legal consequences of copyright infringement for broadcasters, including lawsuits, fines, and reputational damage.
1687.6.4	Analyze privacy violation cases in broadcasting, discussing the legal principles involved and the implications for broadcasters' policies on handling personal information.

Broadcast Technology and Operations

1687.9	Understand the technical aspects of broadcast operations, including studio equipment, transmission systems, signal processing, and audiovisual technologies.
1687.9.1	Identify and describe the key components of a broadcast studio, including cameras, microphones, switchers, and lighting equipment, and understand their functions and uses.
1687.9.2	Explain different types of transmission systems used in broadcasting, such as terrestrial, satellite, and internet-based systems.
1687.9.3	Understand how signal processing, including encoding, compression, and modulation affect the quality and integrity of the broadcast signal and how they are used to optimize the transmission of audiovisual content.
1687.9.4	Propose solutions for maintaining high-quality signals throughout the transmission process, ensuring that the audience receives clear and reliable broadcasts.
1687.9.5	Describe the latest audiovisual technologies used in broadcast operations, including digital video and audio formats, streaming technologies, and high-definition (HD) and ultra-high-definition (UHD) broadcasting.
1687.10	Demonstrate proficiency in operating broadcast equipment, including cameras, microphones, mixing consoles, video switchers, and playback devices.
1687.10.1	Demonstrate how to set up different types of microphones, including dynamic, condenser, lavalier, and shotgun microphones, for various production environments.
1687.10.2	Understand the importance of microphone placement and how it affects audio quality.
1687.10.3	Demonstrate proficiency in operating audio mixing consoles, including adjusting gain, EQ, panning, and applying effects.
1687.10.4	Practice mixing audio from multiple sources, ensuring clear and balanced sound for broadcast.
1687.10.5	Identify and troubleshoot common audio issues, such as feedback, distortion, and low signal levels.
1687.10.6	Demonstrate proficiency in operating video switchers, including selecting video sources, applying transitions, and managing multi-camera setups.
1687.10.7	Practice executing live switches during production, ensuring smooth and professional transitions between video feeds.
1687.10.8	Demonstrate proficiency in cueing and playing back video clips, ensuring seamless integration of pre-recorded content with live video feeds.
1687.11	Apply technical knowledge to troubleshoot common issues, optimize signal quality, and ensure smooth operation of broadcast facilities.
1687.11.1	Recognize common technical issues that can occur in broadcast operations, including audio feedback, video signal loss, synchronization problems, and equipment malfunctions.
1687.11.2	Understand key parameters that affect signal quality in audio and video broadcasts, such as signal-to-noise ratio, resolution, bit rate, and latency.
1687.11.3	Demonstrate proficiency in adjusting equipment settings to optimize signal quality, including camera settings (e.g., focus, exposure, white balance), audio mixer settings (e.g., gain, EQ), and transmission equipment (e.g., bandwidth allocation, compression settings).
1687.11.4	Demonstrate proficiency in conducting thorough system checks before, during, and after broadcasts to identify and address potential issues.

Audience Analysis and Engagement

1687.19	Analyze audience demographics, viewing habits, and consumption trends to inform programming decisions and content development strategies.

1687.19.1	Demonstrate how to gather data on audience demographics through surveys, focus groups, and market research reports.
1687.19.2	Analyze audience demographics to identify patterns and trends in viewing habits, content preferences, and consumption behaviors.
1687.19.3	Propose programming ideas and content formats that resonate with target audience demographics, ensuring that broadcast content is relevant and appealing to viewers.
1687.19.4	Identify peak viewing times, preferred genres, and popular content formats among target viewer groups.
1687.19.5	Explore trends such as cord-cutting, binge-watching, second-screen usage, and the rise of on-demand viewing, discussing their implications for broadcast operations.
1687.19.3	Discuss emerging platforms, content delivery models, and audience engagement strategies that may shape the future of broadcast operations.
1687.20	Understand the principles of audience engagement, including audience segmentation, content customization, and interactive programming formats.
1687.20.1	Use audience demographic data and consumption insights to make informed programming decisions, such as selecting content genres, scheduling time slots, and targeting specific viewer segments.
1687.20.2	Develop content strategies that align with audience preferences and consumption trends across different platforms.
1687.20.3	Propose content formats, storytelling approaches, and engagement tactics that resonate with target viewer groups and drive audience engagement.
1687.20.4	Optimize scheduling priorities based on audience viewing habits and consumption patterns, maximizing audience reach and engagement.
1687.21	Explore the use of social media, audience feedback mechanisms, and audience measurement tools to gauge audience response and engagement with broadcast content.
1687.21.1	Identify and understand how to utilize various social media platforms to engage with audiences, promote broadcast content, and gather feedback in real-time.
1687.21.2	Implement audience feedback mechanisms, such as phone-ins, email submissions, and online surveys, to solicit feedback and opinions from viewers about broadcast content.
1687.21.3	Understand how to utilize audience measurement tools, such as ratings surveys, audience meters, and web analytics, to track audience viewership, engagement, and demographics across different broadcast channels and platforms.

Cultural and Societal Impact of Broadcasting

1687.23	Examine the historical evolution of broadcasting and its role in shaping cultural identities, social norms, and collective memory.
1687.23.1	Explore the historical evolution of broadcasting from its inception to modern-day forms, exploring key milestones, technological advancements, and socio-cultural impacts.
1687.23.2	Examine the technological advancements that have shaped the evolution of broadcasting, such as the invention of the telegraph, radio transmission, television broadcasting, and digital media technologies.
1687.23.3	Analyze the socio-cultural impacts of broadcasting on society, including its role in shaping cultural identities, social norms, and collective memory.
1687.23.4	Analyze the representation of different cultural groups in broadcast media, discussing stereotypes, biases, and efforts toward more inclusive and authentic portrayals.
1687.23.5	Explore how broadcasting has been used to promote national and regional identities, fostering a sense of belonging and shared cultural heritage among diverse populations.

1687.23.6	Discuss the influence of broadcasting on social norms, values, and behaviors, examining its impact on public opinion, consumer culture, and civic engagement.
1687.23.7	Discuss the role of broadcasting in shaping public opinion on various issues, including politics, social issues, and popular culture.
1687.24	Analyze the portrayal of diverse communities, cultures, and perspectives in broadcast media and its impact on social cohesion and inclusivity.
1687.24.1	Analyze the portrayal of diverse communities, cultures, and perspectives in broadcast media, identifying stereotypes, biases, and representations that contribute to or challenge social cohesion and inclusivity.
1687.24.2	Explore strategies for promoting diversity, equity, and inclusion in broadcast media, including inclusive storytelling, diverse casting, and representation of underrepresented voices and perspectives.
1687.24.3	Promote inclusive storytelling in broadcast media, including incorporating diverse narratives, experiences, and perspectives into content development.
1687.24.4	Advocate for responsible and ethical representation of diverse communities, cultures, and perspectives in broadcast media, promoting social cohesion, empathy, and understanding.
1687.25	Explore the influence of broadcast media on political discourse, public opinion formation, and democratic processes, including the role of media bias, framing, and agenda-setting.
1687.25.1	Explore the concept of media bias and its impact on political discourse, including biases in news reporting, commentary, and editorial content.
1687.25.2	Discuss how broadcast media sets the agenda by selecting, emphasizing, and prioritizing certain issues over others, shaping the focus of public attention and influencing policy debates.
1687.25.3	Identify strategies for promoting media literacy and critical thinking skills among audiences, empowering them to navigate and evaluate political information in broadcast media effectively.

Community Engagement and Service

1687.23	Understand the concept of broadcasting as a public service and its responsibility to serve the needs and interests of diverse communities.
1687.23.1	Define the concept of broadcasting as a public service and articulate its role in serving the needs and interests of diverse communities.
1687.23.2	Propose initiatives for fostering community engagement and dialogue through broadcast media, such as public service announcements, community-based programming, and interactive platforms.
1687.23.3	Explore innovative approaches to reaching and serving underserved populations.
1687.24	Explore strategies for community engagement, outreach, and involvement in broadcast programming and decision-making processes.
1687.24.1	Identify a range of strategies for community engagement in broadcast programming, such as town hall meetings, community forums, listener surveys, and social media campaigns.
1687.24.2	Analyze examples of successful community engagement initiatives in broadcast media, discussing their impact on audience participation, program quality, and community relations.
1687.24.3	Identify potential partners, stakeholders, and resources for implementing engagement initiatives, discussing strategies for maximizing impact and sustainability.
1687.24.4	Reflect on the impact of community engagement initiatives on building positive community relations and fostering stakeholder engagement in broadcast operations.
1687.25	Identify opportunities for collaboration with local organizations, educational institutions, and community stakeholders to address community issues and promote civic engagement through broadcast media.

1687.25.1	Identify potential collaboration opportunities with local organizations, educational institutions, and community stakeholders to address community issues through broadcast media.
1687.25.2	Develop collaborative projects and initiatives with local organizations, educational institutions, and community stakeholders to promote civic engagement through broadcast media.
1687.25.3	Evaluate the impact and effectiveness of collaborative projects and initiatives in addressing community issues and promoting civic engagement through broadcast media.

Students will learn all aspects of live television production through hands-on application. This includes how to plan, coordinate, and execute live television broadcasts, covering a range of formats including news programs, talk shows, sports events, and entertainment shows. They will delve into various roles within a live production team, including producers, directors, camera operators, audio technicians, and on-air talent, and develop proficiency in their respective areas of specialization..

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Television Production Basics

1689.1	Understand the fundamental principles of live television production
1689.1.1	Apply the fundamental principles of television production in practical exercises, such as filming short scenes, conducting interviews, or creating basic television segments.
1989.2	Demonstrate appropriate use of camera operation, lighting techniques, and audio mixing.
1689.2.1	Demonstrate proficiency in camera operation by accurately framing shots, adjusting focus and exposure settings, and smoothly panning, tilting, and zooming to capture dynamic and visually appealing footage.
1689.2.2	Apply various lighting techniques to achieve desired visual effects and mood in their productions.
1689.2.3	Demonstrate the ability to set up and adjust lighting equipment, control light intensity and direction, and effectively use lighting accessories such as diffusers, reflectors, and gels.
1689.2.4	Develop skills in audio mixing to ensure clear and balanced sound in their productions.
1689.2.5	Demonstrate the ability to adjust microphone placement, control input levels, minimize background noise.
1689.2.6	Demonstrate ability to mix multiple audio sources to achieve optimal sound quality and consistency.
1689.2.7	Produce high-quality video content by effectively utilizing camera operation, lighting techniques, and audio mixing in their productions.
1689.3	Understand crew positions in live production casts.
1689.3.1	Identify and describe the various crew positions commonly found in live production casts, including roles such as director, producer, camera operator, audio engineer, lighting technician, floor manager, and talent.
1689.3.2	Understand the specific responsibilities and duties associated with each crew position in a live production cast.
1689.3.3	Explain the role of each crew member in executing a successful live production, including tasks related to equipment operation, communication, coordination, and problem-solving.
1689.3.4	Analyze the interactions and relationships between different crew positions within a live production cast.
1689.3.5	Understand how effective communication, collaboration, and teamwork among crew members contribute to the smooth operation and successful outcome of live productions.

Live Broadcasting Techniques

1689.4	Differentiate live broadcasts and other broadcasting deliverables.
1689.4.1	Define and describe the characteristics of live broadcasts, including real-time transmission of content, immediate audience engagement, unscripted elements

1689.4.2	Identify and explain various types of broadcasting deliverables beyond live broadcasts, including pre-recorded programs, on-demand content, podcasts, streaming services, and social media platforms
1689.4.3	Understand the differences in production processes, audience interaction, and distribution methods between live broadcasts and other deliverables.
1689.4.4	Compare and contrast the features and benefits of live broadcasts and other broadcasting deliverables.
1689.4.5	Analyze factors such as audience reach, production flexibility, viewer engagement, and content longevity to understand when each type of delivery method is most appropriate for different purposes and contexts.
1689.5	Determine content to be live broadcasted.
1689.5.1	Select program content, in conjunction with producers and assistants, based on factors such as program specialties, audience tastes, or requests from the public.
1689.5.2	Explore various sources for content inspiration, including current events, interviews, performances, and community activities.
1689.5.3	Study background information to prepare for programs or interviews.
1689.5.4	Define target audience demographics such as age, gender, and location.
1689.5.5	Determine audience preferences, interests, and behaviors.
1689.5.6	Evaluate audience ratings and engagement metrics to gauge reach and impact.
1689.5.7	Understand factors that effect content selection such as relevance, timeliness, audience interest, and potential for engaging storytelling.
1689.5.8	Brainstorm and develop compelling concepts for live broadcasts, including format ideas, segment planning, and creative elements such as visuals, graphics, and interactive features.
1689.5.9	Assess the technical feasibility of live broadcasting different types of content, considering factors such as available equipment, production resources, venue logistics, and technical requirements.
1689.5.10	evaluate potential challenges and constraints to ensure the successful execution of their chosen content ideas.
1689.6	Create or prepare production schedule/timeline.
1689.6.1	Create a detailed production schedule or timeline for a broadcast program.
1689.6.2	Reserve audiovisual equipment and facilities.
1689.6.3	Develop a comprehensive production schedule that breaks down the production process into manageable tasks, allocate resources, and establish deadlines to meet project milestones and deadlines.
1689.6.4	Create strategies for mitigating delays, resolving conflicts, and adjusting schedules as needed to maintain workflow efficiency and meet production goals.
1689.6.5	Prepare a detailed timeline that facilitates efficient workflow and project management.
1689.7	Demonstrate the ability to write scripts for Live TV.
1689.7.1	Understand the fundamental principles of scriptwriting for live TV, including proper formatting, structure, and style.
1689.7.2	Define the different components of a script, such as scene headings, action descriptions, dialogue, and transitions.
1689.7.3	Understand the importance of clarity, brevity, and consistency in scriptwriting to effectively convey information to the production team and on-air talent.
1689.7.4	Identify storytelling techniques suitable for live TV, such as engaging openings, compelling narratives, and effective pacing
1689.7.5	Understand how to structure scripts to maintain audience interest and create anticipation for upcoming segments or events.
1689.7.6	Practice incorporating hooks, cliffhangers, and other storytelling devices to capture and retain viewer attention throughout the live broadcast.

1689.7.7	Develop the ability to write scripts that are adaptable and flexible to accommodate changes and unexpected developments during live broadcasts
1689.7.8	Research techniques for improvisation, quick edits, and on-the-fly adjustments to ensure smooth transitions and seamless continuity in the broadcast.
1689.7.9	Engage in simulated scenarios and role-playing exercises to practice writing scripts under time constraints and in response to real-time changes and challenges.
1689.8	Determine technical requirements and site survey/location scout.
1689.8.1	Identify and analyze the technical requirements for a production, including equipment needs, power sources, lighting conditions, sound considerations, and logistical requirements.
1689.8.2	Understand how technical requirements vary based on the type of production, such as studio-based vs. on-location shoots, live broadcasts vs. pre-recorded segments, and indoor vs. outdoor settings.
1689.8.3	Document their findings from the site survey or location scout in a detailed report or checklist, outlining technical requirements, site conditions, and any potential challenges or opportunities identified.
1689.8.4	Analyze technical requirements, assess site conditions, and develop comprehensive plans for successful productions.

Production

1689.9	Prepare graphics appropriate to live production.
1689.9.1	Develop proficiency in using graphic design software tools commonly used in television production, such as Adobe Photoshop, Illustrator, or After Effects.
1689.9.2	Apply graphic design skills to create a variety of graphics appropriate for use in live production broadcasts, including lower thirds, title cards, banners, logos, and on-screen graphics.
1689.9.3	Tailor graphics to match the style, tone, and branding of the production, ensuring consistency and coherence in visual presentation.
1689.9.4	Understand the technical requirements and limitations of graphics for live broadcast, including resolution, aspect ratio, file format, and compatibility with broadcast systems.
1689.9.5	Demonstrate techniques for optimizing graphics for broadcast, such as rasterizing text, exporting alpha channels, and converting file formats to ensure compatibility and quality on-air.
1689.10	Execute various lighting designs.
1689.10.1	Apply knowledge of lighting principles and equipment to execute various lighting designs for different types of television productions, including studio-based shows, on-location shoots, interviews, and live broadcasts.
1689.10.2	Create different lighting setups, such as three-point lighting, Rembrandt lighting, high-key lighting, low-key lighting, and mood lighting, to enhance visual storytelling and create specific atmospheres.
1689.10.3	Adapt lighting designs to meet the specific requirements and constraints of different production scenarios, such as set size, location conditions, camera angles, talent positioning, and desired aesthetic goals.
1689.11	Direct and produce a studio production.
1689.11.1	Apply directing and producing skills to lead studio productions from inception to completion, overseeing rehearsals, blocking, camera setups, lighting design, sound recording, and performance direction.
1689.11.2	Manage studio production logistics.
1689.11.3	Direct creative aspects for effective execution.
1689.11.4	Oversee production elements for quality output.
1689.12	Direct and produce a field production.
1689.12.1	Understand unique requirements and challenges of field production, including location scouting, outdoor shooting conditions, equipment mobility, and logistical considerations.

1689.12.2	Understand how to adapt production plans and workflows to effectively execute field productions in diverse environments and settings.
1689.12.3	Develop strategies to address logistical challenges, weather conditions, and safety considerations to ensure a smooth and successful production process on location.
1689.12.4	Coordinate on-location tasks such as set-up, equipment setup, camera operation, lighting design, sound recording, and talent direction to ensure efficient and effective execution of the production plan.
1689.12.5	Oversee production elements to ensure seamless execution from a distance.
1689.13	Collect, set up, and maintain props, set dressings, and scenery.
1689.13.1	Understand the importance of props and set dressings in enhancing the visual storytelling of television productions, creating realistic and immersive environments that support the narrative and character development.
1689.13.2	Understand the difference between props (objects used by actors during scenes) and set dressings (decorative elements used to enhance the visual appearance of sets) and their roles in creating believable and visually engaging scenes.
1689.13.3	Understand the importance of maintaining props, set dressings, and scenery throughout the production process to ensure continuity, safety, and visual consistency.
1689.13.4	Demonstrate techniques for organizing, repairing, cleaning, and storing props and set dressings to preserve their condition and functionality for the duration of the production.
1689.14	Select appropriate music for production.
1689.14.1	Record speech, music, and other sounds on recording media, using recording equipment.
1689.14.2	Consider factors such as genre conventions, target audience preferences, narrative themes, pacing, and character development to inform their music selection process.
1689.14.3	Explore a variety of music libraries, online platforms, and licensing options to find suitable music tracks that match the desired style, tempo, instrumentation, and mood for their productions.
1689.14.4	Experiment with different music cues, loops, and edits to enhance dramatic moments, highlight key narrative beats, and create emotional resonance in their productions.
1689.15	Perform on-camera production skills.
1689.18.1	Execute scripted or improvised performances with authenticity.
1689.18.2	Engage with the camera to establish connection with the audience.
1689.18.3	Follow directorial instructions to ensure smooth on-camera delivery.
1689.18.4	Practice controlling nerves and managing performance anxiety to deliver natural and engaging performances that resonate with audiences.
1689.18.5	Develop presentation skills tailored to on-camera performance, including script delivery, teleprompter reading, ad-libbing, and improvisation.
1689.18.6	Practice conducting interviews with guests or subjects, demonstrating professionalism, empathy, and adaptability to elicit informative and compelling responses.
1689.18.7	Explore basic acting techniques applicable to on-camera productions, including character development, emotion expression, scene analysis, and blocking.
1689.19	Perform camera movements.
1689.19.1	Operate television or motion picture cameras to record scenes for live television broadcasts.
1689.19.2	Instruct camera operators regarding camera setups, angles, distances, movement, and variables and cues for starting and stopping filming.
1689.19.3	Identify and demonstrate the effective use of various camera shots, angles, and movements for video production. (production scenarios, narrative scenes, interviews, live events, and documentary shots)
1689.19.4	Demonstrate on-camera performance techniques necessary in TV production e.g., hand-held shooting, tripod shooting, etc.

1689.20	Properly adjust cameras (i.e., exposure, white balance).
1689.20.1	Compose and frame each shot, applying the technical aspects of light, lenses, film, filters, and camera settings to achieve the effects sought by directors.
1689.20.2	Adjust positions and controls of cameras, printers, and related equipment to change focus, exposure, and lighting.
1689.20.3	Exemplify how white balancing affects the picture.
1689.21	Demonstrate appropriate lens operation and framing.
1689.21.1	Operate lenses effectively for desired framing such as wide shots, close-ups, or medium shots.
1689.21.2	Ensure precise focusing and framing.
1689.21.3	Adjust lenses to achieve desired composition.
1689.21.4	Use framing techniques like rule of thirds, leading lines, or framing within a frame to enhance visual composition.

Post-Production

1689.22	Understand how to archive footage.
1689.22.1	Understand the importance of archiving footage in television production, including preserving historical records, ensuring access to valuable content for future projects, and complying with legal and copyright requirements.
1689.22.2	Understand the potential risks of data loss, deterioration, and obsolescence, and the benefits of implementing archival strategies to mitigate these risks.
1689.22.3	Understand the importance of maintaining file integrity, redundancy, and backups to ensure the long-term accessibility and usability of archived footage.
1689.22.4	Explore archival tools and technologies used in television production, including digital asset management (DAM) systems, archival storage solutions, and cloud-based storage platforms.
1689.23	Describe procedures for preparing production for distribution.
1689.23.1	Differentiate various distribution channels used in television production, including broadcast television, cable networks, streaming platforms, online channels, and syndication.
1689.23.2	Understand the characteristics, audience demographics, and technical requirements of each distribution channel, as well as the opportunities and challenges associated with distribution in today's media landscape.
1689.23.3	Encode or transcode media files into suitable formats for distribution channels.
1689.23.4	Create metadata and accompanying documentation for tracking and promotion purposes.
1689.23.5	Demonstrate how to optimize video and audio quality while meeting the technical requirements and compatibility standards of different distribution channels.
1689.23.6	Understand the importance of quality assurance in delivering a polished and professional viewing experience for audiences across different platforms.
1689.23.7	Create quality control procedures involved in preparing productions for distribution, including reviewing and correcting technical issues, ensuring compliance with broadcast standards, and conducting final checks for errors or inconsistencies.
1689.23.8	explore distribution agreements, licensing arrangements, and rights management considerations involved in distributing television productions to third-party platforms and networks.

This course is designed to introduce the student to the knowledge base and technical skills required to identify, configure, and upgrade microcomputer hardware and peripherals. Content skill sets are based on testing objectives for the CompTIA A+ certification. Areas of study include personal computer components, laptop and portable devices, printers and scanners, networks, security and safety and environmental issues. Students will demonstrate knowledge and technical expertise in hardware troubleshooting and repair. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. This course is recommended as an Elective in the CISCO Networking Academies Program of Study.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Mobile Devices

1692.1	Mobile Devices
1692.1.1	Install and configure laptop hardware and components.
1692.1.2	Install components within the display of a laptop.
1692.1.3	Use appropriate laptop features.
1692.1.4	Compare and contrast characteristics of various types of other mobile devices.
1692.1.5	Connect and configure accessories and ports of other mobile devices.
1692.1.6	Configure basic mobile device network connectivity and application support.
1692.1.7	Use methods to perform mobile device synchronization.

Networking

1692.2	Networking
1692.2.1	Compare and contrast TCP and UDP ports, protocols, and their purposes.
1692.2.2	Compare and contrast common networking hardware devices.
1692.2.3	Install and configure a basic wired/wireless SOHO network.
1692.2.4	Compare and contrast wireless networking protocols.
1692.2.5	Summarize the properties and purposes of services provided by networked hosts.
1692.2.6	Explain common network configuration concepts.
1692.2.7	Compare and contrast Internet connection types, network types, and their features.
1692.2.8	Use appropriate networking tools.

Hardware

1692.3	Hardware
1692.3.1	Explain basic cable types, features, and their purposes.
1692.3.2	Identify common connector types.
1692.3.3	Install RAM types.
1692.3.4	Select, install, and configure storage devices.
1692.3.5	Install and configure motherboards, CPUs, and add-on cards.

1692.3.6	Explain the purposes and uses of various peripheral types.
1692.3.7	Summarize power supply types and features.
1692.3.8	Select and configure appropriate components for a custom PC configuration to meet customer specifications or needs.
1692.3.9	Install and configure common devices.
1692.3.10	Configure SOHO multifunction devices/printers and settings.
1692.3.11	Install and maintain various print technologies.

Virtualization and Cloud Computing

1692.4	Virtualization and Cloud Computing
1692.4.1	Compare and contrast cloud computing concepts.
1692.4.2	Set up and configure client-side virtualization.

Hardware and Network Troubleshooting

1692.5	Hardware and Network Troubleshooting
1692.5.1	Use the best practice methodology to resolve problems.
1692.5.2	Troubleshoot problems related to motherboards, RAM, CPUs, and power.
1692.5.3	Troubleshoot hard drives and RAID arrays.
1692.5.4	Troubleshoot video, projector, and display issues.
1692.5.5	Troubleshoot common mobile device issues while adhering to the appropriate procedures.
1692.5.6	Troubleshoot printers.
1692.5.7	Troubleshoot common wired and wireless network problems.

This course introduces the student to the knowledge base and technical skills related to networking. Areas of study include media and topologies, protocols and standards, network implementation and network support. Content Skill Sets are based on testing objectives for the CompTIA Network+ certification. Emphasis will be placed on personal and professional ethics and students will explore a variety of career opportunities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Networking Fundamentals

1694.1	Explore the basics of networking.
1694.1.1	Explain the purposes and uses of ports and protocols.
1694.1.2	Explain devices, applications, protocols, and services at their appropriate OSI layers.
1694.1.3	Explain the concepts and characteristics of routing, bandwidth, and switching.
1694.1.4	Configure a subnet and use appropriate IP addressing schemes such as public vs private, IPv4 vs IPv6, IPv4 subnetting, IPv6 concepts, virtual IP and subinterfaces.
1694.1.5	Compare and contrast the characteristics of network topologies, types, and technologies to include mesh, star/hub & spoke, bus, ring, hybrid, service-related entry point, virtual network concepts and provider links like satellite, DSL, cable etc.
1694.1.6	Implement the appropriate wireless technologies and configurations.
1694.1.7	Summarize cloud concepts and their purposes in regard to deployment models, service models, infrastructure as code, connectivity options, multitenancy, elasticity, scalability, and security implications.
1694.1.8	Implement and understand the functions of network services like DHCP, DNS, and NTP
1694.1.9	Compare and contrast the Open Systems Interconnection (OSI) model layers and encapsulation concepts including OSI model layers and data encapsulation and decapsulation within the OSI context.
1694.1.10	Explain basic corporate and datacenter network architecture including three-tiered, software-defined networking, spine and leaf, traffic flows, branch office vs on-premises datacenter vs colocation. And storage area networks.

Infrastructure

1694.2	Understand the interconnectivity of a network.
1694.2.1	Deploy the appropriate cabling solution regarding copper, fiber, connector types, cable management, ethernet standards.
1694.2.2	Configure and deploy common Ethernet switching features like VLAN, LACP, MDI-X, PoE, PoE+, CSAM/CD and ARP.
1694.2.3	Determine the appropriate placement of networking devices on a network and install/configure them such as networking vs networked devices.

1694.2.4	Explain the purposes and use cases for advanced networking devices.
1694.2.5	Explain the purposes of virtualization and network storage technologies.
1694.2.6	Compare and contrast WAN technologies.
1694.2.7	Install and configure the appropriate wireless standards and technologies including 802.11 standards, frequencies and range, channels, SSID, antenna types, encryption standards, cellular technologies, and MIMO/MU-MIMO.
1694.2.8	Implement routing solutions including installation and configuring of hardware, calculating subnets, and allocating IP addresses subnet addresses and broadcast addresses for Class A,B, and C networks

Network Operations

1694.3	Effectively manage a network.
1694.3.1	Use appropriate documentation and diagrams to manage the network including plans and procedures such as change management, incident response disaster recovery plans and standard operating procedures. Also, hardening and security policies, common documentation such as floor plans rack diagrams IDF/MDF and wiring diagrams and NDA, SLA, and MOUs.
1694.3.2	Compare and contrast business continuity and disaster recovery concepts to include load balancing, multipathing, NIC teaming, redundant hardware clusters, facilities and infrastructure support, redundancy and high availability concepts and network device backup/restore.
1694.3.3	Explain common scanning, monitoring and patching processes and summarize their expected outputs.
1694.3.4	Use remote access methods.
1694.3.5	Identify policies and best practices.
1694.3.6	Use statistics and sensors to ensure network availability to include performance metrics/sensors, SNMP, network device logs, interface statistics/status, interface errors or alerts, environmental factors and sensors, baselines, NetFlow data and uptime/downtime.

Network Security

1694.4	Demonstrate common security concepts.
1694.4.1	Explore common security concepts such as threats, vulnerabilities, exploits, DNS-Spoofing, least privilege, role-based access, zero trust, defense in depth, authentication methods, risk management and security information event management (SIEM).
1694.4.2	Summarize the purposes of physical security devices including detection methods, prevention methods, and asset disposal.
1694.4.3	Explain authentication and access controls.
1694.4.4	Secure a basic wireless network.
1694.4.5	Summarize common networking attacks such as technology-based attacks like ransomware, DNS poisoning, VLAN hopping, malware, spoofing, and human and environmental attacks like phishing, tailgating, and piggybacking.
1694.4.6	Implement network device hardening, including best practices, wireless security and IoT access considerations.
1694.4.7	Explain common mitigation techniques and their purposes.

1694.4.8	Compare and contrast remote access methods and security implications such as VPN types, remote connections, and gateways, SSH, VNC, virtual desktop, authentication and authorizations and in-band vs out-of-band management.

Network Troubleshooting and Tools

1694.5	Explain the network troubleshooting methodology.
1694.5.1	Follow appropriate steps for troubleshooting issues to include identifying the problem, establishing a theory of cause, testing the theory, developing a plan of action, verifying results and documenting actions, outcomes, and lessons.
1694.5.2	Use the appropriate tool such as cable crimper, punchdown tool, tone generator, loopback adaptor, OTDR, multimeter, cable tester, wire map, tap, fusion splicer, spectrum analyzers, snips/cutters, cable stripper and fiber light meter.
1694.5.3	Troubleshoot common wired connectivity and performance issues. Items to consider include specifications and limitations, cable considerations, cable application.
1694.5.4	Troubleshoot common wireless connectivity and performance issues such as interference, wrong SSID, captive portal issues. Consider specifications and limitations like speed and distance and consider placement, type, and antennas.
1694.5.5	Troubleshoot general networking issues such as collisions, asymmetrical routing, rogue DHCP server and IP setting issues. Consider device configurations, routing tables, interface status, VLAN assignment and network performance baselines.
1694.5.6	Use the appropriate network software tools and commands like Wi-Fi analyzer, port scanner, iperf, TFTP server IP scanner. Line command tools would include ping, ipconfig, nslookup, traceroute, arp, etc. Also use basic network platform commands like show interface, config, and route.

This course introduces the student to the knowledge base and technical skills related to working with network servers. Areas of study include server hardware, server installation, server configuration, server upgrade, proactive maintenance, security and environmental issues, troubleshooting, and disaster recovery. Students will explore various career opportunities. This course is recommended as an Elective in the Computer Systems Repair Technology Program of Study. Content Skill Sets are based on testing objectives for the Server+ Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to occupations in computer repair and networking. Students are encouraged to become active members of the student organization, SkillsUSA. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Server Architecture

1695.1	Understanding server infrastructure management and optimization.
1695.1.1	Explain the purpose and function of server form factors.
1695.1.2	Install, configure, and maintain server components such as racking, power cabling, network cabling, server chassis and server components.
1695.1.3	Compare and contrast power and cooling components.

Server Administration

1695.2	Using best practices for server administration and management.
1695.2.1	Install and configure server operating systems like minimum operating system requirements, hardware compatibility lists, GUI, core, bare metal virtualized, media installation types, imaging and partition volume types and file system types.
1695.2.2	Compare and contrast server roles and requirements for each.
1695.2.3	Use access and control methods to administer a server.
1695.2.4	Perform proper server maintenance techniques to include out-of-band management, local hardware administration, components, drives, hot-swappable hardware and BIOS/UEFI.
1695.2.5	Explain the importance of asset management and documentation to include asset management such as labeling, warranty, life cycle and disposal, document management such as updates, service manuals, recovery processes, document availability, secure storage of sensitive documentation.
1695.2.6	Explain the purpose and operation of virtualization components including host vs guest, virtual networking, resource allocation and provisioning, management interfaces for virtual machines and cloud models.
1695.2.7	Explain the key concepts of high availability for servers such as clustering, fault tolerance, and redundant server network infrastructure.
1695.2.8	Summarize scripting basics for server administration including script types, environmental variables, comment syntax, basic script constructs, basic data types and common server administration scripting tasks.

1695.2.9	Explain licensing concepts like models such as per-instance, per server, open source, subscription, license vs maintenance support, volume licensing, license count validation and version compatibility.

Storage

1695.3	Explore storage deployment and configuration.
1695.3.1	Install and deploy primary storage devices based on given specifications and interfaces.
1695.3.2	Configure RAID using best practices.
1695.3.3	Summarize hardware and features of various storage technologies like server role requirements, directory connectivity, storage management, monitoring, data migration and transfer and administrative interfaces.
1695.3.4	Calculate appropriate storage capacity and plan for future growth.

Security

1695.4	Summarize data security concepts.
1695.4.1	Compare and contrast data security methods and concepts such as encryption paradigms, UEFI/BIOS passwords, and bootloader passwords.
1695.4.2	Compare and contrast physical security methods and concepts such as physical access controls, and environmental controls.
1695.4.3	Apply server hardening techniques to include OS hardening, application hardening, host security, hardware hardening and patching.
1695.4.4	Explain basic network security systems and protocols.
1695.4.5	Implement logical access control methods based on company policy.
1695.4.6	Implement data security methods and secure storage disposal techniques such as proper removal procedures, media destruction, and media retention requirements like cable remediation and electronics recycling.
1695.4.7	Implement proper environmental controls and techniques.
1695.4.8	Configure servers to use IP addressing and network infrastructure services to include IP configuration, VLAN, default gateways, name resolution, addressing protocols, firewalls, static vs dynamic and MAC addresses.
1695.4.9	Compare and contrast various ports and protocols.
1695.4.10	Install cables and implement proper cable management procedures.
1695.4.11	Explain concepts pertaining to identity and access management for server administration to include user accounts, user groups, password policies, permissions and access controls, auditing, MFA and SSO.
1695.4.12	Explain data security risks and mitigation strategies such as hardware failure, malware, DLO, unwanted access methods, and mitigation strategies such as data monitoring, regulatory constraints, and legal considerations.

Disaster Recovery

1695.5	Conduct appropriate disaster recovery strategies.
1695.5.1	Explain the importance of disaster recovery principles including site types, replication, and testing.
1695.5.2	Explain the importance of backups and restores such as backup methods, backup frequency, media rotation, backup media types, file-level-vs system-state backup, restore methods, backup validation and media inventory before restoration.
1695.5.3	Implement appropriate backup techniques.

Troubleshooting

1695.6	Utilize troubleshooting tools and techniques.
1695.6.1	Explain troubleshooting theory and methodologies. Identify and determine the scope of the problem, establish a theory of probable cause, test the theory, establish a plan of action, implement the solution, or escalate, verify functionality, perform root cause analysis, and document findings, actions, and outcomes.
1695.6.2	Effectively troubleshoot hardware problems, selecting the appropriate tools and methods. Explore common problems such as memory errors, system crashes, CMOS, LED readouts. Review common causes like power supply faults, incompatible components, overheating, or environmental issues. Use tools and techniques such as event logs, upgrades/downgrades, ESD etc.
1695.6.3	Effectively troubleshoot software problems, selecting the appropriate tools and methods. Explore common problems like inability to log on, access files, slow performance service failures and freezing. Explore common causes like incompatibility of components. Memory leaks, buffer overrun, missing or failed updates. Use tools and techniques such as patching, upgrade/downgrades, recovery options and configuration management.
1695.6.4	Effectively diagnose network problems, selecting the appropriate tools and methods to include common problems such as lack of connectivity, service provider failure, unknown host, incorrect DHCP information. Explore common causes like improper IP configuration, IPv4 vs IPv6 misconfigurations, component failure and use tools and techniques like checking cables and power supply, and commands such as ipconfig, ipaddr, and ping.
1695.6.5	Effectively troubleshoot storage problems, selecting the appropriate tools and methods. Explore common problems like boot errors, failed drives, cache failures and causes like misconfigured RAID, cable problems and bad sectors. Use tools and techniques like partition tools, system logs and inspections.
1695.6.6	Effectively diagnose security issues, selecting the appropriate tools and methods. Explore common concerns like file integrity, improper privilege escalation and inability to access network fileshares. Explore common causes such as open ports, inactive services, misconfigured permissions and use tools like port scanners, sniffers, and antivirus/anti-malware.

This course introduces the students to the knowledge base and technical skills related to working with network security. Areas of study include Network Security, Compliance and Operational Security, Threats and Vulnerabilities, Application, Data and Host Security, Access Control and Identity Management and Cryptography. Courses are aligned with CompTIA standards. Emphasis will be placed on personal and professional ethics and students will explore a variety of career opportunities. This course is recommended as an Elective in the Computer Systems Repair Technology Program of Study. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to twenty occupations in computer repair and networking. Students are encouraged to become active members of the student organization, SkillsUSA. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Threats, Attacks, and Vulnerabilities

1696.1	Understand common threat actors and motivations.
1696.1.1	Compare and contrast different types of social engineering techniques like segmentation, access control, patching, encryption etc.
1696.1.2	Analyze potential indicators to determine the type of attack such as malware, physical, network, application, cryptographic and password attacks as well as the indicators of attacks.
1696.1.3	Analyze potential indicators associated with application attacks.
1696.1.4	Analyze potential indicators associated with network attacks.
1696.1.5	Explain different threat actors such as nation-state, hacktivist, insider threat and shadow IT.
1696.1.6	Explain the security concerns associated with diverse types of vulnerabilities concerning applications, OS, web-based, hardware, virtualization, cloud specific, supply chain, cryptographic, misconfiguration, mobile devices, or zero-day.
1696.1.7	Summarize the techniques used in security assessments.
1696.1.8	Explain the techniques used in penetration testing.
1696.1.9	Determine attributes of actors, internal/external, resources and funding as well as the level of sophistication and capability.
1696.1.10	Explore motivations of threat actors such as data exfiltration, extortion, revenge, belief systems etc.
1696.1.11	Research common threat vectors such as message, image or file based, voice call, removable device, vulnerable software, or unsupported systems as well as supply chain and human vectors including social engineering.

Architecture and Design

1696.2	Compare and contrast security implications of different architecture models.
1696.2.1	Explore architecture and infrastructure concepts and considerations.
1696.2.2	Explain the importance of security concepts in an enterprise environment such as infrastructure considerations and secure communication/access along with selection of effective controls.
1696.2.3	Summarize virtualization and cloud computing concepts.

1696.2.4	Summarize secure application development, deployment, and automation concepts.
1696.2.5	Summarize authentication and authorization design concepts.
1696.2.6	Implement cybersecurity resilience by exploring load balance vs clustering, site considerations, platform diversity, multi-cloud systems, continuity of operations, capacity planning, testing, backups, and power.
1696.2.7	Explain the security implications of embedded and specialized systems.
1696.2.8	Explain the importance of physical security controls.
1696.2.9	Summarize the basics of cryptographic concepts.
1696.2.10	Demonstrate concepts and strategies to protect to include data types, data classifications, general data considerations and methods to secure data.

Implementation

1696.3	Develop network designs and settings.
1696.3.1	Implement secure protocols.
1696.3.2	Implement host or application security solutions.
1696.3.3	Implement secure network designs.
1696.3.4	Install and configure wireless security settings.
1696.3.5	Implement secure mobile solutions.
1696.3.6	Apply cybersecurity solutions to the cloud.
1696.3.7	Implement identity and account management controls.
1696.3.8	Implement authentication and authorization solutions.
1696.3.9	Implement public key infrastructure.

Operations and Incident Response

1696.4	Apply common security techniques to computing resources.
1696.4.1	Use the appropriate tool to assess organizational security by monitoring computing resources, reviewing activities, and using tools such as SCAP, SIEM, DLP and SNMP.
1696.4.2	Summarize the importance of policies, processes, and procedures for incident response such as identification methods, analysis, vulnerability response and remediation, validation of remediation and reporting.
1696.4.3	Utilize appropriate data sources to support an investigation like log(s) data and data sources.
1696.4.4	Given an incident, apply mitigation techniques or controls to secure an environment.
1696.4.5	Explain the key aspects of digital forensics including the process, training, testing, root cause analysis, threat hunting, and digital forensics.
1696.4.6	Explain the security implications of proper hardware, software, and data asset management including acquisition/procurement, assignment/accounting, monitoring/asset tracking and disposal/decommissioning.
1696.4.7	Modify enterprise capabilities to enhance security by using firewalls, IDS/IPS, web filter, OS security, secure protocols, DNS filtering, email security, DLP, NAC, EDR/XDR, and user analytics.
1696.4.8	Implement and maintain identity and access management by using provisioning, permissions, SSO, interoperability, multifactor authentication, password, and privileged access management tools.
1696.4.9	Explain automation and orchestration related to secure operations including use cases of automation and scripting, benefits, and other considerations.

Governance, Risk and Compliance

1696.5	Understand security program management and oversight.
1696.5.1	Summarize elements of effective security governance such as guidelines, policies, standards, procedures, external considerations, monitoring and revision, types of governance structures and the roles and responsibilities for systems and data.
1696.5.2	Compare and contrast distinct types of controls to include third-party risks like vendor assessment, selection, agreement types, monitoring, and rules of engagement.
1696.5.3	Explain the importance of applicable regulations, standards, or frameworks that impact organizational security posture.
1696.5.4	Explain the importance of policies to organizational security as related to phishing, anomalous behavior recognition, user guidance and training, reporting, and monitoring and development and execution.
1696.5.5	Summarize risk management processes and concepts including risk identification, risk assessment, risk analysis, risk register, risk tolerance, risk appetite, management strategies, reporting and business impact analysis.
1696.5.6	Explain privacy and sensitive data concepts in relation to security.
1696.5.7	Summarize elements of effective security compliance to include compliance reporting, consequences of non-compliance, compliance monitoring, and privacy.
1696.5.8	Explain types and purposes of audits and assessments including attestation, internal, external and penetration testing.

General Security Concepts.

1696.6	Understand the general concepts of security.
1696.6.1	Compare and contrast diverse types of security controls including the various categories and control types.
1696.6.2	Summarize fundamental security concepts such as CIA, non-repudiation, AAA, physical security, gap analysis, zero trust, deception and disruption technology.
1696.6.3	Explain change management processes and the impact to security like business processes impacting security operations, technical implications, documentation, and version control.
1696.6.4	Explain appropriate cryptographic solutions like PKI, encryptions, TCM, HSM, obfuscation, CRLs, OCSP, among others.

This course introduces the student to the knowledge base and technical skills for the Linux operating system. Areas of study include installation, management, configuration, security, documentation, and hardware. Students will demonstrate knowledge and technical expertise in basic installation, operation, security, troubleshooting and basic Linux hardware services for the Linux operating system on workstations and servers. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts.

Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Hardware and System Configuration

1698.1	Understand Linux components.
1698.1.1	Use filesystem hierarchy standard (FHS) from /boot to /tmp.
1698.1.2	Explain Linux boot process concepts. BIOS, UEFI, commands, kernel panic, device types in/dev, basic package compilation from source, storage concepts and hardware information.
1698.1.3	Install, configure, and monitor kernel modules.
1698.1.4	Configure and verify network connection parameters.
1698.1.5	Manage storage in a Linux environment using disk partitioning, mounting local and remote devices, filesystem management, monitoring storage space and disk usage, creating and modifying volumes using LVM, inspecting RAID implementations, SAN/NAS, and storage hardware.
1698.1.6	Compare and contrast cloud and virtualization concepts and technologies.
1698.1.7	Configure localization options.

System Operations and Maintenance

1698.2	Summarize Linux fundamentals.
1698.2.1	Conduct software installations, configurations, updates, and removals.
1698.2.2	Manage users and groups.
1698.2.3	Create, modify, and redirect files in addition to file editing, file compression, file metadata, soft and hard links, copying files and files and directory operations.
1698.2.4	Configure and use the appropriate processes and services such as system services, scheduling services, and process management.
1698.2.5	Summarize and explain server roles.
1698.2.6	Automate and schedule jobs.
1698.2.7	Explain the use and operation of Linux devices.
1698.2.8	Compare and contrast Linux graphical user interfaces.
1698.2.9	Use the appropriate networking tools or configuration files like interface management, name resolution, network monitoring, remote networking tools.
1698.2.10	Build and install software using package management, sandbox applications and system updates.
1698.2.11	Manage software configurations including updating configuration files, configure kernel options, configure common system services and localization.

Security

1698.3	Manage Linux system security.
1698.3.1	Apply or acquire the appropriate user and/or group permissions and ownership.

1698.3.2	Configure and implement appropriate access and authentication methods including account creation and deletion and account management.
1698.3.3	Summarize security best practices in a Linux environment including managing key infrastructure (PKI) certificates, certificate use cases, authentication, and Linux hardening.
1698.3.4	Implement logging services.
1698.3.5	Implement and configure Linux firewalls like use cases, common firewall technologies and key firewall features.
1698.3.6	Backup, restore, and compress files.
1698.3.7	Configure and execute remote connectivity for system management including SSH and executing commands as another user.
1698.3.9	Apply the appropriate access controls including file permissions, security-enhanced Linux, AppArmor and command-line utilities.

Linux Troubleshooting and Diagnostics

1698.4	Diagnose and repair in Linux.
1698.4.1	Analyze system properties and remediate accordingly utilizing system to resolve problems such as unit files. Application crash, boot issues and journal issues.
1698.4.2	Analyze system processes to optimize performance.
1698.4.3	Analyze and troubleshoot user issues like login issues, user file access issues, password issues, privilege elevation and quota issues.
1698.4.4	Analyze and troubleshoot application and hardware issues.
1698.4.5	Analyze and troubleshoot storage issues such as high latency, low throughput, IOPS scenarios, capacity issues, filesystem issues, I/O scheduler, device issues and mount option problems.
1698.4.6	Analyze and troubleshoot network resource issues to include network configuration issues, firewall issues, interface errors, bandwidth limitations, name resolution issues, testing remote systems.
1698.4.7	Analyze and troubleshoot central processing unit (CPU) and memory issues including runaway and zombie processes, high CPU utilization, high load average, high run queues, CPU times, CPU process priorities, memory exhaustion, OOM, swapping, and hardware.

Automation and Scripting

1698.5	Create scripts and automation.
1698.5.1	Use scripts and variables such as shell script elements, common script utilities, environmental variables, and relative and absolute paths.
1698.5.2	Deploy and execute basic BASH scripts.
1698.5.3	Conduct version control using Git including clone, push, pull, commit, add, checkout, branch, tag and gitignore.
1698.5.4	Perform basic container operations like container management and container image operations.
1698.5.5	Summarize orchestration processes and concepts including Kubernetes benefits and application user cases, single-node, multi-container use cases, container persistent storage, container networks, service mesh, bootstrapping and container registries.
1698.5.6	Summarize common infrastructure as code technologies including file formats, utilities, CI/CD, and advanced Git topics.

This program is structured to address current computing concepts, including cloud and mobile technologies; to align closely with educational requirements and ensure learners of all ages can validate their understanding of Digital Literacy. Students will demonstrate their ability to select and use the appropriate research, productivity, collaboration, and communications tools, to find reliable information, create content, communicate safely, and identify credibility and bias in modern digital environments.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Technology Basics

1700.1	Access and navigate between digital environments.
1700.1.1	Recognize operating system terms and concepts.
1700.1.2	Explain basic functions of web browsers.
1700.1.3	Explain processes and requirements for accessing digital environments.
1700.1.4	Explain methods of navigating between digital environments.
1700.2	Identify digital devices and connections.
1700.2.1	Identify input devices.
1700.2.2	Identify output devices.
1700.2.3	Identify cables, connectors, and connections.
1700.3	Identify peripherals.
1700.3.1	Identify various printers.
1700.3.2	Identify external hard drives.
1700.3.3	Identify webcams.
1700.4	Explain fundamental software concepts.
1700.4.1	Explain basic software application concepts.
1700.4.2	Compare and contrast proprietary and open-source software.
1700.4.3	Describe processes for installing software from online sources.
1700.5	Explain fundamental hardware concepts.
1700.5.1	Describe concepts related to computing devices.
1700.5.2	Describe concepts related to memory.
1700.5.3	Describe concepts related to data storage.
1700.6	Explain fundamental operating system concepts.
1700.6.1	Compare and contrast features of mobile device operating systems.
1700.6.2	Compare and contrast features of computer operating systems.
1700.7	Explain fundamental networking concepts.
1700.7.1	Describe network connectivity concepts.
1700.7.2	Describe online connectivity concepts.
1700.7.3	Compare and contrast network and connection types.
1700.7.4	Describe networking infrastructure.
1700.7.5	Identify whether a device is connected.
1700.7.6	Describe basic network troubleshooting techniques.

1700.8	Explain information technology technical skills.
1700.8.1	Use word processing, presentation software, and email applications to prepare communications.
1700.8.2	Use spreadsheet and database applications to manage and communicate data and information.
1700.8.3	Identify and select appropriate hardware components associated with information systems.
1700.8.4	Identify and select appropriate security practices and applications and network services associated with information systems.

Digital Citizenship, Ethics and Legal Responsibilities

1700.9	Create and manage a digital identity.
1700.9.1	Explain how to manage personal data online.
1700.9.2	Explain how to manage personally identifiable information.
1700.9.3	Explain how to maintain digital privacy and security.
1700.10	Cultivate, manage, and protect your digital reputation.
1700.10.1	Recognize the permanence of actions in the digital world.
1700.10.2	Recognize legal and ethical behavior when using technology.
1700.11	Respond to inappropriate digital behavior and content.
1700.11.1	Explain the impact of negative digital communication.
1700.11.2	Assess the validity of online information.
1700.11.3	Explain the importance of online anonymity.
1700.11.4	Explain the value of nonresponse to negative communication.
1700.12	Apply appropriate laws, regulations, and industry standards to IT situations.
1700.12.1	Obtain explicit consent for data processing, implementing appropriate data security measures, and facilitating data subject rights such as access, rectification, and erasure.
1700.12.2	Maintain data confidentiality, integrity, and availability, implementing access controls, and conducting regular risk assessments.
1700.12.3	Abide by the CFAA regulations to prevent unauthorized access to computer systems and networks, including implementing access controls, monitoring user activities, and prosecuting individuals or entities involved in unauthorized access, hacking, or cybercrime.
1700.12.4	Implement ISO/IEC 27001 standards to establish an information security management system (ISMS) framework, including risk assessment, risk treatment, and security controls.
1700.12.5	Adhere to the Digital Millennium Copyright Act (DMCA).
1700.12.6	Adhere to the Telecommunications Act.
1700.13	Identify ethical issues and demonstrate ethical behavior in IT situations.
1700.13	Research ethical behavior regarding the collection, storage, and use of personal data.
1700.13.1	Resolve questions about the adequacy of security measures, the responsibility of organizations to protect sensitive information, and the potential consequences of data breaches for individuals and society.
1700.13.2	Ensure protection of intellectual property, including software piracy, copyright infringement, and the unauthorized use or distribution of proprietary information or technology.

Information Management

1700.14	Use and refine criteria for online searches.
1700.14.1	Define the information required to complete a given task.
1700.14.2	Distinguish between relevant and irrelevant search results.
1700.14.3	Collect and retain source reference information for search and research results.
1700.15	Understand methods for searching within digital content.

1700.15.1	Explain features that enable you to locate information in a file.
1700.15.2	Explain features that enable you to locate information on a webpage.
1700.16	Understand copyright and licensing restrictions for digital content.
1700.16.1	Explain the basics of public domain content.
1700.16.2	Explain the basics of Creative Commons content.

Content Creation

1700.17	Create basic documents and presentations.
1700.17.1	Display proficiency in creating basic documents.
1700.17.2	Display proficiency in creating basic presentations.
1700.18	Understand accepted referencing and attribution practices.
1700.18.1	Define referencing and attribution.
1700.18.2	Explain the purpose of referencing and attribution.
1700.18.3	Locate online referencing and attribution sources.
1700.18.4	Implement appropriate online citations in a given document.
1700.19	Save and back up work.
1700.19.1	Determine how, when, and where to back up data in a typical digital work setting.
1700.19.2	Implement file management principles and naming conventions.
1700.20	Understand fundamental printing concepts.
1700.20.1	Describe portrait vs landscape orientation.
1700.20.2	Describe double-sided printing.
1700.20.3	Explain common print settings.
1700.20.4	Explain printing methods.

Communication

1700.21	Express yourself through digital means.
1700.21.1	Know where you can post or share in the digital world.
1700.21.2	Be aware of platform-specific guidelines for posting and sharing.
1700.21.3	Understand and follow acceptable use policies for posting and sharing.
1700.22	Interact with others in a digital environment.
1700.22.1	Implement digital interactions in a given digital technology.
1700.22.2	Differentiate between effective and ineffective digital interaction methods.
1700.22.3	Demonstrate the use of inclusive language.
1700.22.4	Differentiate among email response options.

Collaboration

1700.23	Identify digital collaboration concepts.
1700.23.1	Identify the benefits of digital collaboration.
1700.23.2	Define synchronous and asynchronous communications.
1700.23.3	Identify methods to review work and provide feedback to peers.
1700.24	Identify digital etiquette standards for collaborative processes.
1700.24.1	Identify digital etiquette for written digital collaboration.
1700.24.2	Identify digital etiquette For visual digital collaboration.
1700.25	Locate, organize, and reference written information.
1700.25.1	Organize gathered information into structured formats for easy access and reference.

1700.25.2	Researching online technical documentation, user manuals, and official guides to gather information about configuring network settings on a router.
1700.25.3	Create reference guides and documentation repositories to facilitate efficient access to written information.
1700.26	Utilize listening skills and interpret verbal/nonverbal (body language) behaviors to enhance communication.
1700.26.1	Actively listen to users' descriptions of technical issues during support sessions, paying attention to verbal cues, tone of voice, and nonverbal cues to better understand their concerns.
1700.26.2	Interpret nonverbal cues, such as body language and facial expressions, to gauge engagement, understanding, and receptiveness to technical discussions.
1700.26.3	Adjust communication style based on verbal and nonverbal feedback to ensure effective exchange of technical information.
1700.27	Interpret and use tables, charts, and figures to support written and oral communication.
1700.27.1	Incorporate tables, charts, and figures into technical documentation to visually illustrate complex concepts, data, and processes.
1700.27.2	Use a bar chart to visualize progress against key milestones.
1700.27.3	Review a performance analysis report for a web application, examine line graphs showing website traffic patterns over time.

Safety and Security

1700.28	Describe digital security threats.
1700.28.1	Identify features of secure passwords.
1700.28.2	Identify when and how to reset a password.
1700.28.3	Identify when and how to lock a device.
1700.28.4	Explain how to clear saved browser settings.
1700.29	Be aware of data-collection technology.
1700.29.1	Describe how navigation tracking works.
1700.29.2	Describe security concerns related to navigation tracking.
1700.29.3	Describe security concerns related to storing information on a device.
1700.29.4	Describe the benefits of private mode browsing.
1700.30	Identify health risks associated with the use of digital technologies.
1700.30.1	Identify mental health risks associated with online technologies.
1700.30.2	Identify physical health threats associated with computer and device usage.
1700.30.3	Identify and practice appropriate safety procedures for IT occupations.
1700.30.4	Identify and practice appropriate environmental procedures for IT occupations.

Problem Solving, Critical Thinking, and Decision Making

1700.31	Demonstrate information support and services technical skills.
1700.31.1	Utilize database management skills to streamline data retrieval and analysis processes.
1700.31.2	Identify and resolve network connectivity issues by conducting packet analysis and implementing firewall rule adjustments, minimizing downtime for users, and improving overall network performance.
1700.31.3	Apply software debugging techniques to enhance system stability and functionality.
1700.31.4	Utilize project management software effectively.
1700.32	Demonstrate knowledge of troubleshooting techniques.

1700.32.1	Learn troubleshooting techniques such as isolation testing, incremental changes, error message analysis, regression testing and root cause analysis.
1700.32.2	Using remote access, examine system settings, identify conflicting software, and resolve the issue by uninstalling the problematic application.
1700.32.3	Create a comprehensive troubleshooting guide for a customer relationship management (CRM) software, detailing common user errors, their underlying causes, and step-by-step solutions.
1700.32.4	Analyze error logs and diagnostic tools to pinpoint hardware malfunctions and implement effective solutions.
1700.33	Perform computer user support.
1700.33.1	Remotely access users' computers using software like TeamViewer or Remote Desktop Protocol (RDP) to troubleshoot issues directly.
1700.33.2	Maintain a comprehensive knowledge base containing articles, guides, FAQs, and troubleshooting steps for common technical issues.
1700.33.3	Implement a ticketing system such as Zendesk or Jira Service Management to manage and track user-reported issues.
1700.33.4	Offer live chat support through platforms like Intercom or LiveChat, allowing users to chat with support agents in real-time.
1700.33.5	Assist users with the installation and configuration of software applications.
1700.33.6	Perform data backup tasks to safeguard their important files and documents.
1700.33.7	Learn how to recognize and avoid phishing emails, practice good password hygiene, and identify potential security threats.
1700.33.8	Clean up disk space, remove unnecessary startup programs, update device drivers, and perform system maintenance tasks.
1700.34	Define functions of system administration and project management.
1700.34.1	Configure and maintain computer systems, including servers, networks, and databases, install and update software, configure hardware components, manage user accounts, and ensure system security.
1700.34.2	Monitor system performance metrics, such as CPU usage, memory utilization, and network bandwidth.
1700.34.3	Configure firewalls, implement access controls, monitor security logs, and conduct security audits.
1700.34.4	Troubleshoot hardware and software issues, resolve technical problems, and assist with system usage.
1700.34.5	Develop project plans, schedules, and budgets to ensure successful project execution.
1700.34.6	Allocate resources, including personnel, equipment, and budget, to project tasks and activities.
1700.34.7	Conduct risk assessments, develop risk management plans, and implement risk mitigation strategies.
1700.37.8	Provide regular updates, report project status, and address concerns.
1700.37.9	Monitor project performance, conduct quality inspections, and implement corrective actions.
1700.35	Identify and implement quality assurance processes (e.g., acceptable use policies, change monitoring, patch testing).
1700.35.1	Develop and implement acceptable use policies to establish guidelines for the appropriate use of technical computer applications and resources.
1700.35.2	Implement change monitoring and version control processes to track modifications to technical computer applications and ensure consistency and reliability.
1700.35.3	Establish patch testing and deployment procedures to evaluate and apply software updates and patches systematically.
1700.36	Locate credible sources of information about problems and determine appropriate methods for investigating causes.

1700.36.1	Identify and utilize credible sources of information, such as official documentation, peer-reviewed articles, and reputable forums, to research technical problems.
1700.36.2	When troubleshooting a software issue, consult the official documentation provided by the software vendor.
1700.36.3	Assess the severity and scope of the problem to determine appropriate investigation methods and prioritize resources effectively.
1700.36.4	Employ systematic investigation techniques, such as root cause analysis (RCA) and diagnostic tools, to identify the underlying causes of technical problems.
1700.36.5	Use diagnostic tools such as built-in hardware diagnostics or third-party utilities to perform comprehensive tests on hardware components, including memory, storage, and CPU.
1700.37	Determine root causes of problems to suggest and evaluate solutions.
1700.37.1	Analyze the data to identify patterns or commonalities that may indicate the root cause of the issue, such as conflicting software components or memory leaks.
1700.37.2	Conduct risk assessments to identify potential drawbacks or unintended consequences of proposed solutions.
1700.37.3	Review results of RCA and solution evaluation, recommend the most suitable solution(s) to provide justification and rationale for the chosen approach.

Systems

1700.38	Describe the relationship, roles, and responsibilities among IT professionals.
1700.38.1	Understand the roles of developers, quality assurance engineers, system administrators, and project managers.
1700.38.2	Establish cross-functional task forces or committees to address complex technical challenges that require input from multiple disciplines.
1700.38.3	Establish clear reporting structures and communication channels to facilitate effective communication and decision-making
1700.39	Analyze the impact on IT based on technological advances (e.g., wireless, SmartPhones, cloud computing).
1700.39.1	Assess the impact of wireless technologies on IT infrastructure and operations, such as cost-benefit analysis.
1700.39.2	Analyze the integration of smartphones and mobile devices in business processes and IT systems such as BYOD, and MDM solutions.
1700.39.3	Evaluate the benefits and challenges of migrating IT workloads and data to cloud platforms such as Amazon Web Services (AWS), Microsoft Azure, or Google Cloud Platform (GCP).
1700.40	Identify standard terminology and basic concepts within IT.
1700.40.1	Create a centralized document or knowledge base containing definitions and explanations of common IT terms and concepts. Include terms related to hardware (e.g., CPU, RAM), software (e.g., operating system, application), networking (e.g., IP address, DNS), cybersecurity (e.g., firewall, encryption), and programming (e.g., variables, functions).
1700.40.2	Review topics such as computer hardware and software, network fundamentals, data management, cybersecurity best practices, and emerging technologies.

Employability and Career Development

1700.41	Demonstrate appropriate workplace behaviors related to a career in IT.
1700.41.1	Demonstrate effective communication skills in IT settings by actively listening, articulating ideas clearly, and collaborating with team members.

1700.41.2	Uphold professional standards and ethics in IT work by maintaining integrity, respecting confidentiality, and adhering to industry best practices.
1700.41.3	Stay informed about industry trends, advancements, and best practices
1700.41.4	Demonstrate strong problem-solving skills and critical thinking abilities.
1700.41.5	Effectively manage time and prioritize tasks to meet project deadlines and organizational goals.
1700.42	Pursue career development skills to advance in IT careers.
1700.42.1	Set clear and achievable career goals aligned with their interests, strengths, and aspirations.
1700.42.2	Engage in self-directed learning and skills development activities to stay updated on industry trends and emerging technologies.
1700.42.3	Actively engage in networking activities to expand professional network and build relationships with industry peers, mentors, and potential employers.
1700.42.4	Solicit feedback from supervisors, colleagues, and peers to identify areas for improvement and enhance their professional skills and performance.
1700.42.5	Volunteer for leadership roles within professional organizations, such as serving on committees or organizing events, to demonstrate leadership skills and expand their influence in the industry.
1700.43	Demonstrate knowledge of certifications appropriate for careers in IT.
1700.43.1	Explore certification programs offered by reputable organizations such as CompTIA, Cisco, Microsoft, AWS, and Google Cloud. Identify certifications aligned with your desired career path, such as CompTIA A+, Network+, and Security+ for entry-level IT professionals, or Cisco Certified Network Associate (CCNA)
1700.43.2	Assess the potential benefits of obtaining certifications, such as increased job opportunities, higher earning potential, and enhanced credibility in the IT industry.
1700.43.3	Regularly review industry publications, blogs, and forums to stay updated on new certifications and trends.

This course introduces the student to the knowledge and technical skills for all courses in the Computer Systems and Hardware Support Program of Study. Areas of study include computer hardware, data representation, operating system, utility, productivity software, communications and networks, and the Internet. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to occupations in the IT industry. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Computer Hardware

1705.1	Understand computer hardware and software, including terminology and concepts.
1705.1.1	Operate circuit boards, processors, chips, electronic equipment and computer hardware and software, including applications and programming.
1705.1.2	Understand terminology and concepts related to computer hardware.
1705.1.3	Utilize the various devices associated with a typical microcomputer system.
1705.1.4	Classify computers based on size, function, and number of users.
1705.1.5	Determine the steps of the information processing cycle.
1705.1.6	Examine the functions of the components of the system unit.
1705.1.7	Compare random-access and read-only memories.
1705.1.8	Inspect commonly used input devices.
1705.1.9	Inspect commonly used display devices.
1705.1.10	Inspect commonly used printers.
1705.1.11	Inspect commonly used storage devices.
1705.1.12	Compare distinct types of storage media.
1705.1.13	Perform simple binary.
1705.1.14	Illustrate the electronic representation of data.
1705.1.15	Examine how coding systems are used to represent text and numbers during processing.

Operating Systems, Utility and Production Software

1705.2	Identify programs and operating systems for microcomputers.
1705.2.1	Demonstrate knowledge of computer software.
1705.2.2	Identify programs associated with a typical microcomputer system.
1705.2.3	Identify the purpose and functions of an operating system.
1705.2.4	Compare a variety of microcomputer operating systems.
1705.2.5	Demonstrate basic OS (Operating System) operations.
1705.2.6	Examine essential system utilities.
1705.2.7	Examine a variety of productivity application programs and suites.

1705.2.8	Laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules and the democratic political process.
1705.2.9	Relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
1705.2.10	Investigate methods of protecting a user's personal information.
1705.2.11	Investigate methods of protecting a company's intellectual property rights and copyrights.
1705.2.12	Examine software license agreements and distribution policies.
1705.2.13	Examine software copyright infringement.
1705.2.14	Examine plagiarism.

Communications and Networks

1705.3	Explore network connection media and methods, and functions.
1705.3.1	Explain network connection media and methods.
1705.3.2	Examine the functions of various networking devices.
1705.3.3	Compare the media and methods used in networking.
1705.3.4	Compare different network classifications.
1705.3.5	Compare different network architectures.
1705.3.6	Compare different network topologies.
1705.3.7	Compare different network standards.
1705.3.8	Compare different web browsers.
1705.3.9	Compare distinct types of Internet connections.
1705.3.10	Compare search engines.
1705.3.11	Locate information.

Computing Systems

1705.4	Explore multifunctional devices, system evaluation, illustrating computing roles, software, and hardware interactions, problem-solving in integrated systems, and analyze IT devices.
1705.4.1	Identify different multifunctional computing devices and connection technologies, both virtual and physical, to describe their purpose.
1705.4.2	Develop and apply criteria to evaluate computing systems for a given purpose.
1705.4.3	Create an artifact to demonstrate the roles and interactions of computing systems embedded in everyday objects.
1705.4.4	Compare and contrast interactions between application software, system software and hardware.
1705.4.5	Apply a systemic process to identify problems and take steps to correct them within an integrated computing system.
1705.4.6	Analyze an IT device to determine either what repairs are needed or how to build it.

Networks and the Internet

1705.5	Explore networks and devices.
1705.5.1	Evaluate and select networking devices to establish scalable communications.
1705.5.2	Evaluate and select networking protocols to establish network communication.
1705.5.3	Understand scalability and reliability of networks to describe the relationships and effects of how the diverse types of networks work together.

1705.5.4	Examine and employ principles of cybersecurity.
1705.5.5	Identify physical, social, and digital security risks to address attacks.

Data and Analysis

1705.6	Analyze and investigate data.
1705.6.1	Analyze patterns in a real-world data store through hypothesis, testing and use of data tools to gain insight and knowledge.
1705.6.2	Investigate data storage systems to compare how data is stored and accessed.
1705.6.3	Analyze the benefits and limitations of data visualization or multisensory artifacts and tools to communicate which is most appropriate to solve a real-world problem.
1705.6.4	Evaluate a model by creating a hypothesis, testing it, and refining it to discover connections and trends in the data.

Algorithmic Thinking and Programming

1705.7	Develop algorithms, methods, and analysis.
1705.7.1	Define and use appropriate problem-solving strategies and visual artifacts to create and refine a solution to a real-world problem.
1705.7.2	Define and implement an algorithm by decomposing problem requirements from a problem statement to solve a problem.
1705.7.3	Identify types of variables and data and utilize them to create a computer program that stores data in appropriate ways.
1705.7.4	Define control structures and Boolean logic and use them to solve real-world scenarios.
1705.7.5	Use appropriate syntax to create and use a method.
1705.7.6	Use data scoping to isolate data.
1705.7.7	Break down a solution into procedures using systematic analysis and design.
1705.7.8	Define and implement an algorithm by decomposing problem requirements from a problem statement to solve a problem.
1705.7.9	Generate computational artifacts by methodically organizing, manipulating, and processing data.
1705.7.10	Utilize different data storage structures to store larger and more complex data than variables can contain.
1705.7.11	Identify the appropriate data structures or variables to use to design a solution to a complex problem.
1705.7.12	Investigate software development methodologies to select the appropriate one for a project to complete as a team.
1705.7.13	Compare test methodologies to evaluate why each is used and to determine their benefits and costs.
1705.7.14	Correctly use consistent naming conventions, version control and comments to demonstrate why these are important for future use, maintenance, and reuse of code.

IMPACTS OF COMPUTING

1705.8	Examine and evaluate the impacts of computing.
1705.8.1	Analyze recent technology to predict realistic impacts on society.
1705.8.2	Explore other professions to understand how computing has and will impact them positively and negatively.
1705.8.3	Evaluate tools to increase connectivity of people in diverse cultures and career fields.

1705.8.4	Analyze the collection and generation of data through automated processes to explain the privacy concerns that are not always evident to users.
1705.8.5	Interpret and analyze breaches in privacy and security to investigate the legal and ethical impact.
1705.8.6	Analyze the concepts of usability and security to explain typical tradeoffs between them.
1705.8.7	Analyze the collection and generation of data through automated processes to explain the legal concerns that are not always evident to users.
1705.8.8	Explain the beneficial and harmful effects of intellectual property laws to determine the impacts on innovation.

This course introduces the student to the knowledge base and technical skills for producing digital images for use in web sites and multimedia applications. Areas of study include digital imaging concepts, imaging hardware, imaging applications, and legal and ethical consideration. Students will demonstrate knowledge and technical expertise in creating, capturing, and altering digital images. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. This course is recommended as an Elective in the Computer Systems Repair Technology Program of Study.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Digital Imaging

1706.1	Digital Imaging
1706.1.1	Digital imaging terminology and concepts.
1706.1.2	Differentiate between vector and bitmap images.
1706.1.3	Examine factors that determine the quality of a digital image.
1706.1.4	Examine the impact of image size, resolution, and color depth on performance.
1706.1.5	Differentiate between the common types of image file formats.
1706.1.6	Examine the web-safe palette.
1706.1.7	Hardware devices to capture and/or create images.
1706.1.8	Compare common features of digital cameras.
1706.1.9	Take pictures with a digital camera.
1706.1.10	Transfer images to the computer for editing.
1706.1.11	Compare common features of scanners.
1706.1.12	Scan various types of documents and capture the results for editing.
1706.1.13	Compare common features of digitizing tablets.
1706.1.14	Create and capture images using a digitizing tablet.

Imaging Software

1706.2	Imaging Software
1706.2.1	Digital imaging software.
1706.2.2	Compare types of imaging software and scanning software programs.
1706.2.3	Apply common editing and retouching techniques to digital photographs.
1706.2.4	Use layers to create composite images.
1706.2.5	Add type to an image.
1706.2.6	Enhance images using special effects and filters.
1706.2.7	Export images to formats supported by the web.

This course is an advanced program structured to address current computing concepts, including cloud and mobile technologies; to align closely with educational requirements and ensure learners of all ages can validate their understanding of Digital Literacy.

Students will demonstrate their ability to select and use the appropriate research, productivity, collaboration, and communications tools, to find reliable information, create content, communicate safely, and identify credibility and bias in modern digital environments.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Technology Basics

1709.1	Customize digital environments.
1709.1.1	Configure device settings to meet individual needs and preferences.
1709.1.2	Configure browser settings to meet individual needs and preferences.
1709.2	Use a personal digital calendar.
1709.2.1	Create appointments or tasks on a personal digital calendar.
1709.2.2	Share a personal digital calendar with others.
1709.2.3	Display specific information on your personal calendar.
1709.3	Define higher-level technology concepts.
1709.3.1	Describe automation methods.
1709.3.2	Describe cloud computing.
1709.3.3	Describe and understand the use of autocorrect functions.
1709.3.4	Describe and understand the use of autocomplete functions.
1709.4	Identify and explain common hardware adjustments.
1709.4.1	Identify and explain common sound setting adjustments.
1709.4.2	Identify and explain monitor brightness and contrast controls.
1709.5	Explain core printer concepts.
1709.5.1	Distinguish between laser and inkjet printers.
1709.5.2	Confirm a successful connection to a printer.
1709.5.3	Select a default printer.
1709.6	Identify digital devices and connections.
1709.6.1	Define processing devices.
1709.6.2	Distinguish between categories of data cables and connectors.

Digital Citizenship

1709.7	Create and manage multiple digital identities.
1709.7.1	Differentiate between personal and professional digital identities.
1709.7.2	Manage multiple site credentials.
1709.8	Apply digital etiquette standards.
1709.8.1	Implement situational digital etiquette standards.
1709.8.2	Determine the appropriate time to send a communication.

1709.8.3	Describe digital etiquette standards for content.
1709.8.4	Display sensitivity to cultural diversity.
1709.9	Seek opportunities to increase your digital competence.
1709.9.1	Be aware of technological advancements.
1709.9.2	Use help features and community resources.
1709.9.3	Seek feedback that informs and improves your learning.

Information Management

1709.10	Determine digital information needs and requirements.
1709.10.1	Understand key search terms.
1709.10.2	Demonstrate how to filter search results.
1709.11	Determine the veracity of an individual search result or digital artifact.
1709.11.1	Assess the accuracy of a search result or digital artifact.
1709.11.2	Assess the perspective of a search result or digital artifact.
1709.11.3	Assess the bias of a search result or digital artifact.
1709.11.4	Determine the credibility of a search result or digital artifact.
1709.11.5	Assess the relevance of a search result or digital artifact.
1709.12	Manage online data collection, storage, and retrieval.
1709.12.1	Explain methods of collecting digital data and responses.
1709.12.2	Explain and interact with central data storage systems.
1709.12.3	Fill out online forms.

Content Creation

1709.13	Create and edit digital content.
1709.13.1	Prepare structured documents.
1709.13.2	Prepare presentations.
1709.13.3	Prepare basic workbooks.
1709.13.4	Perform basic image editing.
1709.13.5	Describe basic video-editing techniques.
1709.13.6	Display proficient keyboarding skills.
1709.13.7	Track changes in a document.
1709.13.8	Use common shortcuts.
1709.14	Manage digital information and files.
1709.14.1	Organize, store, and retrieve data and content.
1709.14.2	Explain benefits and methods of compressing files.
1709.14.3	Explain and identify ownership of data in various storage locations.
1709.14.4	Distinguish between read-only and read-write files.
1709.14.5	Implement password protection.
1709.14.6	Explain file versioning concepts.
1709.15	Responsibly repurpose digital resources.
1709.15.1	Understand the rights and obligations of using or sharing intellectual property.
1709.15.2	Unify design elements by using design themes and artistic styles.
1709.16	Publish or present content for a specific audience.
1709.16.1	Determine how to customize information for a given audience.
1709.16.2	Determine the file format that will work for a given user.

Communication

1709.17	Interact with others in a digital environment.
1709.17.1	Choose appropriate communication platforms and tools.
1709.17.2	Compose email messages.
1709.17.3	Interact with members of a digital community.
1709.17.4	Use online resources to determine availability of community services.
1709.18	Understand Internet commerce basics.
1709.18.1	Describe goods and services.
1709.18.2	Explain how digital payments work.
1709.18.3	Describe in-app purchases and their security concerns.
1709.18.4	Identify examples of media streaming services.

Collaboration

1709.19	Use digital tools and technologies to collaborate on the creation of content.
1709.19.1	List digital tools used for collaboration.
1709.19.2	Explain the benefits of collaboration.
1709.19.3	Compare and contrast synchronous editing and asynchronous editing.
1709.19.4	Describe coauthoring techniques.
1709.19.5	Explain methods used to review and provide feedback to peers.
1709.20	Apply digital etiquette standards for collaborative processes.
1709.20.1	Explain etiquette standards related to video conferences.
1709.20.2	Explain etiquette standards related to webinars.
1709.20	Apply leadership qualities to improve the quality of work and the work environment.
1709.20.1	Demonstrate leadership qualities through actions, behaviors, and ethical standards.
1709.20.2	Encourage collaboration and teamwork to enhance problem-solving and innovation in technical projects.
1709.20.3	Articulate project goals, objectives, and expectations emphasizing the importance of their contributions to overall project success.
1709.21	Work effectively in a team environment to improve the quality of work and the work environment.
1709.21.1	Establish clear communication using tools like Slack, Microsoft Teams and Zoom and hold regular meetings to ensure effective information exchange.
1709.21.2	Implement cross-functional collaboration by assigning tasks and responsibilities that capitalize on each team member's strengths and expertise.
1709.21.3	Promote knowledge sharing and continuous learning to enhance skills and stay updated on technological advancements.

Safety and Security

1709.22	Avoid health risks and physical harm while using digital technologies.
1709.22.1	Describe health risks of standard computing practices.
1709.22.2	Describe risks of internet use.
1709.22.3	Describe the purpose of universal hardware design.
1709.23	Avoid mental health threats while using digital technologies.
1709.23.1	Explain the concept of Catfishing.
1709.23.2	Explain "FOMO" (fear of missing out).
1709.23.3	Explain the potential dangers and consequences of negative media posts.

1709.24	Understand device security.
1709.24.1	Identify methods of protecting against untrusted portable media devices.
1709.24.2	Define device encryption and identify encryption methods.
1709.24.3	Explain when blocking camera access is appropriate and necessary.
1709.25	Understand file security.
1709.25.1	Identify password protection file options.
1709.25.2	Explain editing restrictions.

Academic Foundations

1709.26	Apply language arts skills in an IT environment.
1709.26.1	Use effective technical writing skills for creating documentation, manuals, and guides for software applications, hardware installations, troubleshooting procedures, and user instructions.
1709.26.2	Present findings, project updates, or proposals to various stakeholders.
1709.26.3	Use language effectively to create intuitive interfaces, labels, and instructions that guide users through digital experiences.
1709.26.4	Apply well-written comments and documentation to help others understand the purpose, functionality, and structure of code, facilitating collaboration, maintenance, and troubleshooting in IT projects.
1709.27	Apply writing skills in an IT environment.
1709.27.1	Write error messages, button labels, menu options, tooltips, and other UI elements to ensure an intuitive and user-friendly experience.
1709.27.2	Apply strong written communication skills for composing clear and professional emails.
1709.28	Apply mathematics skills in an IT environment.
1709.28.1	Develop efficient algorithms for computational problems by applying mathematical concepts.
1709.28.2	Utilize statistical methods and mathematical models to analyze datasets, identify patterns, and make data-driven decisions.
1709.28.3	Apply mathematical knowledge in designing and implementing network protocols and cryptographic algorithms.
1709.28.4	Utilize mathematical concepts such as indexing, normalization, and query optimization techniques to design efficient database schemas and improve data retrieval speeds in database management.
1709.28.5	Apply mathematical principles such as equivalence partitioning and boundary value analysis in software testing to design test cases, identify defects, and ensure the reliability and accuracy of software applications.
1709.29	Apply science skills in an IT environment.
1709.29.1	Apply principles of physics and electronics to design and develop computer hardware components such as CPUs, GPUs, memory modules, and motherboards, optimizing performance, power efficiency, and reliability.
1709.29.2	Utilize principles of physics and engineering to design, configure, and maintain network architectures, including routers, switches, and servers, ensuring efficient data transmission, bandwidth optimization, and network reliability.
1709.29.3	Apply principles of computer science, cryptography, and forensic science to analyze security threats, detect intrusions, and investigate cybercrimes, developing and implementing countermeasures to protect IT systems and data.

1709.29.4	Utilize skills in statistical analysis, machine learning, and data visualization to analyze large datasets, extract insights, patterns, and trends, and drive business decisions in areas such as marketing, finance, and healthcare.
1709.29.5	Apply knowledge of environmental science, energy efficiency, and sustainable practices to design green data centers, optimize power consumption, and reduce carbon footprint in IT operations and infrastructure, contributing to environmental sustainability.

This course covers facial procedures, skincare analysis, hair removal, makeup application, and post-facial care. Students learn cleansing, steaming, exfoliation, massage, and masking techniques, as well as moisturizing and sun protection. By course end, students are proficient in performing complete facial services. This course includes a minimum of 72 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-9. Minimum Curriculum for Aestheticians 9.1. An aesthetician student shall complete a course of study consisting of a minimum of 600 clock hours consisting of aesthetics as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Physical Services

1714.1	Apply knowledge of facial procedures, manipulations, skin analysis, hair removal, and make-up services.
1714.1.1	Demonstrate an understanding of cleansing procedures.
1714.1.2	Demonstrate an understanding of steaming procedures.
1714.1.3	Demonstrate an understanding of exfoliation procedures (i.e., chemical, mechanical/manual).
1714.1.4	Demonstrate a basic understanding of massage movements.
1714.1.5	Demonstrate an understanding of methods of extraction.
1714.1.6	Demonstrate an understanding of the functions and applications of masks such as clay/mud, gel, rubberized, cream, and thermal.
1714.1.7	Demonstrate an understanding of the conclusion of facial services: moisturize, sun protection, and after care.
1714.1.8	Perform a complete facial service, including cleansing, exfoliating, massage, mask and moisturize.

Practical Work

1714.2	Perform practical work.
1714.2.1	Comply with the required facility regulations.
1714.2.2	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
1714.2.3	Complete required documentation accurately.
1714.2.4	Participate in evaluation process.

This course offers a comprehensive overview of scientific concepts and physical services. Students will learn about the structure and functions of nails and skin, along with identification of common disorders. Students will gain practical skills in manicuring natural and artificial nails, emphasizing sanitation and precise application techniques. Students will explore electrical safety and explore modern electrotherapy methods. This course includes a minimum of 80 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-6. Minimum Curriculum for Manicurists 6.1. A manicurist/nail technician student shall complete a course of study consisting of a minimum of 400 clock hours of nail technology as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Scientific Concepts

1716.1	Identify scientific components of nails.
1716.1.1	Identify functions, parts, and structure of nails.
1716.2	Identify scientific components of skin.
1716.2.1	Identify functions, parts, and structure of skin.
1716.3	Exhibit basic knowledge of histology, anatomy, and physiology.
1716.3.1	Differentiate among histology, anatomy, and physiology.
1716.3.2	Identify disorders and diseases of nails.
1716.3.3	Describe the signs and symptoms of disorders, diseases, and conditions of nails.
1716.3.4	Identify diseases that should not be treated in a salon.
1716.3.5	Identify disorders and diseases of skin.
1716.3.6	Describe the signs and symptoms of disorders, diseases, and conditions of nails.
1716.3.7	Identify bones in arms and hands.
1716.3.8	Identify muscles and their functions in arms and hands.
1716.3.9	Identify bones in legs and feet.
1716.3.10	Identify muscles and their functions in legs and feet.
1716.4	Describe electrical safety and electrotherapy techniques.
1716.4.1	Identify electrical equipment used in nail salons.
1716.4.2	Explain why it's important to ground electrical equipment in a salon.
1716.4.3	Discuss electrotherapy techniques like LED light therapy for curing gel nails during a practical nail treatment session.

Physical Services

1716.5	Demonstrate knowledge and application of manicuring services, including natural and artificial nails.
1716.5.1	Outline the steps involved in preparing natural nails for a manicure.
1716.5.2	Identify the essential tools and products required for both natural and artificial nail services.

1716.5.3	Explain the differences between natural and artificial nails in terms of composition and structure.
1716.5.4	Explain the importance of proper sanitation and disinfection procedures in preventing nail infections.
1716.5.5	Summarize the stages of nail growth and how they affect manicuring services.
1716.5.6	Assess the effectiveness of different nail care products and techniques in achieving desired results.
1716.5.7	Identify basic nail shapes.
1716.5.8	Explain the purpose of base coats, polish colors, and topcoats in a nail polishing procedure.
1716.5.9	Analyze nail conditions and shapes to determine the most suitable polish or gel application methods.
1716.5.10	Practice applying nail polish with precision, ensuring even coverage and smooth finish.
1716.5.11	Perform a basic manicure procedure on natural nails, including shaping, cuticle care, and polish application.

Nail Product Chemistry

1716.6	Identify chemical ingredients in nail products.
1716.6.1	Describe the purpose of each ingredient in nail products (e.g., solvents, polymers, plasticizers).
1716.6.2	Identify the effects of specific ingredients on nail health and appearance.
1716.7	Explain the interaction between chemicals.
1716.7.1	Identify chemical interactions commonly encountered in nail services.
1716.7.2	Explain how certain chemicals interact during nail application processes (e.g., acrylic application, gel curing).
1716.7.3	Demonstrate proper handling techniques to prevent adverse chemical interactions.
1716.8	Recognize physical changes.
1716.8.1	Explain the physical changes involved in different nail treatments (e.g., nail polish drying, acrylic curing).
1716.8.2	Identify factors that influence the rate and extent of physical changes in nail products.
1716.9	Recognize chemical reactions.
1716.9.1	Explain the chemical reactions underlying various nail treatments (e.g., acrylic application, gel curing).

This course covers pedicuring techniques and advanced nail technology, including UV gel application, nail tips, wraps, and acrylic enhancements. Students will learn proper procedures, safety protocols, and creative nail art design.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-6. Minimum Curriculum for Manicurists 6.1. A manicurist/nail technician student shall complete a course of study consisting of a minimum of 400 clock hours of nail technology as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Physical Services

1717.1	Demonstrate knowledge and application of pedicuring services.
1717.1.1	Outline the steps involved in preparing natural nails for a pedicure.
1717.1.2	Identify the essential tools and products required for a complete pedicure treatment.
1717.1.3	Discuss safety guidelines for handling sharp tools and disinfecting footbaths.
1717.1.4	Perform a complete pedicure service, including foot soaking, exfoliation, nail trimming, cuticle care, massage, and polish.
1717.1.5	Perform UV gel application techniques proficiently, including curing and shaping.

Nail Technology

1717.2	Practice advanced knowledge of nail tips, wraps, and UV Gels.
1717.2.1	Explain the purposes of the necessary supplies for nail tips.
1717.2.2	Identify the types of nail tips.
1717.2.3	Demonstrate proper procedures and safety in nail tips application and removal.
1717.2.4	Explain the benefits of silk, linen, fiberglass, and synthetic wrap applications.
1717.2.5	Demonstrate the procedures and precautions in fabric wrap applications.
1717.2.6	Demonstrate maintenance, repair, and removal of wraps.
1717.2.7	Describe the supplies used in UV gel application.
1717.2.8	Demonstrate the proper procedures for maintaining UV gel services using forms over tips and on natural nails.
1717.2.9	Describe the one- and two-color methods for applying UV gels.
1717.2.10	Explain how to safely remove UV gels.
1717.2.11	Explain the purpose of supplies in acrylic nail enhancement.
1717.3	Apply knowledge of nail enhancements and design.
1717.3.1	Demonstrate the use of monomer liquid and polymer powder nail enhancements.
1717.3.2	Practice health and safety precautions involving application of nail primers.
1717.3.3	Perform rebalance procedures and repairs.
1717.3.4	Implement proper procedures for removal of acrylic nail enhancements.
1717.3.5	Explain differences in traditional and odorless acrylic nail enhancement products.
1717.3.6	Demonstrate the use of creative nail art design products.

1717.3.7	Create various nail art designs using techniques such as stamping, freehand painting, and embellishments.

This course will introduce students to computer-aided drafting using CAD software. Areas of study include the CAD interface, basic geometry, working aids, basic dimensioning, plotting, and student organizations. Students will demonstrate knowledge and technical expertise in the commands and features of the program. Emphasis will be placed on personal and professional ethics and students will explore a variety of career opportunities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

CAD Interface

1718.1	CAD Interface
1718.1.1	Components of the CAD software interface.
1718.1.2	Examine the components of the CAD window and describe their functions.
1718.1.3	Examine the CAD file management commands to manage files, libraries, and directories.
1718.1.4	Use the keyboard, menu, toolbar, and shortcut menu to invoke CAD commands.
1718.1.5	Examine the units of measure used by CAD.
1718.1.6	Examine the Cartesian coordinate system.

Basic Geometry

1718.2	Basic Geometry
1718.2.1	Components of 2D geometry as they relate to drafting.
1718.2.2	Draw 2D geometric shapes (e.g., lines, circles, arcs, ellipses, rectangles, and regular polygons using the draw toolbar menu and aliases).
1718.2.3	Demonstrate proper use of the modify commands (e.g., move, copy, offset, trim, extend, stretch, rotate, mirror, fillet and scale using the modify toolbar, menu, and aliases).

Working Aids

1718.3	Working Aids
1718.3.1	The working aids related to CAD.
1718.3.2	Examine CAD's drawing aids including layering system, object properties, snap mode, and object snaps.
1718.3.3	Use CAD's workings aids to setup drawings, improve quality and accuracy of drawings.

Basic Dimensioning

1718.4	Basic Dimensioning
1718.4.1	Basic dimensioning techniques using CAD.
1718.4.2	Draw basic dimensions following standard drafting procedures using the dimension toolbar, menu, and aliases.
1718.4.3	Create and edit text using single and multi-line text commands.

Plot Drawings

1718.5	Plot Drawings
1718.5.1	Components and functions of a plotter/printer.
1718.5.2	Examine the components and functions of a plotter/printer.
1718.5.3	Plot and print drawings using CAD software.

This course offers hands-on training in nail care, including manicuring and artificial nail services, alongside techniques for hand, arm, foot, and leg massages. Students learn to assess client needs, apply enhancements safely, and perform relaxing massages effectively. Practical skills cover wraps, tips, and paraffin wax treatments, ensuring proficiency while adhering to industry standards. This course includes a minimum of 115 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-6. Minimum Curriculum for Manicurists 6.1. A manicurist/nail technician student shall complete a course of study consisting of a minimum of 400 clock hours of nail technology as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Physical Services

1719.1	Demonstrate knowledge and application of manicuring services, including natural and artificial nail services.
1719.1.1	Evaluate the condition of a client's nails and recommend suitable treatments or enhancements based on their needs.
1719.1.2	Apply acrylic or gel enhancements to artificial nails following proper techniques and safety protocols.
1719.1.3	Demonstrate the use of nail drills for shaping and refining artificial nails without causing damage to the natural nail bed.
1719.1.4	Analyze the potential risks and complications associated with improper nail care practices and suggest preventive measures.

Basic Procedures

1719.2	Demonstrate hand, arm, foot, and leg massages.
1719.2.1	Identify key pressure points on the hand, arm, foot, and leg.
1719.2.3	Explain the importance of hand, arm, foot, and leg massages in enhancing circulation and relaxation.
1719.2.4	Perform hand, arm, foot, and leg massages using appropriate pressure and techniques.
1719.2.5	Identify areas of tension or discomfort and adjust massage techniques accordingly.
1719.2.6	Demonstrate proper body mechanics to prevent strain during massage sessions.
1719.3	Apply knowledge of wraps, tips, paraffin wax treatments.
1719.3.1	Explain the purpose of nail wraps, tips, and paraffin wax treatments in nail enhancement and maintenance.
1719.3.2	Evaluate the condition of the nails and skin before applying wraps, tips, or paraffin wax to determine suitability.
1719.3.3	Apply nail wraps and tips with precision and proper adhesion techniques.
1719.3.4	Perform paraffin wax treatments on hands and feet safely and effectively.

Practical Work

1719.4	Perform practical work.

1719.4.1	Comply with the required facility regulations.
1719.4.2	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
1719.4.3	Complete required documentation accurately.
1719.4.4	Participate in evaluation process.

This course introduces students to the specialization of architectural drawing and design. Areas of study include architectural styles, floor plans, dimensioning and annotation, site and foundation plans, elevations and section layouts, and residential utilities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Technical Drafting

1721.1	Identify and interpret architectural abbreviations, terminology, and symbols commonly used in technical drafting.
1721.1.1	Recognize and interpret architectural abbreviations and terms commonly using in drawings.
1721.1.2	Identify architectural elements and components based on their descriptions.
1721.2	Apply the drafting process to accurately communicate architectural design ideas and concepts.
1721.2.1	Following drafting processes to accurately translate architectural concepts into drawings.
1721.2.2	Communicate effectively with team members and architects to understand project requirements.
1721.3	Create detailed architectural drawings with appropriate notations and annotations.
1721.3.1	Apply detailed notations to architectural drawings to convey specific design features accurately.
1721.3.2	Describe architectural details with clarity and precision.
1721.4	Apply geometric principles and mathematical calculations to architectural drafting tasks.
1721.4.1	Apply geometric principles and mathematical concepts to architectural drafting.
1721.4.2	Utilize precise lines and measurements to create accurate architectural drawings.

Design and Representation

1721.5	Create accurate site drawings and topographic maps depicting the natural features and contours of a given site.
1721.5.1	Produce site drawings and topographic maps following established standards.
1721.5.2	Analyze and interpret site data to create accurate representations of topography.
1721.6	Develop detailed floor plans and layouts illustrating the spatial organization and arrangement of interior spaces within a building.
1721.6.1	Develop floor plans and layouts according to project specifications and design intent.
1721.6.2	Utilize drafting techniques to create well-organized floor plans.
1721.7	Generate comprehensive exterior views and elevations showcasing the architectural features, proportions, and façade details of a building.
1721.7.1	Generate exterior views and elevations depicting building facades accurately.
1721.7.2	Apply principles of perspective to create realistic architectural elevations.
1721.8	Specify appropriate building materials and finishes for architectural elements based on functionality, durability, and aesthetic requirements.
1721.8.1	Identify and specify appropriate building materials for architectural projects.
1721.8.2	Apply knowledge of building materials to accurately represent them in drawings.
1721.9	Design roofs and roof plans that provide structural support, weather protection, and architectural character to a building.
1721.9.1	Draft roof plans reflecting the design and structural requirements of the building.

1721.9.2	Communicate roof details and features effectively through drawings.
1721.10	Integrate various building systems, such as HVAC, plumbing, electrical, and fire protection, into architectural designs.
1721.10.1	Describe the general building systems and their integration within architectural designs.
1721.10.2	Incorporate building systems such as HVAC, plumbing, and electrical into architectural drawings.
1721.11	Design functional and aesthetically pleasing stairs and steps that provide safe and efficient vertical circulation within a building.
1721.11.1	Design and draft stairs and steps that meet safety and building code requirements.
1721.11.2	Illustrate stair details and configurations accurately in architectural drawings.
1721.12	Plan and detail foundation systems that provide structural support and stability to a building.
1721.12.1	Design and draft foundation plans that support the structural integrity of buildings.
1721.12.2	Communicate foundation details and specifications clearly through drawings.

Regulatory and Compliance

1721.13	Interpret and apply relevant building codes, including ADA (Americans with Disabilities Act) codes, to architectural designs.
1721.13.1	Interpret and apply relevant building codes and ADA regulations to architectural designs.
1721.13.2	Ensure architectural drawings comply with applicable building and accessibility codes.
1721.13.3	Describe the general building systems and their integration within architectural designs.
1721.13.4	Incorporate building systems such as HVAC, plumbing, and electrical into architectural drawings.
1721.14	Coordinate with electrical engineers to integrate electrical systems and components into architectural designs.
1721.14.1	Incorporate electrical components and layouts into architectural drawings.
1721.14.2	Coordinate with electrical engineers to ensure proper placement and representation of electrical systems.
1721.15	Incorporate HVAC (Heating, Ventilation, and Air Conditioning) systems and ductwork into architectural designs.
1721.15.1	Integrate HVAC systems into architectural designs while considering space and functionality.
1721.15.2	Communicate HVAC requirements and specifications effectively through drawings.
1721.16	Develop construction schedules and timelines for architectural projects.
1721.16.1	Create schedules for architectural elements such as doors, windows, and finishes.
1721.16.2	Organize and present schedule information clearly and logically in drawings.
1721.17	Coordinate with plumbers to integrate plumbing systems and fixtures into architectural designs.
1721.17.1	Incorporate plumbing fixtures and layouts into architectural drawings.
1721.17.2	Coordinate with plumbing professionals to ensure accurate representation of plumbing systems.

This course introduces the student to the knowledge base and technical skills for piping drafting. Areas of study include piping, joints and fittings, valves, schematics, and layouts. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Piping

1722.1	Piping
1722.1.1	Types of piping and the purposes for which each is used.
1722.1.2	Examine piping terminology and materials.
1722.1.3	Examine the purpose for certain types of piping.
1722.1.4	Draw piping jobs.

Joints and Fittings

1722.2	Joints and Fittings
1722.2.1	Common joints and fittings.
1722.2.2	Examine common joints.
1722.2.3	Examine common fittings.

Valves

1722.3	Valves
1722.3.1	Common valve type.
1722.3.2	Examine common valve types.
1722.3.3	Examine common valve type uses.

Schematics and Layouts

1722.4	Schematics and Layouts
1722.4.1	Piping schematics and isometric layouts.
1722.4.2	Draw a piping schematic.
1722.4.3	Draw an isometric piping layout.
1722.4.4	Demonstrate dimensioning of piping systems.

This course will introduce students to the specialization of civil drafting and design. Areas of study include maps and construction and utilization of survey data. Emphasis will be placed on personal and professional ethics and students will explore a variety of career opportunities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Maps and Construction

1723.1	Maps and Construction
1723.1.1	Design techniques, tools and principals involved in production of precision technical plans, blueprints, drawings, and models.
1723.1.2	Materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
1723.1.3	Examine common mapping concepts including earth directions, latitude, longitude, and relationship to sea level.
1723.1.4	Convert azimuth to bearings and reverse.
1723.1.5	Plot traverses, contours, and profiles.
1723.1.6	Draw and/or plot land from legal descriptions.

Application of Survey Data

1723.2	Application of Survey Data
1723.2.1	CAD software in order to create drawings from field notes.
1723.2.2	Examine field surveying data and its applications to site/plot plan.
1723.2.3	Create a model using surveying data.

This course introduces the student to the knowledge base and technical skills necessary for mechanical drafting. Areas of study include advanced dimensioning techniques, assembly drawings, threads and fasteners, gears and cams, welding, and basic solid modeling.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Terminology and Identification

1725.1	Define and apply general terminology commonly used in mechanical drafting.
1725.1.1	Recognize and apply standard mechanical terminology in drawings.
1725.1.2	Identify mechanical components and features based on their descriptions.
1725.2	Create multi-view drawings of mechanical parts and assemblies.
1725.2.1	Generate multi-view drawings depicting mechanical components with accuracy and clarity.
1725.2.2	Identify and label different views in multi-view drawings appropriately.
1725.3	Generate sectional views of mechanical components to illustrate internal features and dimensions.
1725.3.1	Create sectional views to illustrate internal features and details of mechanical components.
1725.3.2	Label and identify sectional views and related terminology correctly.
1725.4	Render pictorial views of mechanical parts and assemblies to enhance visualization and understanding.
1725.4.1	Produce pictorial drawings to represent mechanical objects in three dimensions.
1725.4.2	Recognize and describe different types of pictorial drawings and their applications.
1725.5	Construct auxiliary views to represent inclined or oblique surfaces of mechanical features.
1725.5.1	Develop auxiliary views to show inclined or oblique surfaces of mechanical components accurately.
1725.5.2	Identify and label auxiliary views correctly within mechanical drawings.

Drawing Techniques and Principles

1725.6	Apply appropriate equipment techniques, drawing rules, and principles in mechanical drafting tasks.
1725.6.1	Utilize drafting equipment and techniques effectively to produce accurate drawings.
1725.6.2	Apply established drawing rules and principles to ensure quality and consistency.
1725.7	Implement dimensioning and layout techniques to accurately convey the size, shape, and relationships of mechanical components.
1725.7.1	Properly dimension and layout mechanical drawings according to industry standards.
1725.7.2	Communicate design intent clearly through dimensioning and layout techniques.
1725.8	Utilize descriptive geometry principles to analyze and represent spatial relationships and configurations of mechanical features.
1725.8.1	Apply descriptive geometry principles to accurately represent three-dimensional objects on two-dimensional drawings.
1725.8.2	Interpret and create geometric constructions and projections.
1725.9	Illustrate revolved features and components in mechanical drawings to depict rotational symmetry and three-dimensional form.
1725.9.1	Apply revolution techniques to depict rotational features and components accurately.
1725.9.2	Utilize revolutions to represent cylindrical and circular objects effectively.

1725.10	Determine and depict intersections between geometric elements and mechanical features in technical drawings.
1725.10.1	Illustrate intersections of mechanical features and components accurately.
1725.10.2	Apply intersection techniques to represent complex geometric relationships in drawings.

Geometric Dimensioning and Tolerancing (GD&T)

1725.11	Apply geometric dimensioning and tolerancing principles to accurately define and communicate the form, orientation, and tolerance requirements of mechanical features on technical drawings.
1725.11.1	Interpret geometric dimensioning and tolerancing symbols and specifications in mechanical drawings.
1725.11.2	Apply GD&T principles to communicate dimensional requirements effectively.

Working Drawings and Management

1725.12	Implement procedures for the identification and numbering of working drawings in accordance with organizational standards and industry best practices.
1725.12.1	Identify and organize drawings using appropriate numbering and identification systems.
1725.12.2	Follow established procedures for the identification and management of mechanical drawings.
1725.13	Manage and organize mechanical drawings effectively to ensure accessibility, accuracy, and version control throughout the drafting process.
1725.13.1	Organize and manage mechanical drawings effectively to ensure accessibility and version control.
1725.13.2	Follow established protocols for document control and revision management in mechanical drafting processes.

Fasteners, Connections, and Welding

1725.14	Specify and Design Threads-Fasteners-Connections-Welding.
1725.14.1	Depict threads, fasteners, connections, and welding details accurately in mechanical drawings.
1725.14.2	Apply standard symbols and conventions for representing threaded components and welded joints.

Drafting Math and Geometry

1725.15	Apply mathematical principles and geometric concepts to accurately interpret and create technical drawings in mechanical drafting.
1725.15.1	Apply mathematical and geometric principles to solve drafting problems and create accurate drawings.
1725.15.2	Calculate dimensioning, angles, and geometric relationships required for mechanical drafting.

Threads and Fasteners

1725.16	Identify and apply fastener terminology and symbols.
1725.16.1	Identify and interpret fastener terminology and symbols commonly used in technical drawings.
1725.16.2	Select appropriate fasteners based on application requirements and specifications.
1725.17	Identify and apply screw thread terminology and symbols.
1725.17.1	Identify and interpret screw thread terminology and symbols such as thread pitch, diameter, and thread form.
1725.17.2	Create technical drawings depicting screw threads accurately.
1725.18	Produce threaded fastener drawings.
1725.18.1	Create technical drawings of threaded fasteners, including bolts, screws, and nuts.
1725.18.2	Specify dimensions, thread specifications, and other relevant details in threaded fastener drawings.
1725.19	Produce common fasteners and applications.

1725.19.1	Identify common fasteners used in mechanical assemblies and structures.
1725.19.2	Design and produce technical drawings of common fasteners such as bolts, screws, and rivets for specific applications.

Manufacturing Processes

1725.20	Demonstrate knowledge of machining operations.
1725.20.1	Identify common machining operations such as turning, milling, drilling, and grinding.
1725.20.2	Explain the principles and techniques involved in each machining operation.
1725.20.3	Describe the equipment and tools used in machining processes.
1725.21	Demonstrate knowledge of welding.
1725.21.1	Identify different welding processes, including MIG, TIG, and stick.
1725.21.2	Explain the principles and applications of each welding process.
1725.22	Demonstrate knowledge of various manufacturing processes.
1725.22.1	Identify and describe various manufacturing processes such as casting, forging, and molding.
1725.22.2	Explain the advantages, limitations, and applications of each manufacturing process.
1725.22.3	Understand the sequence of steps involved in different manufacturing processes.
1725.23	Demonstrate knowledge of various materials.
1725.23.1	Identify common engineering materials such as metals, plastics, and composites.
1725.23.2	Describe the properties and characteristics of different materials.
1725.23.3	Explain the suitability of materials for specific applications based on their properties.
1725.24	Identify standard shop tools and equipment.
1725.24.1	Identify and describe common shop tools and equipment used in manufacturing processes.
1725.25	Demonstrate knowledge of mechanical components.
1725.25.1	Identify and describe common mechanical components such as gears, bearing, and shafts.
1725.25.2	Understand the functions and applications of mechanical components in machinery and systems.
1725.25.3	Interpret technical drawings and specifications of mechanical components.

Design Principles

1725.26	Explain design guidelines (form, function, repetition, etc.).
1725.26.1	Apply design principles to create basic drawings with emphasis on clarity and aesthetic appeal.
1725.27	Identify steps of the design process/cycle.
1725.27.1	Identify and describe the steps involved in the design process, including ideation, conceptualization, and refinement.
1725.27.2	Apply design process to complete drafting assignments, from initial concept to final presentation.
1725.28	Research and design a project.
1725.28.1	Conduct research to gather information and inspiration for a drafting project, considering factors such as user needs and design constraints.
1725.28.2	Apply design principles to develop and execute a drafting project, demonstrating creativity and problem-solving skills.
1725.29	Use reference materials.
1725.29.1	Effectively use reference materials such as textbooks, online resources, and design catalogs to inform drafting work.
1725.29.2	Demonstrate the ability to interpret and apply information obtained from reference materials to improve the quality of their designs.

This course introduces the student to the knowledge base and technical skills for structural steel drafting. Areas of study include structural steel, high strength bolts, welding symbols, and structural truss floor plans. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Structural Steel

1726.1	Structural Steel
1726.1.1	A variety of structural steel characteristics.
1726.1.2	Examine structural steel shapes.
1726.1.3	Draw and label structural steel shapes.

High Strength Bolts

1726.2	High Strength Bolts
1726.2.1	High strength bolts used in structural joints.
1726.2.2	Examine high strength bolts.
1726.2.3	Draw and label high strength bolts.

Welding Symbols

1726.3	Welding Symbols
1726.3.1	Welding symbols used in steel fabrication.
1726.3.2	Examine welding symbols.
1726.3.3	Draw a detail of a welded beam.

Structural Floor Plans

1726.4	Structural Floor Plans
1726.4.1	Structural floor plans.
1726.4.2	Examine structural floor plans.
1726.4.3	Draw and label a structural floor plan.

This course introduces the student to techniques used in advanced orthographic projection. Areas of study include sectioning, pictorial views, auxiliary views, patterns and developments, dimensioning, advanced 2D CAD techniques, and basic 3D modeling in CAD. Students will demonstrate knowledge and technical expertise in various fundamental drafting techniques.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Multiview Drawing

1727.1	Produce basic orthographic views.
1727.1.1	Explain concepts and principles underlying the creation of multi-view drawings.
1727.1.2	Visualize objects and views.
1727.1.3	Construct multi-view drawings.
1727.2	Produce auxiliary views.
1727.2.1	Explain the concepts and principles of primary auxiliary views.
1727.2.2	Construct primary auxiliary views.
1727.3	Produce section views.
1727.3.1	Explain the concepts and principles of sectional views.
1727.3.2	Construct sectional views.
1727.4	Produce intersections and developments.
1727.4.1	Explain the concepts of intersections and developments.
1727.4.2	Construct intersections and developments.
1727.5	Produce schematic drawings.
1727.5.1	Explain specifications for graphical symbols used in schematic drawings to ensure universal understanding of components and devices.
1727.5.2	Understand requirements for drafting practices to ensure schematic drawings are prepared and interpreted consistently and accurately.
1727.6	Produce pictorial drawings.
1727.6.1	Explain the concepts and principles of pictorial drawings.
1727.6.2	Construct pictorial drawings.
1727.7	Produce detail working drawings.
1727.7.1	Explain techniques and procedures for constructing working drawings.
1727.7.2	Construct working drawings.
1727.8	Produce assembly drawings.
1727.8.1	Use guidelines to specify sizes and fits on assembly drawings for correct component assembly.
1727.8.2	Recognize principles for clear assembly drawings that show parts and how they fit together.
1727.8.3	Describe how to create assembly drawings with guidelines for arranging and showing parts.
1727.8.4	Explain how to detail assembly drawings with views, sections, and lists of parts for manufacturing.
1727.8.5	Understand requirements for drafting practices to ensure assembly drawings are consistent and accurate.
1727.9	Demonstrate drawing revisions.
1727.9.1	Use guidelines for precise drawing changes, ensuring dimensions and tolerances are adjusted accurately.
1727.9.2	Recognize clear methods for showing changes on drawings.

Drafting Techniques**Course #: 1727****Allowable Teacher Endorsement:** 0608, 1800, 1801, 1810, 7011, 7028, 7105

1727.9.3	Describe how to document drawing changes effectively.
1727.9.4	Explain how to include revised symbols, ensuring they match updated specifications.
1727.10	Produce modified part drawings.
1727.10.1	Explain techniques and procedures for modifying part drawings.
1727.10.2	Construct modified part drawings.

This course introduces the student to the knowledge base and technical skills for advanced computer aided drafting. Areas of study include paper space/model space, layout, and add-on software. Students will demonstrate knowledge and technical expertise in the use of CAD software. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Paper and Model Space

1728.1	Paper and Model Space
1728.1.1	The use of paper space/model space as a plotting tool.
1728.1.2	Examine the paper space/model space.
1728.1.3	Set up a paper space border.

Layout

1728.2	Layout
1728.2.1	The creation of a working drawing from a 3D model for production.
1728.2.2	Create 2D views of 3D models.
1728.2.3	Set up views and create profiles.
1728.2.4	Complete a project with dimensions and notes.

Add-On Software

1728.3	Add-On Software
1728.3.1	Add-on software.
1728.3.2	Examine add-on software options.
1728.3.3	Select and complete a project with the instructor's approval.

Fundamentals of Drafting is an introductory course which equips students with essential drafting skills, covering tools, measurement, drafting techniques, freehand sketching, orthographic projection, dimensioning, basic computer skills, and drawing techniques, providing a strong foundation for further study in the Drafting Program.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Basic Drawing Skills

1729.1	Identify and demonstrate appropriate use of drafting tools, materials, and equipment.
1729.1.1	Use conventional drafting stations, technical handbooks, tables, calculators, and traditional drafting tools, such as boards, pencils, protractors, and T-squares.
1729.1.2	Apply appropriate techniques when using drafting tools and equipment.
1729.1.3	Explain the correct use of manual drafting equipment and supplies.
1729.1.4	Explain correct lettering technique.
1729.1.5	Demonstrate drawing procedures.
1729.1.6	Construct a single-view drawing.
1729.2	Demonstrate knowledge of the use of CAD as a drafting tool.
1729.2.1	Explain basic CAD terms and concepts.
1729.2.2	Explain basic 2D CAD commands
1729.2.3	Explain basic 3D modeling commands and concepts.
1729.2.4	Construct a 2D CAD drawing.
1729.2.5	Construct a 3D CAD model.
1729.2.6	Exhibit proficiency in utilizing Computer-Aided Design (CAD) software for drafting purposes.
1729.2.7	Apply CAD commands and functions to create technical drawings effectively.
1729.3	Drawing standards and conventions.
1729.3.1	Adhere to recognized drawing standards and conventions, such as line weights and symbol usage.
1729.3.2	Apply industry-standard drawing practices to ensure clarity and consistency in drawings.
1729.4	Utilize appropriate drawing layout and scale.
1729.4.1	Implement suitable drawing layout techniques to organize drawings effectively.
1729.4.2	Choose and apply appropriate scale to drawings for accurate representation.
1729.5	Complete annotation of drawings.
1729.5.1	Accurately annotate drawings with necessary information, including dimensions and notes.
1729.5.2	Apply consistent and clear annotation practices to enhance drawing communication.
1729.6	Complete a title block.
1729.6.1	Create and fill out a title block with relevant information, including title, scale, and date.
1729.6.2	Arrange and format a title block according to established standards.
1729.7	Demonstrate sketching skills and techniques.
1729.7.1	Identify the concepts related to sketching.
1729.7.2	Explain the concepts related to sketching multi-view and pictorials
1729.7.3	Construct an isometric sketch.
1729.7.4	Construct an oblique sketch.
1729.7.5	Construct a multi-view sketch.

Geometric Construction

1729.8	Identify geometric terms and constructions.
1729.8.1	Explain selected geometric terms.
1729.8.2	Explain the procedures for drawing standard geometric constructions.
1729.9	Produce basic geometric constructions.
1729.9.1	Construct drawings that require geometric constructions.
1729.9.2	Implement properties of geometric shapes (e.g., angles, congruence) to create constructions.
1729.10	Construct lines at any given angle.
1729.10.1	Create lines at specified angles using drafting tools.
1729.10.2	Apply trigonometric principles for angle construction.
1729.11	Construct irregular curved lines.
1729.11.1	Create irregular curved lines using drafting tools or freehand techniques.
1729.11.2	Apply compass-assisted methods for curve construction.
1729.12	Construct geometric shapes and plane figures.
1729.12.1	Generate specific geometric shapes (e.g., triangles, quadrilaterals) using drafting techniques.
1729.12.2	Apply methods for constructing shapes with given properties (e.g., equilateral triangle, rectangle).
1729.13	Draw Lines.
1729.13.1	Draw straight lines of varying lengths and orientations using drafting tools.
1729.13.2	Utilize drafting tools (e.g., T-square, triangle) for accurate line drawings.
1729.14	Draw Curved elements.
1729.14.1	Sketch curved elements (e.g., arcs, ellipses) with drafting tools or by freehand.
1729.14.2	Apply properties of arcs and ellipses to accurately draw curved elements.
1729.15	Pattern Development.
1729.15.1	Explain techniques and procedures for constructing pattern developments.
1729.15.2	Construct pattern development.

Dimensioning Skills

1729.16	Dimension basic features.
1729.16.1	Identify the accepted standards for mechanical dimensioning practices.
1729.16.2	Accurately dimension basic features such as lines, circles, and rectangles on technical drawings, ensuring clarity and readability.
1729.16.3	Explain the procedures for dimensioning mechanical drawings.
1729.16.4	Construct dimensions on an engineering drawing.
1729.17	Apply local and general notes.
1729.17.1	Include local and general notes on drawings as required.
1729.17.2	Apply notes to provide additional information or instructions related to specific features.
1729.18	Interpret abbreviations and symbols.
1729.18.1	Interpret abbreviations and symbols commonly used in technical drawings.
1729.18.2	Understand and apply industry-standard abbreviations and symbols in dimensioning.
1729.19	Demonstrate metric dimensioning.
1729.19.1	Implement metric dimensioning standards in technical drawings.
1729.19.2	Dimension drawings using the metric system accurately and consistently.
1729.20	Demonstrate dual dimensioning.
1729.20.1	Provide dual dimensions (metric and imperial) on technical drawings.
1729.20.2	Display measurements in both metric and imperial units for clarity and convenience.

1729.21	Demonstrate tabular/charted dimensioning.
1729.21.1	Present dimensions in tabular or charted formats when appropriate.
1729.21.2	Organize and display dimensions systematically using tables or charts.
1729.22	Demonstrate baseline dimensioning.
1729.22.1	Utilize baseline dimensioning methods to establish a reference dimension.
1729.22.2	Apply baseline dimensions to improve clarity and consistency in dimensioning.
1729.23	Demonstrate tolerancing practices.
1729.23.1	Apply tolerance values to dimensions according to specific requirements.
1729.23.2	Ensure dimensions reflect allowable variations and tolerances in manufacturing.
1729.24	Identify finished surfaces.
1729.24.1	Identify and designate finished surfaces on technical drawings.
1729.24.2	Clearly indicate surfaces that require specific finishing treatments or requirements.
1729.25	Demonstrate geometric dimension and tolerancing (GD&T).
1729.25.1	Apply geometric dimensioning and tolerancing principles to technical drawings.
1729.25.2	Use GD&T symbols and concepts to specify geometric tolerances accurately.

Applied Mathematics

1729.26	Basic mathematic operations.
1729.26.1	Add and subtract integers and decimals accurately.
1729.26.2	Multiply and divide integers and decimals with precision and efficiency.
1729.26.3	Apply order of operations to solve mathematical expressions correctly.
1729.27	Apply methods of measurement.
1729.27.1	Use appropriate tools and techniques to measure distance accurately on technical drawings.
1729.27.2	Interpret and apply linear, angular, and radial measurements in drafting context.
1729.27.3	Record and report precision measurements (e.g., micrometers, calipers, scale, laser).
1729.27.4	Use reverse engineering principles to generate engineering drawings.
1729.28	Calculate distance, area, and volume.
1729.28.1	Calculate distance using the Pythagorean theorem and trigonometric functions.
1729.28.2	Determine areas of geometric shapes using appropriate formulas (e.g., area of a rectangle, triangle, circle).
1729.28.3	Calculate volumes of basic solids (e.g., cubes, cylinders, spheres) using appropriate formulas.
1729.29	Calculate fractions and decimals.
1729.29.1	Perform operations with fractions (addition, subtraction, multiplication, division) accurately and efficiently.
1729.29.2	Convert between fractions and decimals and vice versa.
1729.30	Demonstrate conversion skills.
1729.30.1	Convert between units of measurement within the same system (e.g., inches to feet) accurately.
1729.30.2	Convert between units of measurement from different systems (e.g., inches to millimeters, feet to meters) accurately.
1729.31	Calculate taper/slope.
1729.31.1	Calculate taper angles and slopes using trigonometric principles and formulas accurately.
1729.31.2	Apply taper calculations to practical drafting scenarios (e.g., inclined surfaces, tapered shafts).
1729.32	Demonstrate knowledge of algebraic equations.
1729.32.1	Solve algebraic equations involving one variable accurately.
1729.32.2	Apply algebraic equations to solve drafting-related problems (e.g., calculating unknown dimensions).
1729.33	Demonstrate knowledge of geometry.

1729.33.1	Apply geometric principles to solve problems involving angles and shapes accurately.
1729.33.2	Calculate measurements of geometric figures (e.g., perimeter, circumference, area) accurately using appropriate formulas.
1729.34	Demonstrate knowledge of trigonometry.
1729.34.1	Apply trigonometric ratios (sine, cosine, tangent) to solve problems involving right triangles accurately.
1729.34.2	Apply trigonometric principles to solve problems involving angles and triangles accurately.

3-D Modeling

1729.35	Generate and modify construction entities (e.g., planes, axis, points).
1729.35.1	Build and shape 3D entities such as planes, axes, and points.
1729.35.2	Adapt and refine construction entities to meet specific design requirements.
1729.36	Create and constrain 3-D assemblies.
1729.36.1	Assemble components to form 3D assemblies.
1729.36.2	Define relationships between parts to ensure proper fit and function.
1729.37	Produce alternative output (e.g., rapid prototype, CNC).
1729.37.1	Fabricate physical models using additive or subtractive means.
1729.37.2	Optimize production processes to enhance efficiency and quality.

In this course, students will learn industry standards in hair coloring and lightening techniques. From identifying common hair coloring products to mastering corrective coloring methods, students will gain proficiency in achieving desired color results. This course includes a minimum of 75 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-10. Minimum Curriculum for Hair Stylists 10.1. A hair stylist student shall complete a course of study consisting of a minimum of 1,000 clock hours of hair styling as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Chemical Services

1730.1	Apply knowledge and proficiency of hair coloring, including corrective coloring and color formation.
1730.1.1	Identify the chemical composition of common hair coloring products such as oxidative dyes, semi-permanent dyes, and direct dyes.
1730.1.2	Identify primary colors (red, blue, yellow) and secondary colors (green, orange, purple) used in color formation.
1730.1.3	Explain the principles behind corrective coloring techniques, such as color wheel theory and color neutralization, to clients and fellow stylists.
1730.1.4	Demonstrate appropriate hair coloring techniques, such as root touch-ups, full-head color, and balayage, to achieve desired color results.
1730.1.5	Demonstrate corrective coloring methods to address specific issues like brassiness, uneven color, or unwanted tones.
1730.2	Apply knowledge and proficiency of hair lightening.
1730.2.1	Recall the chemical composition of common hair lightening products such as powdered bleach, cream lighteners, and high-lift hair color.
1730.2.2	Explain the principles behind hair lightening techniques, including the role of oxidative agents like hydrogen peroxide in lifting natural pigment from the hair shaft.
1730.2.3	Demonstrate the steps involved in the hair lightening process, including sectioning, application, monitoring, and rinsing.
1730.2.4	Demonstrate appropriate hair lightening techniques, such as traditional foil highlights, balayage, or color melting, to achieve desired levels of lift and tone.

Practical Work

1730.3	Perform practical work.
1730.3.1	Comply with the required facility regulations.
1730.3.2	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
1730.3.3	Complete required documentation accurately.
1730.3.4	Participate in evaluation process.

This course provides essential training in infection control and scientific concepts relevant to aesthetics. Students will learn proper sanitation procedures, understand anatomy and physiology principles, grasp basic chemistry and electricity concepts, and explore the impact of nutrition on skin health. This course includes a minimum of 36 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-9. Minimum Curriculum for Aestheticians 9.1. An aesthetician student shall complete a course of study consisting of a minimum of 600 clock hours consisting of aesthetics as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Infection Control for Aesthetics

1731.1	Demonstrate an understanding of infection control in aesthetics.
1731.1.1	Define common pathogens relevant to aesthetics procedures.
1731.1.2	Describe the difference between disinfection and sterilization in the context of aesthetic tools and equipment.
1731.1.3	Explain the significance of proper disposal of single-use items in maintaining a sterile environment.
1731.1.4	Demonstrate the correct procedure for sanitizing tools and work surfaces in an aesthetics clinic.

Scientific Concepts

1731.2	Discuss principles of anatomy and physiology as they relate to aesthetics.
1731.2.1	Demonstrate an understanding of cells and their functions.
1731.2.2	Demonstrate an understanding of tissues such as epithelial, connective, nerve, and muscular.
1731.2.3	Demonstrate an understanding of organs and their functions (e.g., skin, lungs, heart).
1731.2.4	Discuss body systems and their functions (e.g., muscular, integumentary, nervous, endocrine, skeletal).
1731.3	Apply knowledge of the basics of chemistry.
1731.3.1	Identify common chemical ingredients used in cosmetics and skincare products.
1731.3.2	Explain the role of pH in skincare and how it affects different skin types.
1731.3.3	Describe the chemical processes involved in hair coloring and bleaching treatments.
1731.3.4	Analyze the chemical composition of skincare products to determine their suitability for different skin types.
1731.4	Apply knowledge of the basics of electricity.
1731.4.1	Explain the principles of electrical conductivity and how they relate to skincare devices like microcurrent or ultrasound.
1731.4.2	Analyze the potential risks of electric shock or burns associated with using electrical devices in aesthetics procedures.
1731.4.3	Demonstrate proper usage and maintenance of electrical skincare devices according to manufacturer instructions.

1731.5	Apply knowledge of the basics of nutrition.
1731.5.1	Explain the impact of nutrition on skin health, including the role of antioxidants, vitamins, and hydration.
1731.5.2	Describe how dietary habits can affect common skin conditions like acne or eczema.

This course covers essential scientific concepts in skin health and care. Students will learn about skin histology and physiology, including skin layers and cell turnover processes. Students will study various skin disorders, diseases, and inflammations, and analyze skincare product composition, regulatory requirements, and functions. This course includes a minimum of 90 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-9. Minimum Curriculum for Aestheticians 9.1. An aesthetician student shall complete a course of study consisting of a minimum of 600 clock hours consisting of aesthetics as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Scientific Concepts

1732.1	Demonstrate an understanding of histology and physiology of the skin.
1732.1.1	Identify the different layers of the skin and their functions.
1732.1.2	Describe the biological processes involved in skin cell turnover.
1732.1.3	Differentiate between the structures and functions of eccrine and apocrine sweat glands.
1732.1.4	Explain the role of melanocytes in skin pigmentation.
1732.2	Demonstrate an understanding of skin disorders and diseases.
1732.2.1	Identify disorders of the sebaceous gland such as acne, milia, and seborrhea.
1732.2.2	Identify disorders of the sudoriferous gland such as hyperhidrosis, bromhidrosis, anhidrosis.
1732.2.3	Discuss contagious diseases (e.g., bacterial conjunctivitis, herpes simplex, tinea).
1732.2.4	Identify skin inflammations such as dermatitis, eczema, rosacea.
1732.2.5	Discuss types and causes of skin pigmentation.
1732.2.6	Discuss types and characteristics of skin growths such as skin tags, moles, and keratoma.
1732.2.7	Discuss skin cancers (e.g., basal cell carcinoma, squamous cell carcinoma, melanoma).
1732.2.8	Differentiate between primary and secondary skin lesions.
1732.3	Demonstrate an understanding of skin care products.
1732.3.1	Analyze the chemical composition of common skincare ingredients and their effects on the skin.
1732.3.2	Explain regulatory requirements for labeling skin care products, including ingredient lists, warnings, and claims.
1732.3.3	Discuss the functions of skin care products (e.g., hydration, protection, cleanse).
1732.3.4	Discuss the acidity and alkalinity in skin care products.

This course covers hair design standards, including shampooing, conditioning, thermal techniques, and hair styling. Students learn to analyze hair and scalp conditions, select suitable products, and apply proper techniques. Proficiency in thermal techniques like blow-drying and flat ironing is emphasized, along with mastering diverse hair styling methods for creating original looks tailored to individual clients. This course includes a minimum of 115 hours of practical work.

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§3-1-10. Minimum Curriculum for Hair Stylists 10.1. A hair stylist student shall complete a course of study consisting of a minimum of 1,000 clock hours of hair styling as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Hair Designing

1734.1	Apply knowledge of principles and procedures for shampooing and conditioning.
1734.1.1	Describe the characteristics of different types of shampoos and conditioners and their respective benefits.
1734.1.2	Explain the importance of proper shampooing and conditioning techniques for maintaining hair health and appearance.
1734.1.3	Analyze the condition of clients' hair and scalp to determine the most suitable shampoo and conditioner products and techniques.
1734.1.4	Perform thorough shampooing techniques tailored to individual client needs and hair conditions.
1734.1.5	Apply appropriate conditioning treatments to address specific hair concerns, such as dryness or damage.
1734.2	Apply knowledge and proficiency of various thermal techniques, including hair pressing, blow-drying, and flat ironing.
1734.2.1	Explain the recommended temperature ranges for hair pressing, blow-drying, and flat ironing.
1734.2.2	Explain the principles behind hair pressing, blow-drying, and flat ironing, including how heat affects hair structure.
1734.2.3	Differentiate among thermal techniques and their appropriate applications.
1734.2.4	Demonstrate proper technique in using hair tools to straighten various hair types.
1734.2.5	Demonstrate proper blow-drying methods to achieve desired volume and smoothness.
1734.3	Apply knowledge and proficiency of various hair styling techniques.
1734.3.1	Apply principles of balance and design (e.g., facial shape, physical structures).
1734.3.2	Apply knowledge of principles, procedures, and safety of hair styling (e.g., wet styling, thermal styling).
1734.3.3	Demonstrate original hairstyles to achieve unique looks tailored to individual clients.

This course covers hair designing techniques including braiding, finger waving, and pin curls, alongside hair enhancement methods such as wig services and extensions. Students gain hands-on experience with diverse hair types, ensuring proficiency in execution while emphasizing safety protocols and client consultations. This course includes a minimum of 115 hours of practical work.

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§3-1-10. Minimum Curriculum for Hair Stylists 10.1. A hair stylist student shall complete a course of study consisting of a minimum of 1,000 clock hours of hair styling as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Hair Designing

1735.1	Apply knowledge and proficiency of various hair styling techniques, including base control (e.g., braiding, finger waving, pin curls).
1735.1.1	Explain the differences between braiding, finger waving, and pin curls, including their purposes and suitable hair types.
1735.1.2	Demonstrate the procedures for the various types of braiding including invisible, rope and fishtail.
1735.1.3	Demonstrate proficiency in executing braiding, finger waving, and other hair styling techniques on various hair lengths and textures.
1735.2	Apply understanding of hair enhancement methods and procedures (e.g., wigs, extensions, hair fusions).
1735.2.1	Outline the elements of a client consultation for wig services.
1735.2.2	Explain the difference between human hair and synthetic wigs.
1735.2.3	Demonstrate wig measurement.
1735.2.4	Demonstrate procedures for putting on a wig.
1735.2.5	Apply knowledge of principles, procedures, and safety related to hair enhancements: braid and sew attachment, bonding, fusion bonding, tube shrinking, linking).

Practical Work

1735.3	Perform practical work.
1735.3.1	Comply with the required facility regulations.
1735.3.1	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
1735.3.1	Complete required documentation accurately.
1735.3.1	Participate in evaluation process.

This course covers the use of various hair cutting and texturizing tools, including scissors, clippers, and razors, to achieve basic and specialty haircuts. Students learn safe procedures, clipper techniques, and workstation cleanliness. This course includes a minimum of 120 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-10. Minimum Curriculum for Hair Stylists 10.1. A hair stylist student shall complete a course of study consisting of a minimum of 1,000 clock hours of hair styling as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Hair Designing

1736.1	Apply knowledge and proficiency of various hair cutting or texturizing tools techniques (e.g., clippers).
1736.1.1	Identify different types of hair cutting and texturizing tools, including scissors, clippers, razors, and texturizing shears.
1736.1.2	Demonstrate the safe and proper procedures in haircutting.
1736.1.3	Demonstrate mastery of basic haircuts.
1736.1.4	Demonstrate mastery of specialty haircuts.
1736.1.5	Utilize clipper techniques to achieve precise haircuts, such as fades, tapers, and buzz cuts, according to client preferences and hair type.
1736.1.5	Demonstrate effective station clean-up.

Practical Work

1736.2	Perform practical work.
1736.2.1	Comply with the required facility regulations.
1736.2.2	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
1736.2.3	Complete required documentation accurately.
1736.2.4	Participate in evaluation process.

This course covers safety, sanitation, and business skills essential for success in the salon industry. Students will learn sterilization techniques, client accommodation, workplace safety, and business fundamentals like pay scales and client interactions. This is the foundational course that must be taken first in Pre-Cosmetology.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety and Sanitation

1737.1	Apply techniques to ensure client safety and protection.
1737.1.1	Identify potential hazards within the salon environment.
1737.1.2	Identify skin condition and any potential allergies or sensitivities.
1737.1.3	Practice appropriate sterilization techniques for tools and equipment.
1737.1.4	Practice proper handwashing procedures.
1737.1.5	Identify strategies to accommodate clients with special needs or conditions.
1737.2	Identify and demonstrate the three levels of decontamination and disinfection.
1737.2.1	Differentiate between sterilization, disinfection, and sanitation.
1737.2.2	Demonstrate proper cleaning techniques for non-porous surfaces.
1737.2.3	Demonstrate an understanding of the use of chemical disinfectants for implements and tools.
1737.2.4	Demonstrate an understanding of sterilization techniques for reusable equipment using autoclaves or chemical solutions.
1737.3	Identify concepts of salon-related ecology and bacteriology.
1737.3.1	Explain the role of bacteria in the salon environment.
1737.3.2	Describe how pathogens can be transmitted and methods to prevent their spread.
1737.3.3	Analyze the impact of salon practices on environmental sustainability.
1737.3.4	Develop strategies to minimize chemical waste and promote a healthier salon ecosystem.
1737.4	Demonstrate appropriate first aid and workplace safety procedures.
1737.4.1	Identify common workplace injuries and their causes in the cosmetology industry.
1737.4.2	Demonstrate proper techniques for responding to cuts, burns, and other minor injuries.
1737.4.3	Demonstrate an understanding of emergency protocols, including evacuation procedures and contacting medical assistance.
1737.4.4	Explain the importance of adhering to precautions to prevent the transmission of bloodborne pathogens.
1737.5	Select and utilize appropriate Personal Protective Equipment (PPE) for specific tasks.
1737.5.1	Identify the types of PPE required for different salon procedures.
1737.5.2	Demonstrate the proper procedure for putting on and removing gloves, masks, and protective eyewear.
1737.5.3	Monitor and maintain the quality of PPE to ensure effectiveness.
1737.6	Display knowledge of SDS information and OSHA regulations.
1737.6.1	Locate and interpret Safety Data Sheets (SDS) for salon products.
1737.6.2	Explain the purpose of OSHA regulations in ensuring workplace safety.
1737.6.3	Identify potential hazards associated with salon chemicals and equipment.

Salon-Related Business Skills

1737.7	Demonstrate knowledge of pay scales and compensation plans.
1737.7.1	Identify different types of pay scales in the cosmetology industry such as hourly, commission-based, and salary.
1737.7.2	Describe how pay scales affect employee motivation and performance.
1737.7.3	Explain how compensation plans are structured to align with business goals.
1737.7.4	Compare and contrast different pay scales and their suitability for different salon environments.
1737.8	Distinguish types of salon ownership and licensures.
1737.8.1	Identify types of ownership such as sole proprietorship, partnership, corporation, and franchise.
1737.8.2	Explain the regulations established by the WV State Board of Barbers and Cosmetologists (WVBBC), detailing its authority, responsibilities, and criteria for obtaining licensure per W. Va. Code §30-27.
1737.8.3	Identify the licensure requirements for salon owners and operators as per state regulations.
1737.8.4	Describe the advantages and disadvantages of each ownership structure in terms of liability, taxation, and management.
1737.9	Display professional client interactions and sales techniques.
1737.9.1	Identify effective communication strategies for building rapport with clients.
1737.9.2	Identify sales techniques such as upselling, cross-selling, and suggestive selling.
1737.9.3	Explain the importance of professionalism in client interactions and sales.
1737.10	Complete and maintain appropriate client and salon records.
1737.10.1	Identify types of client records such as intake forms, treatment history, and consent forms.
1737.10.2	Explain the importance of accurate and up-to-date client and salon records.

This course covers scientific concepts essential for hair and scalp care, including hair structure, melanin's role in color, and basic anatomy. Students also learn infection control, identifying pathogens and mastering sanitation techniques for salon tools. This course includes a minimum of 25 hours of practical work.

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§3-1-10. Minimum Curriculum for Hair Stylists 10.1. A hair stylist student shall complete a course of study consisting of a minimum of 1,000 clock hours of hair styling as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Scientific Concepts

1738.1	Identify scientific components of hair and scalp.
1738.1.1	Describe the structures of the hair root.
1738.1.2	Illustrate the layers of the hair shaft.
1738.1.3	Identify the functions of sebaceous glands in the scalp.
1738.1.4	Explain the relationship between hair follicles and hair growth.
1738.1.5	Describe the role of melanin in determining hair color.
1738.2	Exhibit basic knowledge of histology, anatomy, and physiology.
1738.2.1	Identify function and structure of the hair and scalp.
1738.2.2	Identify signs and symptoms of conditions, disorders, and diseases of the hair and scalp.
1738.2.3	Identify muscles and joints and their functions related to head and face.
1738.2.4	Identify functions of the nervous system.
1738.2.5	Identify functions of the circulatory system.
1738.2.6	Identify the types and functions of tissue in the human body.
1738.3	Exhibit knowledge of infection control specifically for cosmetology.
1738.3.1	Identify common pathogens that can be transmitted in a salon environment.
1738.3.2	Explain the importance of personal hygiene in preventing the spread of infections.
1738.3.3	Explain the difference between sanitation, disinfection, and sterilization.
1738.3.4	Explain the importance of using environmental Protection Agency (EPA)-approved disinfectants in cosmetology settings.
1738.3.5	Demonstrate the correct technique for cleaning and disinfecting salon tools, such as combs, brushes, and scissors.

In this course, students will explore physical services, covering facial procedures, skin analysis, hair removal techniques such as waxing and tweezing, as well as eyelash and eyebrow services including tinting, artificial lashes, and lash lifting. Additionally, students learn about body treatments like wraps, scrubs, and sunless tanning, alongside makeup principles, product selection, and safe application techniques including contouring and highlighting. This course includes a minimum of 109 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-9. Minimum Curriculum for Aestheticians 9.1. An aesthetician student shall complete a course of study consisting of a minimum of 600 clock hours consisting of aesthetics as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Physical Services

1739.1	Apply knowledge of facial procedures, manipulations, skin analysis, hair removal, and make-up services.
1739.1.1	Demonstrate an understanding of hair removal methods and procedures such as waxing and tweezing.
1739.1.2	Discuss eyelash and eyebrow services (e.g., lash and brow tinting, artificial lashes, lash lifting).
1739.1.3	Discuss body treatments including body wraps, body scrubs, and sunless tanning.
1739.1.4	Demonstrate an understanding of the principles of makeup and product selection.
1739.1.5	Demonstrate proper and safe makeup application (e.g., contouring, highlighting, blending).

Practical Work

1739.2	Perform practical work.
1739.2.1	Comply with the required facility regulations.
1739.2.2	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
1739.2.3	Complete required documentation accurately.
1739.2.4	Participate in evaluation process.

This course offers a thorough exploration of Cosmetology Science, emphasizing the basics of chemistry and electricity relevant to the field. Students will analyze the chemical composition of hair care products, discuss essential chemistry terms, and understand chemical processes in common hair treatments. Additionally, the course covers electrical fundamentals, including identifying and using electrical tools safely, understanding conductivity and resistance, and implementing safety measures. This course includes a minimum of 25 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-10. Minimum Curriculum for Hair Stylists 10.1. A hair stylist student shall complete a course of study consisting of a minimum of 1,000 clock hours of hair styling as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Cosmetology Science

1740.1	Apply knowledge of the basics of chemistry.
1740.1.1	Analyze the ingredients list of hair care products to determine their chemical composition and potential effects on different hair types.
1740.1.2	Discuss common chemistry terms in cosmetology, such as pH, chemical bonds, and chemical reactions.
1740.1.3	Describe the chemical processes involved in common hair treatments like coloring, perming, and straightening.
1740.1.4	Discuss chemical reactions (e.g., overexposure, chemical burn).
1740.2	Apply knowledge of the basics of electricity.
1740.2.1	Identify electrical tools commonly used in cosmetology, such as hair dryers, curling irons, and clippers.
1740.2.2	Explain the principles of electrical conductivity and resistance as they relate to styling tools and techniques.
1740.2.3	Describe the function of circuit breakers and ground fault circuit interrupters (GFCIs) in preventing electrical hazards.
1740.2.4	Demonstrate proper use and maintenance of electrical tools, including techniques for cord management and cleaning.
1740.2.5	Apply knowledge of electrical safety standards to set up workstations and ensure compliance with regulations.

This course introduces the student to the knowledge base and technical skills as they relate to the field of Diesel Equipment Technology. In the Diesel Engine Components class areas of study include basic engine components, primary functions, service, inspection, and assembly procedures. Safety instruction is integrated into all activities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

General Engine Diagnosis

1741.1	General Engine Diagnosis
1741.1.1	Determine the mechanical condition of engine assembly and its internal components. ☐
1741.1.2	Interpret engine performance diagnostic test results. ☐
1741.1.3	Perform a check for oil leaks or unusual noises.
1741.1.4	Examine and determine the cause of unusual odors and exhaust color from a running diesel engine. ☐
1741.1.5	Verify the complaint, and road/dyno test vehicle; review driver/customer interview and past maintenance documents (if available); determine further diagnosis.
1741.1.6	Identify engine model and serial number to research applicable vehicle and service information, service precautions, and technical service bulletins; determine needed actions.
1741.1.7	Inspect engine assembly and compartment for fuel, oil, coolant, exhaust, or other leaks; determine needed repairs.
1741.1.8	Inspect engine compartment wiring harness, connectors, seals, and locks; check for proper routing and condition; determine needed repairs.
1741.1.9	Isolate and diagnose engine noises; determine needed repairs.
1741.1.10	check engine exhaust for odor, smoke color, and density; determine needed repairs.
1741.1.11	Perform fuel supply and return system tests; check fuel for contamination, quality, and consumption; determine needed repairs.
1741.1.12	Perform air intake system restriction and leakage tests; determine needed repairs.
1741.1.13	Perform intake manifold pressure tests; determine needed repairs.
1741.1.14	Perform exhaust back pressure and temperature tests; determine needed repairs.
1741.1.15	Perform crankcase pressure test; determine needed repairs.
1741.1.16	Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed repairs.
1741.1.17	Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed repairs.
1741.1.18	Isolate and diagnose engine related vibration problems; determine needed repairs.
1741.1.19	Check cooling system for freeze point, level, contamination, coolant type, temperature, pressure, circulation, conditioner concentration, filtration, and fan operation; determine needed repairs.
1741.1.20	Check lubrication system for contamination, oil level, temperature, pressure, filtration, and oil consumption; interpret oil analysis information; determine needed repairs.

1741.1.21	Check and record electronic diagnostic codes and trip/operational data; monitor electronic data; verify customer programmable parameters; clear codes; determine further diagnosis.
1741.1.22	Perform visual inspection for physical damage and missing, modified, or tampered components; determine needed repairs.

Cylinder Head and Valve Train Diagnosis and Repair

1741.2	Inspect and Service Cylinder Head and Valve Train
1741.2.1	Inspect and identify worn and/or out of specification cylinder head assembly and components.
1741.2.2	Demonstrate the ability to rebuild cylinder head and valve train to manufacturer specifications.
1741.2.3	Remove, inspect, disassemble, and clean cylinder head assembly(s).
1741.2.4	Inspect threaded holes, studs, and bolts for serviceability; service/ replace as needed.
1741.2.5	Measure cylinder head thickness and check mating surfaces for warpage and surface finish; inspect for cracks/damage; check condition of passages; inspect core and gallery plugs; determine serviceability and needed repairs.
1741.2.6	Inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine serviceability and needed repairs.
1741.2.7	Inspect and/or replace injector sleeves and seals; pressure test to verify repair (if applicable); measure injector tip or nozzle protrusion where specified by manufacturer.
1741.2.8	Inspect, and/or replace valve bridges (crossheads) and guides; adjust bridges (crossheads) if applicable.
1741.2.9	clean components; reassemble, check, and install cylinder head assembly.
1741.2.10	Inspect pushrods, rocker arms, rocker arm shafts, electronic wiring harness, and brackets for wear, bending, cracks, looseness, and blocked oil passages; repair/ replace as needed.
1741.2.11	Inspect, install, and adjust cam followers and retainers.
1741.2.12	Adjust valve clearance and injector settings.
1741.2.13	Inspect, measure, and replace/reinstall overhead camshaft and bearings; measure and adjust endplay and backlash.

Engine Block Diagnosis and Repair

1741.3	Inspect and Repair Engine Block Assemble
1741.3.1	Identify worn out or out of specifications engine block assembly and components.
1741.3.2	Rebuild and assemble a short block engine to manufacturer specifications.
1741.3.3	Remove, inspect, service, and install pans, covers, ventilation systems, gaskets, seals, and wear rings.
1741.3.4	Disassemble, clean, and inspect engine block for cracks; check mating surfaces and related components for damage or warpage and surface finish; check deck height; check condition of passages, core, and gallery plugs; inspect threaded holes, studs, dowel pins and bolts for serviceability; service/replace as needed.
1741.3.5	Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed service.
1741.3.6	Inspect and measure cylinder walls or liners for wear and damage; determine needed service.
1741.3.7	Replace/reinstall cylinder liners and seals; check and adjust liner height/protrusion.
1741.3.8	Inspect in-block camshaft bearings for wear and damage; replace as needed.
1741.3.9	Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play; inspect, replace/reinstall, and adjust cam followers (if applicable).

1741.3.10	Clean and inspect crankshaft and journals for surface cracks and damage; check condition of oil passages; check passage plugs; measure journal diameters; check mounting surfaces; determine needed service.
1741.3.11	Inspect and replace main bearings; check cap fit and bearing clearances; check and correct crankshaft end play.
1741.3.12	Inspect, reinstall, and time the drive gear train. (This includes checking engine position and speed indicator components, gear wear, and backlash of crankshaft, camshaft, auxiliary, drive, and idler gears; service shafts, bushings, and bearings.)
1741.3.13	Clean, inspect, measure, or replace pistons, pins, and retainers.
1741.3.14	Measure piston-to-cylinder wall clearance.
1741.3.15	Check ring-to-groove fit and end gaps; install rings on pistons.
1741.3.16	Identify piston, connecting rod bearing, and main bearing wear patterns that indicate connecting rod and crankshaft alignment or bearing bore problems; check bearing bore and bushing condition; determine needed repairs.
1741.3.17	Assemble pistons and connecting rods and install them in block; check piston height/protrusion; replace rod bearings and check clearances; check condition, position, and clearance of piston cooling jets (nozzles).
1741.3.18	Inspect and measure crankshaft vibration damper; replace as needed.
1741.3.19	Inspect, install, and align flywheel housing.
1741.3.20	Inspect flywheel/flex plate (including ring gear) and mounting surfaces for cracks, wear, and runout; determine needed repairs.

The skill sets in this course are representative of the basic knowledge included in a Career and Technical Diesel Equipment Technology Program of Study. Incorporated into this course are heavy-truck electrical theory, engine and truck wiring circuits, storage batteries and diesel electrical system testing. This course is recommended as an Elective in Diesel Equipment Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Electrical Components

1742.1	Testing Diesel Electrical Circuits
1742.1.1	Basic electrical theory.
1742.1.2	Basic electrical system testing and equipment.
1742.1.3	Truck wiring circuits.
1742.1.4	Calculate voltage, current, and resistance values using Ohms's law.
1742.1.5	Describe terms associated with electrical theory.
1742.1.6	Demonstrate the proper use of a test light.
1742.1.7	Test circuits using the proper function and range of a multimeter.
1742.1.8	Locate open, shorted, and grounded circuits.
1742.1.9	Demonstrate the proper repair procedures for faulty wiring and connectors.
1742.1.10	Construct and test basic circuits involving fuses, relays, and solenoids.
1742.1.11	Identify three basic circuits used in wiring systems.

Battery Service and Inspection

1742.2	Storage batteries.
1742.2.1	The use of storage batteries.
1742.2.2	Define terms associated with storage batteries.
1742.2.3	Define specific gravity.
1742.2.4	Explain the chemical make-up of battery electrolyte.
1742.2.5	Analyze the effects of cold temperatures in relation to cold cranking amps.
1742.2.6	Test batteries to determine the state of charge.
1742.2.7	Charge and jump start batteries.
1742.2.8	Explain multiple battery installations and wiring procedures to increase voltage or CCA.
1742.2.9	Explain safety procedures associated with handling storage batteries.

The skill sets in this course are representative of the basic knowledge included in a Career and Technical Diesel Equipment Technology Program of Study. Incorporated into this course are elements of introductory knowledge and skills necessary for a career in diesel mechanics. This course is recommended as an Elective in Diesel Equipment Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Diagnosing Mechanical Problems

1743.1	Diagnostic Testing Procedures
1743.1.1	Diagnosing and preparing to test for engine problems.
1743.1.2	Inspect an engine and fill out a checklist during normal operation.
1743.1.3	Attach test instruments to equipment and read dials and gauges to diagnose malfunctions.
1743.1.4	Locate and specify the causes of an engine knock.
1743.1.5	Locate causes of an overheated engine.
1743.1.6	Analyze four causes of smoky exhaust.
1743.1.7	Demonstrate the procedure for emergency shutdown of a diesel engine.

Troubleshooting

1743.2	Troubleshooting.
1743.2.1	Troubleshooting a diesel engine.
1743.2.2	Inspect, test, and listen to defective equipment to diagnose malfunctions, using test instruments such as handheld computers, motor analyzers, chassis charts, and pressure gauges.
1743.2.3	Diagnose the cause of a no-start condition.
1743.2.4	Locate causes of an engine starting but not running.
1743.2.5	Diagnose and repair a diesel engine to knock.
1743.2.6	Locate and repair the cause of an overheating diesel engine.
1743.2.7	Locate and repair the cause of a diesel engine's low power complaint.
1743.2.8	Describe what causes a diesel engine to use too much oil.
1743.2.9	Describe the causes of high and low oil pressure oil pressure.

Tune-up and Adjustments

1743.3	Tune-up and adjustments.
1743.3.1	Tune-up a diesel engine.
1743.3.2	Tune-up a diesel engine to manufacture's specifications.
1743.3.3	Inspect, operate, and test completed products to verify functioning machine capabilities.

This course introduces the student to the knowledge base and technical skills for concepts in diesel electronic engine controls. Areas of study include electronic control modules, electronic fuel injection, and electronic control test equipment. Emphasis will be placed on career exploration, job seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Electrical and Electrical Systems

1744.1	Apply an understanding of basic electrical principles.
1744.1.1	Demonstrate the process of calculating voltage, current, and resistance values using Ohm's law.
1744.1.2	Measure voltage with volt/Ohm meter. ☐
1744.1.3	Inspect battery box(es), cover(s), and mountings.
1744.1.4	Inspect battery hold downs, connections, cables, and cable routing; service as needed.
1744.1.5	Check and record battery state of charge (open circuit voltage) and condition.
1744.1.6	Perform battery test (load and capacitance).
1744.1.7	Inspect starter, mounting, connections, cables, and cable routing.
1744.1.8	Inspect alternator, mounting, wiring, and wiring routing.
1744.1.9	Perform alternator current output test.
1744.1.10	Perform alternator voltage output test.
1744.1.11	Check operation of interior lights; service as needed.
1744.1.12	Check all exterior lights, lenses, and reflectors; check headlight alignment; service as needed.
1744.1.13	Inspect and test trailer power cord connector, cable, and holder; service as needed.
1744.1.14	Identify electrical system testing and equipment.
1744.1.15	Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using digital multimeter (dmm), or appropriate test equipment.
1744.1.16	Check current flow in electrical/electronic circuits and components using a digital multimeter (dmm), clamp-on ammeter, or appropriate test equipment.
1744.1.17	Check continuity and resistance in electrical/electronic circuits and components using a digital multimeter (dmm), or appropriate test equipment.
1744.1.18	find shorts, grounds, and opens in electrical/electronic circuits.
1744.1.19	Diagnose vehicle electronic control systems using appropriate diagnostic tools, software, and service information; check and record diagnostic codes; determine needed repairs.
1744.1.20	Connect diagnostic tool to vehicle; access and verify parameters and calibration settings; perform updates as needed.
1744.2	Demonstrate knowledge of electrical schematics.

1744.2.1	Read and interpret electrical schematic diagrams and symbols.
1744.3	Service and inspect batteries.
1744.3.1	Determine battery state of charge by measuring terminal post voltage using a digital multimeter (dmm).
1744.3.2	Diagnose key-off battery drain (parasitic draw) problems; determine needed repairs.
1744.3.3	Perform battery tests (load and capacitance); determine needed service.
1744.3.4	Inspect, clean, service, or replace battery, cables, and terminal connections.
1744.3.5	Inspect, clean, repair or replace battery boxes, mounts, and hold downs.
1744.3.6	Charge battery using appropriate method for battery type.
1744.3.7	Jump start a vehicle using jumper cables and a booster battery or appropriate auxiliary power supply.
1744.3.8	Diagnose low voltage disconnect (lvd) systems; determine needed repairs.
1744.4	Diagnose and repair starting systems.
1744.4.1	Test/monitor battery and starting system voltage during cranking; determine needed repairs.
1744.4.2	Perform starting circuit voltage drop tests; determine needed repairs.
1744.4.3	Inspect, test, and replace starter control circuit switches, relays, connectors, terminals, and wires (including thermal over crank protection).
1744.4.4	Diagnose starter cranking inhibit systems; determine needed repairs.
1744.4.5	Inspect, test, and replace starter relays and solenoids/switches including integrated mag switch (ims).
1744.4.6	Inspect, clean, repair, or replace cranking circuit cables, connectors, and terminals.
1744.4.7	Remove and replace starter; inspect flywheel ring gear or flex plate.
1744.4.8	Differentiate between electrical and/or mechanical problems that cause a slow crank, no crank, extended cranking, or a cranking noise condition.
1744.5	Diagnose and repair lighting systems.
1744.5.1	Check operation of interior lights; determine needed action.
1744.5.2	Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment; determine needed action.
1744.5.3	Inspect and test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s); determine needed action.
1744.5.4	Perform repairs to interior and exterior lighting systems.
1744.5.5	Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic service tool(s) (including PC based software and/or data scan tools); determine needed action.
1744.5.6	Identify causes of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation.
1744.5.7	Test, aim, and replace headlights.
1744.5.8	Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets, and control components/modules; repair or replace as needed.
1744.5.9	Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays, and control components/modules of parking, clearance, and taillight circuits; repair or replace as needed.
1744.5.10	Inspect and test instrument panel light circuit switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed.
1744.5.11	Inspect and test interior cab light circuit switches, bulbs/LEDs, sockets, low voltage disconnect (LVD), connectors, terminals, wires, and control components/modules; repair or replace as needed.
1744.5.12	Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed.
1744.5.13	Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, wires, and control components/modules; repair or replace as needed.
1744.5.14	Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires, and control components/modules; repair or replace as needed.

1744.5.15	Inspect and test reverse lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, wires, and control components/modules; repair or replace as needed.
1744.6	Diagnose and repair charging systems.
1744.6.1	Inspect alternator, mountings, cable, wiring, and wiring routing; determine needed action.
1744.6.2	Perform alternator output tests.
1744.6.3	Demonstrate the ability to repair battery charging systems.
1744.6.4	Test instrument panel mounted volt meters and/or indicator lamps; determine needed action.
1744.6.5	Identify causes of a no charge, low charge, or overcharge problems; determine needed action.
1744.6.6	Inspect and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.
1744.6.7	Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.
1744.6.8	Perform charging circuit voltage drop tests; determine needed action.
1744.6.9	Remove and replace alternator.
1744.6.10	Inspect, repair, or replace cables, wires, and connectors in the charging circuit.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Diesel Equipment Technology Program of Study. Incorporated into this course include engine system maintenance, under hood and cab maintenance, electrical/electronic systems, frame, and chassis maintenance. This course is recommended as an Elective in Diesel Equipment Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Engine System Maintenance

1745.1	Engine System Maintenance
1745.1.1	Maintenance of the engine.
1745.1.2	Examine engine components.
1745.1.3	Examine engine operation.
1745.1.4	Inspect air induction system and replace filters.
1745.1.5	Inspect cooling system, check, and fill fluid levels, and replace filter as per maintenance schedule.
1745.1.6	Check and fill all fluids and replace filters as per maintenance schedule.

Hood and Cab Maintenance

1745.2	Hood and Cab Maintenance
1745.2.1	Hood and cab maintenance.
1745.2.2	Inspect instruments and controls.
1745.2.3	Inspect safety equipment.
1745.2.4	Inspect hardware.
1745.2.5	Inspect heating and AC system.

Electrical/Electronic Systems

1745.3	Electrical/Electronic Systems
1745.3.1	Electrical/electronic systems.
1745.3.2	Inspect battery, starting system, and cable connections.
1745.3.3	Inspect charging system.
1745.3.4	Inspect lighting system.

Frame and Chassis Maintenance

1745.4	Frame and Chassis Maintenance
1745.4.1	Frame and chassis maintenance.
1745.4.2	Inspect air brake system for proper adjustment and operation.
1745.4.3	Inspect drive train.
1745.4.4	Inspect steering and suspension.
1745.4.5	Inspect tires and wheels.
1745.4.6	Inspect frame and fifth wheel.
1745.4.7	Check and fill all fluid levels and lubricate steering, suspension, and drivelines.

This course introduces the student to the knowledge base and technical skills as they relate to Diesel Support Systems. In the Diesel Support Systems class areas of study include areas such as lubricating and cooling systems, air intake and exhaust systems, starting and charging systems, engine retarders, fuel systems, and governor operation. Safety instruction is integrated into all activities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Diagnose and Repair Diesel Engine Support Systems

1747.1	Diagnose and Repair Diesel Engine Systems
1747.1.1	Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm.
1747.1.2	Inspect vibration damper.
1747.1.3	Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.
1747.1.4	Check engine oil level and condition; check dipstick seal.
1747.1.5	Inspect engine mounts for looseness and deterioration.
1747.1.6	Check engine for oil, coolant, air, fuel, and exhaust leaks (Engine Off and Running).
1747.1.7	Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing.
1747.1.8	Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM).
1747.1.9	Check fuel tanks, mountings, lines, caps, and vents.
1747.1.10	Drain water from fuel system.
1747.1.11	Service water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system.
1747.2	Display understanding of exhaust and induction systems.
1747.2.1	Check exhaust system mountings for looseness and damage.
1747.2.2	Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system and after treatment devices, if equipped.
1747.2.3	Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks.
1747.2.4	Inspect turbocharger for leaks; check mountings and connections.
1747.2.5	Check operation of engine compression/exhaust brake.
1747.2.6	Service or replace air filter as needed; check and reset air filter restriction indicator.
1747.2.7	Inspect and service crankcase ventilation system.
1747.2.8	Inspect diesel exhaust fluid (DEF) system, to include tanks, lines, gauge pump, and filter (if equipped).
1747.2.9	Inspect selective catalyst reduction (SCR) system; including diesel exhaust fluid (DEF) for proper levels, leaks, mounting and connections (if equipped).
1747.3	Identify components and functions of cooling systems.

1747.3.1	Identify and service the vehicle cooling system.
1747.3.2	Verify coolant temperature and check operation of temperature and level sensors/switch, and temperature gauge.
1747.3.3	Inspect and replace thermostat(s), bypasses, housing(s), and seals.
1747.3.4	Flush and refill cooling system; bleed air from system; recover coolant.
1747.3.5	Inspect and repair/replace coolant conditioner/filter, valves, lines, and fittings.
1747.3.6	Inspect and repair/replace water pump, housing, hoses, and idler pulley or drive gear.
1747.3.7	Inspect radiator, pressure cap, and tank(s); determine needed service.
1747.3.8	Inspect and repair/replace fan hub, fan, fan clutch, fan controls, fan thermostat, and fan shroud.
1747.3.9	Pressure test cooling system and radiator cap; determine needed repairs.
1747.3.10	Inspect and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.
1747.4	Identify components and functions of lubricating systems.
1747.4.1	Describe the requirements of the vehicle's manufacturer recommended cooling system service schedule.
1747.4.2	Perform service outlined in the vehicle's lubrication service schedule.
1747.4.3	Analyze oil sample results taken from diesel engine oil.
1747.4.4	Verify engine oil pressure and check operation of pressure sensor/switch and pressure gauge; verify engine oil temperature and check operation of temperature sensor.
1747.4.5	Inspect, measure, and repair/replace oil pump, housing, drives, pipes, and screens;
1747.4.6	adjust drive gear clearance if applicable.
1747.4.7	Inspect and repair/replace oil pressure regulator valve(s), and by-pass valve(s).
1747.4.8	Inspect, clean, test, and reinstall/replace oil cooler, by-pass valve, oil thermostat; lines and hoses.
1747.4.9	Inspect turbocharger lubrication and cooling systems; repair/replace as needed.
1747.4.10	Change engine oil and filters; add proper type of oil.
1747.5	Identify components and functions of fuel systems.
1747.5.1	Inspect and identify worn out or out of specification diesel fuel system components.
1747.5.2	Inspect, test, and repair/replace fuel system tanks, vents, caps mounts, valves, single/dual supply and return lines, and fittings.
1747.5.3	Inspect, clean, test, and repair/replace fuel transfer (supply) pump, pump drives, strainers, fuel/water separators/indicators, filters, heaters, coolers, ecm cooling plates, and mounting hardware. (protect fuel system components from contamination).
1747.5.4	Check fuel system for air; determine needed repairs; prime and bleed fuel system; check, repair/replace primer pump.
1747.5.5	Inspect, test, and repair/replace low-pressure regulator systems (check valves, pressure regulator valves and restrictive fittings).
1747.5.6	Inspect and reinstall/replace high-pressure injection lines, fittings, seals, and mounting hardware. (protect high-pressure injection components from contamination).
1747.5.7	Inspect, adjust, and repair/replace electronic throttle and pto control devices, circuits, and sensors.
1747.5.8	Perform on-engine inspections, tests, and adjustments on hydraulic electronic unit injectors (heui) and electronic controls (rail pressure control).
1747.5.9	Perform on-engine inspections, tests, and adjustments on electronic unit injectors (eui) and electronic controls.
1747.5.10	Perform on-engine inspections and tests, on high-pressure common rail fuel systems and electronic controls.
1747.5.11	Inspect, test, and replace engine protection and automatic stop/restart system components.
1747.5.12	Inspect and replace electrical connector terminals, pins, harnesses, seals, and locks.

1747.5.13	Connect diagnostic tool to vehicle/engine; access and verify programmable parameters; change if applicable.
1747.5.14	Use a diagnostic tool (hand-held or pc based) to inspect and test electronic engine control system, sensors, actuators, electronic control modules (ecms), and circuits; determine further diagnosis.
1747.5.15	Measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter or appropriate test equipment.

Engine System Maintenance

1747.6	Perform troubleshooting and preventive maintenance on engine systems.
1747.6.1	Perform preventive maintenance and troubleshoot problems with engine management systems.
1747.6.2	Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm.
1747.6.3	Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.
1747.6.4	Check engine oil level and condition; check dipstick seal.
1747.6.5	Check engine for oil, coolant, air, fuel, and exhaust leaks (Engine Off and Running).
1747.6.6	Change oil and filters at intervals recommended by the manufacturer.

Cooling System Maintenance

1747.7	Perform troubleshooting and preventive maintenance on cooling systems.
1747.7.1	Perform preventive maintenance and troubleshoot problems on diesel engine cooling systems.
1747.7.2	Check operation of fan clutch.
1747.7.3	Inspect radiator (including air flow restriction, leaks, and damage) and mountings.
1747.7.4	Inspect fan assembly and shroud.
1747.7.5	Pressure test cooling system and radiator cap.
1747.7.6	Inspect coolant hoses and clamps.
1747.7.7	Inspect coolant recovery system.
1747.7.8	Check coolant for contamination, additive package concentration, aeration, and protection level (freeze point).
1747.7.9	Service coolant filter (if equipped)
1747.7.10	Inspect water pump

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Diesel Equipment Technology Program of Study. Incorporated into this course include engine system maintenance, under hood and cab maintenance, electrical/electronic systems, frame, and chassis maintenance. This course is recommended as an Elective in Diesel Equipment Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Transmissions, Clutches, and Differentials

1745.1	Transmissions, Clutches, and Differentials
1745.1.1	Transmissions, clutches, and differentials.
1745.1.2	Remove and replace a manual transmission assembly.
1745.1.3	Remove, inspect, and install clutch, pressure plate and release bearing.
1745.1.4	Remove, inspect, and install rear differential carrier assembly.
1745.1.5	Adjust pinion depth and ring gear backlash.

Steering, Suspension, Tires, Rims, and Wheels

1745.2	Steering, Suspension, Tires, Rims, and Wheels
1745.2.1	Steering, suspension, tires, rims, and wheels.
1745.2.2	Lubricate steering and suspension components.
1745.2.3	Inspect steering linkage, u-joints, and tie rod ends.
1745.2.4	Diagnose and correct steering and suspension problems.
1745.2.5	Adjust toe-in to manufacturers' specifications.
1745.2.6	Remove, inspect, replace, lubricate, and adjust wheel bearings.
1745.2.7	Inspect tires, rims, and wheels for defects.
1745.2.8	Classify types of tires, rims, and wheels.
1745.2.9	Install tire/wheel assemblies.

Air Brakes Systems

1745.3	Air Brakes Systems
1745.3.1	Air brake systems.
1745.3.2	Inspect brake lines, hoses, and air tanks for damage or leaks.
1745.3.3	Remove and replace brake shoes, inspect hardware, and adjust brakes.
1745.3.4	Measure drums/rotors for wear.
1745.3.5	Inspect, remove, and replace brake chamber assembly.
1745.3.6	Cage and uncage a spring brake chamber.

This course covers chemical services, including hair relaxing, permanent waving, and restructuring techniques. Students learn to differentiate between these methods and apply principles and safety measures for each, including hydroxide, thio, and keratin treatments for relaxing and restructuring, as well as alkaline, acid, and non-thio methods for waving and texturizing. This course includes a minimum of 75 hours of practical work.

Notes: This program of study is aligned to meet the requirements set forth by the West Virginia State Board of Barbers and Cosmetologists. <https://wvbbc.com/About-Us/Laws-Regulations>

§3-1-10. Minimum Curriculum for Hair Stylists 10.1. A hair stylist student shall complete a course of study consisting of a minimum of 1,000 clock hours of hair styling as defined pursuant to W. Va. Code § 30-27-3.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Chemical Services

1750.1	Apply knowledge and proficiency of chemical hair relaxing, permanent waving, and restructuring.
1750.1.1	Explain the differences between chemical hair relaxing, permanent waving, and restructuring techniques.
1750.1.2	Apply knowledge of principles, procedures, and safety for chemical hair relaxing and restructuring: hydroxide, thio, keratin.
1750.1.3	Apply knowledge of principles, procedures and safety for chemical hair waving and texturizing: alkaline, acid, non-thio.

Practical Work

1750.2	Perform practical work.
1750.2.1	Comply with the required facility regulations.
1750.2.2	Correctly and safely perform procedures under the supervision of an instructor or clinical preceptor.
1750.2.3	Complete required documentation accurately.
1750.2.4	Participate in evaluation process.

This course introduces the student to the knowledge base and technical skills as they relate to the field of Fundamentals of Diesel Equipment Technology. In the Fundamentals of Diesel Equipment Technology class areas of study include personal and shop safety, career opportunities in the diesel technology industry, the proper use of hand and power tools, basic oxyacetylene cutting, electric welding, and basic shop etiquette. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Safety

1751.1	Demonstrate understanding of fire safety.
1751.1.1	Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
1751.1.2	Identify and apply general and required shop safety rules and procedures.
1751.1.3	Utilize safe procedures for handling of tools and equipment.
1751.1.4	Identify and use proper placement of floor jacks and jack stands.
1751.1.5	Identify and use proper procedures for safe lift operation.
1751.1.6	Utilize proper ventilation procedures for working within the lab/shop area.
1751.1.7	Identify the location and use of eye wash stations.
1751.1.8	Identify and comply with the required use of PPE during lab/shop activities.
1751.1.9	Secure hair and jewelry for lab/shop activities.
1751.1.10	Locate and demonstrate knowledge of Safety Data Sheets (SDS).
1751.1.11	Identify and comply with personal and environmental safety practices associated with the handling, storage, and disposal of chemicals and hazardous materials.
1751.2	Demonstrate understanding of personal, environmental, and equipment safety.
1751.2.1	Identify and comply with the required use of PPE during lab/shop activities.
1751.2.2	Secure hair and jewelry for lab/shop activities.
1751.2.3	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
1751.2.4	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
1751.2.5	Locate and demonstrate knowledge of Safety Data Sheets (SDS).
1751.2.6	Assist in activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
1751.2.7	Identify and comply with personal and environmental safety practices associated with the handling, storage, and disposal of chemicals and hazardous materials.

Shop Practices, Tools, and Equipment

1751.3	Perform precision measuring (e.g., micrometers).

1751.3.1	Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, dial-caliper, etc.).
1751.3.2	Demonstrate proper cleaning, storage, and maintenance of measuring tools and equipment.
1751.4	Identify and select lines and fittings.
1751.4.1	Check transmission case, seals, filter, hoses, lines and cooler for cracks and leaks.
1751.4.2	Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.
1751.4.3	Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.
1751.4.4	Check brake chambers and air lines for secure mounting and damage.
1751.5	Identify, select, and use hand tools.
1751.5.1	Identify tools and demonstrate their proper usage.
1751.5.2	Identify standard and metric designation.
1751.5.3	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
1751.6	Identify, select, and use basic shop equipment.
1751.6.1	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
1751.7	Identify and select proper fasteners.
1751.7.1	Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility
1751.7.2	Identify standard and metric designation.
1751.8	Assess technical information.
1751.8.1	Interface with vehicle's on-board computer; perform diagnostic procedures using electronic service tool(s) (to include PC based software and/or data scan tools); determine needed action.
1751.8.2	Check and record electronic diagnostic codes and trip/operational data; monitor electronic data; clear codes; determine further diagnosis

Diesel Engines

1751.9	Display knowledge of diesel technology terminology.
1751.9.1	Identify the basic diesel components and functions.
1751.9.2	Explain the basic principles in the operation of the four-stroke-cycle diesel engine
1751.9.3	Identify engine assemblies and systems.
1751.10	Display understanding of exhaust and induction systems.
1751.10.1	Perform a visual inspection of the engine and its systems.
1751.10.2	Perform air intake system restriction and leakage test; determine needed action.
1751.10.3	Perform intake manifold pressure (boost) test; determine needed action.
1751.10.4	Check exhaust back pressure; determine needed action.
1751.10.5	Inspect turbocharger(s), wastegate, and piping systems; determine needed action.
1751.10.6	Inspect turbocharger(s) (variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators.
1751.10.7	Check air induction system: piping, hoses, clamps, and mounting; service or replace air filter as needed.
1751.10.8	Inspect intake manifold, gaskets, and connections; replace as needed.
1751.10.9	Inspect, clean, and test charge air cooler assemblies; replace as needed.
1751.10.10	Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed.
1751.10.11	Inspect exhaust after treatment devices; determine necessary action.
1751.10.12	Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action.
1751.10.13	Inspect exhaust gas recirculation (EGR) system including EGR valve, cooler, piping, filter, electronic sensors, controls, and wiring; determine needed action.

1751.11	Identify components and functions of cooling systems.
1751.11.1	Check engine coolant type, level, condition, and consumption; test coolant for freeze protection and additive package concentration; determine needed action.
1751.11.2	Test coolant temperature and check operation of temperature and level sensors, gauge, and/or sending unit; determine needed action.
1751.11.3	Inspect thermostat(s), bypasses, housing(s), and seals; replace as needed.
1751.11.4	Recover coolant, flush, and refill with recommended coolant/additive package; bleed cooling system.
1751.11.5	Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed (if equipped).
1751.11.6	Inspect water pump and hoses; replace as needed.
1751.11.7	Inspect, clean, and pressure test radiator. Pressure test cap, tank(s), and recovery systems; determine needed action.
1751.11.8	Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.
1751.11.9	Inspect turbo charger cooling systems; determine needed action.
1751.12	Display understanding of engine electronics.
1751.12.1	Read and interpret electrical/electronic circuits using wiring diagrams.
1751.12.2	Check continuity in electrical/electronic circuits using appropriate test equipment.
1751.12.3	Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using appropriate test equipment.
1751.12.4	Check current flow in electrical/electronic circuits and components using appropriate test equipment.
1751.12.5	Check resistance in electrical/electronic circuits and components using appropriate test equipment.
1751.12.6	Locate shorts, grounds, and opens in electrical/electronic circuits.
1751.12.7	Diagnose parasitic (key-off) battery drain problems; perform tests; determine needed action.
1751.12.8	Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed.
1751.12.9	Inspect and test spike suppression devices; replace as needed.
1751.12.10	Check frequency and pulse width signal in electrical/electronic circuits using appropriate test equipment.
1751.13	Identify components and functions of lubricating systems.
1751.13.1	Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit, test engine oil temperature and check operation of temperature sensor; determine needed action.
1751.13.2	Check engine oil level, condition, and consumption; determine needed action.
1751.13.3	Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; check drive gear clearances; determine needed action.
1751.13.4	Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action.
1751.13.5	Inspect, clean, and test oil cooler and components; determine needed action.
1751.13.6	Inspect turbocharger lubrication system; determine needed action.
1751.13.7	Determine proper lubricant and perform oil and filter change.
1751.14	Identify components and functions of fuel systems.
1751.14.1	Check fuel level, and condition; determine needed action.
1751.14.2	Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action.
1751.14.3	Inspect, clean, and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates, and mounting hardware; determine needed action.

1751.14.4	Inspect and test pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action.
1751.14.5	Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump.
1751.15	Display knowledge of diesel engine component parts and diesel engine operation.
1751.15.1	Perform a visual inspection of the engine and its systems.
1751.15.2	Identify worn and or out of specification components.
1751.15.3	Identify seals, gaskets, and bearings.
1751.15.4	Identify drive train components and functions.
1751.15.5	Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility.
1751.15.6	Review past maintenance/repair documents, driver vehicle condition reports, and brake/tire wear report. check and record electronic diagnostic codes and trip/operational data. clear codes and data.
1751.15.7	Check engine operation (including unusual noises, vibration, and excessive exhaust smoke); record idle rpm, governed rpm, and pto rpm (if applicable).
1751.15.8	Check engine oil level and condition; check dipstick seal and fill cap seal.
1751.15.9	Check engine compartment wiring, harnesses, connectors, and seals for damage, mounting, and proper routing.
1751.15.10	Check fuel tanks, vents, mountings, lines, caps, and seals; check anti-siphon device (if applicable).
1751.15.11	Inspect water separator/fuel heater; drain water from separator; replace fuel filter(s); prime and bleed fuel system.
1751.15.12	Inspect crankcase ventilation system.
1751.15.13	Check exhaust system mountings for looseness and damage.
1751.15.14	Check engine exhaust system for leaks, excessive noise, proper routing, and missing or damaged components (heat shields and guards).
1751.15.15	Check air induction system piping, charge air cooler, hoses, clamps, mountings, proper routing, and indicators; check for air restrictions and leaks.
1751.15.16	Inspect turbocharger(s) for noise, oil, and exhaust leaks; check mountings and brackets.
1751.15.17	Recognize connections; check wastegate, variable geometry turbocharger (VGT), linkages, and hoses.
1751.15.18	Service or replace air filter(s) as needed.
1751.15.19	Inspect diesel emission control systems, including exhaust gas recirculation (egr).
1751.15.20	Exhaust gas recirculation (egr) cooler, diesel particulate filter (dpf), and/or catalytic converter.
1751.15.21	Check fan clutch/hub operation, bearing condition and noise (including viscous/thermostatic, air, and electric fan types); inspect fan assembly and shroud for missing and damaged components.
1751.15.22	Inspect radiator (including air flow restriction, missing/corroded fins, leaks, and damage) and mountings.
1751.15.23	Inspect coolant hoses and clamps for leaks, damage, and proper routing.
1751.15.24	Inspect coolant recovery system.
1751.15.25	Identify coolant type; check coolant for contamination, supplemental coolant additives (scas), and protection level (freeze point).
1751.15.26	Inspect water pump for leaks and bearing play.

Suspension and Steering

1751.16	Identify, maintain, and inspect TPMS and wheels.
1751.16.1	Identify steering wheel and column operation for free play and binding.

1751.16.2	Adjust wheel bearings as needed (including one and two nut types) in accordance with manufacturer's specifications.
1751.16.3	Inspect tires for irregular wear patterns and proper mounting of directional tires.
1751.16.4	Inspect tires for cuts, cracks, bulges, and sidewall damage.
1751.16.5	Inspect valve caps and stems.
1751.16.6	Measure and record tire tread depth; probe for imbedded debris.
1751.16.7	Check and record tire air pressure; adjust as needed.
1751.16.8	Check for loose lugs and/or slipped wheels; check mounting hardware condition; service as needed.
1751.16.9	Check tire matching (diameter and tread) on dual tire installations.
1751.17	Identify and repair chassis components.
1751.17.1	Inspect and identify worn and or out of specification components.
1751.17.2	Inspect windshield glass for cracks, chips, clarity, discoloration/glazing, or other damage; check sun visor operation.
1751.17.3	Check seat condition, operation, mounting, and suspension components.
1751.17.4	Check door glass and window operation.
1751.17.5	Inspect steps and grab handles.
1751.17.6	Inspect mirror mountings, brackets, glass, heaters, and motors.
1751.17.7	Inspect and record all observed physical damage.
1751.17.8	Lubricate all cab and hood grease fittings.
1751.17.9	Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, linkages, and cables.
1751.17.10	Inspect cab mountings, hinges, latches, linkages; service as needed.
1751.17.11	Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect tilt cab safety devices; service as needed.
1751.17.12	Check cab ride height; inspect cab air suspension springs, mounts, hoses, valves, shock absorbers, and fittings for leaks and damage.
1751.17.13	Inspect front bumper, fairings, and mounts.
1751.18	Identify, maintain, and repair power steering systems.
1751.18.1	Identify all power steering system components.
1751.19	Identify, maintain, and repair steering axle components.
1751.19.1	Inspect axle housing(s) for cracks and leaks.
1751.19.2	Inspect axle breather(s); service as needed.
1751.19.3	Check drive axle(s) oil level.
1751.20	Identify, maintain, and repair suspension types (i.e., front, rear).
1751.20.1	Inspect front and rear suspension components (springs, hangers, shackles, spring u-bolts, insulators, radius rods, torque rods, load pads, walking beams, and equalizers); check u-bolt torque in accordance with manufacturers' specifications.
1751.20.2	Inspect shock absorbers for leaks and mounting.
1751.20.3	Inspect air suspension components (air springs/bags, mounts, arms, hoses, valves, linkage, and fittings) for leaks and damage; check suspension ride height.
1751.20.4	Inspect rear (icc/dot) impact guard.
1751.21	Maintain proper vehicle alignment.
1751.21.1	Demonstrate the ability to check and maintain vehicle alignment.

Brakes

1751.22	Identify, inspect, and repair hydraulic foundation brake system components and functions.

1751.22.1	Inspect hydraulic brake lines, fittings, flexible hoses, and valves for leaks and damage.
1751.22.2	Check hydraulic parking brake operation; inspect parking brake application and holding devices.
1751.22.3	Check operation of hydraulic system; pedal travel, pedal effort, and pedal feel (drift).
1751.22.4	Inspect calipers and/or wheel cylinders for leaks and damage.
1751.22.5	Inspect power brake booster(s), hoses, and control valves.
1751.22.6	Check and/or adjust hydraulic drum brakes.
1751.22.7	Check operation of hydraulic assist back-up system and warning devices.
1751.23	Identify and inspect ABS, ATC, and VSS.
1751.23.1	Perform antilock brake system (abs) operational system self-test. perform automatic traction control (atc) operational system self-test, if equipped.
1751.24	Identify, inspect, and repair air foundation brake system components and functions.
1751.24.1	Check air system for leaks (brakes released).
1751.24.2	Check the air system for leaks (brakes applied).
1751.24.3	Check and record air governor cut-in and cut-out settings (psi).
1751.24.4	Check low air pressure warning devices.
1751.24.5	Check tractor protection valve, if equipped.
1751.24.6	Test air pressure build-up time.
1751.24.7	Inspect coupling air lines, holders, and gladhands.
1751.24.8	Check brake chambers and air lines for secure mountings, damage, and missing caging plugs.
1751.25	Identify and inspect supply system components.
1751.25.1	Inspect hydraulic brake lines, fittings, flexible hoses, and valves for leaks and damage.
1751.25.1	Inspect coupling air lines, holders, and gladhands.
1751.26	Identify, inspect, and repair air system components.
1751.26.1	Inspect air suspension components (air springs/bags, mounts, arms, hoses, valves, linkage, and fittings) for leaks and damage; check suspension ride height.
1751.26.2	Inspect shock absorbers for leaks and mounting.
1751.26.3	Check brake chambers and air lines for secure mountings, damage, and missing caging plugs.

Drivetrains

1751.27	Demonstrate understanding of the types of clutches.
1751. 27.1	Check operation of release/throw out bearing and clutch brake.
1751. 27.2	Check clutch linkage/cable and levers for looseness or binding; lubricate release/throw-out bearing as required.
1751. 27.3	Check clutch master cylinder fluid level; check clutch master cylinder, slave cylinder, lines, and hoses for leaks and damage.
1751. 27.4	Check and/or adjust clutch.
1751.28	Demonstrate understanding of transmissions (e.g., manual, automatic).
1751. 28.1	Check transmission and/or transfer case housing, fasteners, seals, filter, cooler, and cooler lines for cracks, leaks, and proper routing, if equipped.
1751. 28.2	Check transmission wiring, connectors, seals, and harnesses for damage and proper routing.
1751. 28.3	Inspect transmission breather, service as needed.
1751. 28.4	Inspect transmission mounts for looseness and deterioration.
1751.28.5	Check transmission oil/fluid level and condition.
1751.29	Install and replace U-joints and interpret drive line angles.
1751.29.1	Inspect u-joints, yokes, driveshafts, and center bearings for looseness, damage, and proper phasing.

1751.29.2	Inspect axle housing(s) for cracks and leaks.
1751.29.3	Inspect axle breather(s); service as needed.
1751.29.4	Check drive axle(s) oil level.
1751.30	Diagnose and display an understanding of differentials functionality, including interaxle.
1751.30.1	Inspect U-joints, yokes, drive-shafts, boots/seals, center bearings, and mounting hardware for looseness, damage, and proper phasing.
1751.30.2	Check inter-axle differential lock operation.
1751.30.3	Change drive axle(s) oil and filter/screen, if applicable; check and clean magnetic plugs.
1751.30.4	Check drive axle(s) oil level, condition, determine proper type, and service as needed.
1751.30.5	Lubricate all drivetrain grease fittings.
1751.30.6	Inspect axle housing(s) for cracks and leaks.
1751.30.7	Inspect axle breather(s).

Preventive Maintenance

1751.31	Perform troubleshooting and preventive maintenance on transmissions (e.g., manual, automatic).
1751.31.1	Perform preventive maintenance and troubleshoot problems with manual transmissions.
1751.31.2	Perform preventive maintenance and troubleshoot problems with automatic transmissions.
1751.31.3	Check transmission case, seals, filter, hoses, lines and cooler for cracks and leaks.
1751.31.4	Inspect transmission breather.
1751.31.5	Inspect transmission mounts.
1751.31.6	Check transmission oil level, condition, determine proper type and service as needed.
1751.31.7	Check transmission wiring, connectors, seals, and harnesses for damage and proper routing.
1751.31.8	Change transmission oil and filter, if applicable; check and clean magnetic plugs.
1751.31.9	Check transmission range shift operation.
1751.32	Perform troubleshooting and preventive maintenance on brake systems.
1751.32.1	Perform routine preventive maintenance and troubleshoot problems with brake systems.
1751.32.2	Inspect and measure brake shoes or pads; perform needed action.
1751.32.3	Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed.
1751.32.4	Identify and diagnose poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problems caused by the foundation brake, slack adjuster, and brake chamber problems; determine needed action.
1751.32.5	Inspect and measure brake drums or rotors; perform needed action.
1751.33	Perform troubleshooting and preventive maintenance on frame and chassis.
1751.33.1	Perform routine preventive maintenance and troubleshoot problems on frame and chassis systems.
1751.33.2	Inspect frame and frame members for cracks and damage.
1751.33.3	Inspect shock absorbers for leaks and secure mounting.
1751.33.4	Inspect engine mounts for looseness and deterioration.
1751.33.5	Check quarter fenders, mud flaps, and brackets.
1751.34	Perform troubleshooting and preventive maintenance on HVAC systems.
1751.34.1	Perform preventive maintenance and troubleshoot problems with HVAC systems.
1751.34.2	Inspect A/C condenser and lines for condition and visible leaks; check mountings.
1751.34.3	Inspect A/C compressor and lines for condition and visible leaks; check mountings.
1751.34.4	Check A/C system condition and operation; check A/C monitoring system, if applicable.
1751.34.5	Check HVAC air inlet filters and ducts; service as needed.

1751.35	Perform troubleshooting and preventive maintenance through inspection of tire wear patterns.
1751.35.1	Perform routine preventive maintenance and troubleshoot problems with tires.
1751.35.2	Inspect tires for wear patterns and proper mounting.
1751.35.3	Inspect tires for cuts, cracks, bulges, and sidewall damage.
1751.35.4	Inspect valve caps and stems; determine needed action.
1751.35.5	Measure and record tread depth; probe for imbedded debris.
1751.35.6	Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications.
1751.35.7	Check wheel mounting hardware condition; determine needed action.
1751.35.8	Inspect wheel/rims for proper application, load range and design; ensure dual rims are properly clocked to access valve stems; determine needed action.
1751.35.9	Check tire matching (diameter and tread) on single and dual tire applications.
1751.35.10	Re-torque lugs in accordance with manufacturer's specifications.
1751.36	Perform troubleshooting and preventive maintenance on clutches.
1751.36.1	Perform routine preventive maintenance and troubleshoot problems on clutches.
1751.36.2	Check operation of clutch, clutch brake, and gearshift.
1751.36.3	Check clutch linkage/cable for looseness or binding, if applicable.
1751.36.4	Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.
1751.36.5	Check clutch adjustment; adjust as needed.

Basic Oxyacetylene Cutting and Welding

1751.37	Describe various cutting and weld removal processes.
1751.37.1	Identify the safety procedures and PPE required for cutting and welding operations.
1751.37.2	Explain the process for cutting and removing various types of steel and other metals.
1751.37.3	Explain how to set up and use the SMAW welder to perform basic welding operations.

This course introduces the student to the knowledge base and technical skills of the HVAC industry. HVAC 1 begins with instruction in Basic Safety; Introduction to Construction Math; Introduction to Hand Tools; Introduction to Power Tools; Introduction to Construction Drawings; Basic Rigging; Basic Communication Skills; Basic Employability Skills; and Introduction to Materials Handling. Students will then begin developing skill sets related to the fundamentals of HVAC such as Introduction to HVAC, and Trade Mathematics. Teachers should provide each student with real world learning, opportunities, and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

OSHA Guidelines and General Safety

1752.1	Apply personal and environmental safety procedures, including personal protective equipment (PPE).
1752.1.1	Demonstrate Occupational Safety and Health Administration (OSHA) 10, Environmental Protection Agency (EPA) practices, Department of Transportation (DOT) hazardous materials safety requirements, lock-out and tag out, and electrical safety.
1752.1.2	Identify and describe the basic use of PPE used to protect workers from bodily injury.
1752.1.3	Identify and use OSHA practices when working with heating, air-conditioning and refrigeration systems and equipment.
1752.1.4	Identify and use safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
1752.1.5	Describe the purpose and requirements of local, state, and federal heating, ventilation, air-conditioning, and refrigeration (HVAC/R) codes and standards as well as the manufacturer's installation instructions.
1752.1.6	Identify appropriate fire extinguishers and other such safety devices.
1752.1.7	Explain emergency procedures to follow in response to workplace accidents.
1752.1.8	Explain the reasons for regular safety meetings and for company safety policies.
1752.1.9	Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
1752.1.10	Understand a disaster and/or emergency response plan.
1752.2.	Demonstrate understanding of fire protection equipment and procedures.
1752.2.1	Identify fire hazards and describe basic firefighting procedures.
1752.2.2	Identify appropriate fire extinguishers and other such safety devices.
1752.3	Demonstrate knowledge of electrical safety procedures.
1752.3.1	Describe basic job-site electrical safety guidelines.
1752.3.2	Explain the importance of lockout/tagout and describe basic procedures.
1753.4	Demonstrate knowledge of HVAC-specific safety procedures.
1753.4.1	Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).
1753.4.2	Identify common safety principles and organizations.
1753.4.3	Describe the environmental concerns associated with refrigerants.
1753.4.4	Identify the safety classifications of refrigerants.

Related Math, Building Science, Blueprints, and Tools

1752.5	Demonstrate understanding of modes of heat transfer and British Thermal Unit (BTU).
1752.5.1	Identify different whole numbers and their place values.
1752.5.2	Demonstrate the ability to add and subtract whole numbers.
1752.5.3	Demonstrate the ability to multiply and divide whole numbers.
1752.5.4	Define equivalent fractions and show how to find lowest common denominators.
1752.5.5	Describe improper fractions and demonstrate how to change an improper fraction to a mixed number.
1752.5.6	Demonstrate the ability to add and subtract fractions.
1752.5.7	Demonstrate the ability to multiply and divide fractions.
1752.5.8	Describe decimals and their place values.
1752.5.9	Demonstrate the ability to add, subtract, multiply, and divide decimals.
1752.5.10	Demonstrate the ability to convert between decimals, fractions, and percentages.
1752.5.11	Identify and convert units of temperature measurement between the imperial and metric systems.
1752.6	Measure with a ruler, correctly identify fractions.
1752.6.1	Identify and demonstrate how to use rulers.
1752.6.2	Identify and demonstrate how to use measuring tapes.
1752.6.3	Identify and convert units of length measurement between the imperial and metric systems.
1752.6.4	Identify and convert units of weight measurement between the imperial and metric systems.
1752.6.5	Identify and convert units of volume measurement between the imperial and metric systems.
1752.6.6	Identify various types of angles.
1752.6.7	Identify basic geometric shapes and their characteristics.
1752.6.8	Demonstrate the ability to calculate the area of two-dimensional shapes.
1752.6.9	Demonstrate the ability to calculate the volume of three-dimensional shapes.
1752.7	Calculate GPM, CFM, and CFM per ton.
1752.7.1	Explain how to calculate Gallons Per Minute (GPM).
1752.7.2	Describe how to calculate Cubic Feet Per Minute (CFM).
1752.7.3	Explain the process of calculating the CFM per Ton.
1752.8	Understand properties of air.
1752.8.1	Describe the basic principles of heating, ventilation, air conditioning, and refrigeration.
1752.8.2	Explain the principles of heating.
1752.8.3	Explain the principles of ventilation.
1752.8.4	Explain the principles of air conditioning.
1752.8.5	Explain the principles of refrigeration.
1752.8.6	Describe the fundamental concepts of heating and combustion.
1752.8.7	Describe the heat transfer process.
1752.8.8	Explain the fundamental concepts of the refrigeration cycle.
1752.8.9	Describe how heat affects the state of substances.
1752.8.10	Describe pressure-temperature relationships.
1752.8.11	Describe the basic pattern of refrigerant flow and the changes of state that occur in the refrigeration cycle.
1752.9	Accurately interpret blueprints and electrical diagrams.
1752.9.1	Various types of construction drawings, including their fundamental components and features.
1752.9.2	Identify various types of construction drawings.
1752.9.3	Identify and describe the purpose of the five basic construction drawing components.

1752.9.4	Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.
1752.9.5	Identify and explain the use of dimensions and various drawing scales.
1752.9.6	Identify and describe how to use engineer's and architect's scales.
1752.10	Identify, use, and maintain hand and power tools.
1752.10.1	Identify and use various types of hand tools.
1752.10.2	Identify and explain how to use various types of hammers and demolition tools.
1752.10.3	Identify and explain how to use various types of chisels and punches.
1752.10.4	Identify and explain how to use various types of screwdrivers.
1752.10.5	Identify and explain how to use various types of non-adjustable and adjustable wrenches.
1752.10.6	Identify and explain how to use various types of socket and torque wrenches.
1752.10.7	Identify and explain how to use various types of pliers and wire cutters.
1752.10.8	Identify and explain how to use rules and other measuring tools.
1752.10.9	Identify and explain how to use various types of levels and layout tools.
1752.10.10	Identify and explain how to use handsaws.
1752.10.11	Identify and explain how to use various types of files and utility knives.
1752.10.12	Identify and explain how to use chain falls and come-alongs.
1752.10.13	Identify and explain how to use various types of clamps.
1752.10.14	Identify and use various types of power drills and impact wrenches.
1752.10.15	Identify and explain how to use common power drills and bits.
1752.10.16	Identify and explain how to use a hammer drill.
1752.10.17	Identify and explain how to use pneumatic drills and impact wrenches.
1752.10.18	Identify and explain how to use a circular saw.
1752.10.19	Identify and explain how to use saber and reciprocating saws.
1752.10.20	Identify and explain how to use a portable band saw.
1752.10.21	Identify and explain how to use miter and cutoff saws.
1752.10.22	Identify and explain how to use various types of grinders.
1752.10.23	Identify and explain how to use various grinder accessories and attachments.
1752.10.24	Identify and explain how to use pneumatic and powder-actuated fastening tools.
1752.10.25	Identify and explain how to use pavement breakers.
1752.10.26	Identify and explain the uses of hydraulic jacks.

This course will continue to build student skill sets in areas such as Copper and Plastic Piping Practices; Soldering and Brazing; Ferrous Metal Piping Practices; Basic Electricity; Introduction to Cooling; Introduction to Heating; and Air Distribution Systems. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Electricity

1753.1	Demonstrate understanding of basic Electrical Theory and Codes.
1753.1.1	The fundamentals of electricity and basic electrical theory.
1753.1.2	State how electrical power is created and distributed.
1753.1.3	Describe the difference between alternating current and direct current.
1753.1.4	Identify the electrical components used in HVAC/R systems and their functions.
1753.1.5	Define voltage, current, resistance, and power and describe how they are related.
1753.1.6	State the safety practices associated with electricity.
1753.1.7	Describe the difference between alternating current and direct current.
1753.1.8	Use Ohm's law to calculate the current, voltage and resistance in a circuit.
1753.1.9	Use the power formula to calculate how much power is consumed by a circuit.
1753.1.10	Describe how voltage is measured.
1753.1.11	Describe how current is measured.
1753.1.12	Describe how resistance is measured.
1753.1.13	Identify and describe the types of electrical diagrams used in HVAC/R work.
1753.2	Exhibit knowledge of series and parallel circuits.
1753.2.1	Describe the differences between series and parallel circuits and calculate circuit loads for each type.

Soldering, and Brazing

1753.3	Solder and/or braze, and leak test tubing and fittings.
1753.3.1	Describe and demonstrate the use of the PPE, tools, and materials needed to solder copper tubing.
1753.3.2	The safe process of soldering copper tubing.
1753.3.3	The safe process of brazing copper tubing.
1753.3.4	Describe and demonstrate the use of the PPE, tools, and materials needed to solder copper tubing.
1753.3.5	Describe and demonstrate the preparation required for soldering.
1753.3.6	Describe and demonstrate the soldering process.
1753.3.7	Describe and demonstrate the preparation used for brazing.
1753.3.8	Describe and demonstrate the brazing process.
1753.3.9	Describe and demonstrate the process of brazing copper tubing to dissimilar metals.

1753.4	Set up and operate torch and equipment.
1753.4.1	Demonstrate the ability to set up and operate a torch and other essential equipment.

Pipe Fitting and Joining

1753.5	Properly use various pipe and tubing types and fittings.
1753.5.1	Describe and identify copper tubing characteristics.
1753.5.2	Identify various copper fittings.
1753.5.3	Measure, cut, and bend copper tubing to prepare it for joining.
1753.5.4	Describe and demonstrate the methods and tools used to join copper tubing.
1753.5.5	Describe common hangers and supports associated with copper tubing installations.
1753.5.6	Identify different types of plastic piping.
1753.5.7	Identify the tools and products needed and demonstrate how to join plastic piping.

Warm Air Systems

1753.6	Demonstrate knowledge and understanding of sequence of operation.
1753.6.1	Identify heat pump operating principles and their related performance ratings.
1753.6.2	Explain the operation of heat pump systems.
1753.6.3	Common installation practices associated with heat pumps.
1753.6.4	The operation of electric heating equipment used with heat pumps.
1753.6.5	Explain how heat pumps can extract heat from air and water.
1753.6.6	Describe the Coefficient of Performance (COP) and how it is determined.
1753.6.7	Describe the refrigeration cycle of heat pumps.
1753.6.8	Identify the various types of heat pump systems.
1753.6.9	Identify unit components that are important to heat pump operation.
1753.6.10	Explain how electric heating equipment operates.
1753.7	Properly set up and adjust warm air equipment.
1753.7.1	Describe the Coefficient of Performance (COP) and how it is determined.
1753.7.2	Describe the Heating Seasonal Performance Factor (HSPF) and how it is determined.
1753.7.3	Describe the Seasonal Energy Efficiency Ratio (SEER) and how it is determined.
1753.7.4	Describe the basic control strategies for heat pumps and defrost cycles.

This course will continue to build student skill sets in areas of Commercial Airside Systems; Chimneys, Vents, and Flues; Introduction to the Hydronic Systems; Air Quality Equipment; Leak Detection, Evacuation, Recovery, and Charging; Alternating Current; Basic Electronics; and Introduction to Control Circuit Troubleshooting. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Electricity

1754.1	Troubleshoot, service, and repair various electrical circuits and components (thermostats, transformers, fuses, relays, etc.).
1754.1.1	Explain the basic concepts of power generation.
1754.1.2	Describe a sine wave and how it is created.
1754.1.3	Define voltage and identify the ways in which it can be produced.
1754.1.4	Explain the difference between conductors and insulators.
1754.1.5	Explain the basic characteristics of series and parallel circuits.
1754.1.6	Explain how wiring devices are selected and installed.
1754.1.7	Explain the necessity of overcurrent protection devices in electrical circuits.
1754.1.8	Define the terms associated with fuses and circuit breakers.
1754.1.9	Describe the operation of a circuit breaker.
1754.1.10	Apply the National Electrical Code® (NEC®) requirements for overcurrent devices.
1754.1.11	Describe the operation of single-element and time delay fuses.
1754.1.12	Describe how overload relays operate.
1754.2	Troubleshoot, service, and repair various motors and motor controls.
1754.2.1	Explain how single- and three-phase power is provided for practical use.
1754.2.2	Explain how transformers operate.
1754.2.3	Identify various forms of single-phase and three-phase transformers.
1754.2.4	Explain how single-phase motors operate.
1754.2.5	Describe single-phase motor starting circuits.
1754.2.6	Identify the physical and operating characteristics of three-phase motors.
1754.2.7	Identify electrical test instruments and methods used to test motors.
1754.2.8	Explain how to use a capacitor tester.
1754.2.9	Identify basic electrical safety rules and guidelines for safely testing AC components.
1754.2.10	Describe the types of capacitors and their applications.
1754.2.11	Explain how alternating current is developed and draw a sine wave.
1754.2.12	Demonstrate the proper use of motor testing equipment.
1754.2.13	Reverse the rotation of a motor.

Warm Air Systems

1754.3	Demonstrate knowledge and understanding of sequence of operation.
1754.3.1	Explain heat pump operating principles and their related performance ratings.
1754.3.2	Explain how heat pumps can extract heat from air and water.
1754.3.3	Identify unit components that are important to heat pump operation.
1754.3.4	Describe sources of supplemental and/or emergency heat used in heat pumps.
1754.3.5	Explain how electric heating equipment operates.
1754.3.6	Identify the major components of an electric heater.
1754.4	Properly set up and adjust warm air equipment.
1754.4.1	identify air system design strategies for cold climates.
1754.4.2	explain the importance of maximizing energy efficiency through the proper insulation, sealing, and testing of air distribution systems.

Hydronic Systems

1754.5	Service and repair hydronic systems and components, including zone valves.
1754.5.1	Inspect hydronic systems for leaks and standing water.
1754.5.2	Perform routine inspections and maintenance on hydronic systems.
1754.5.3	Explain how to balance the air charge and recharge hydronic systems.
1754.5.4	Describe the process for testing and replacing a zone valve.
1754.6	Troubleshoot hydronic operating pressures, water flow, and temperatures.
1754.6.1	Explain hydronic and electric heating systems.
1754.6.2	Describe the operation of hydronic heating systems.
1754.6.3	Describe the heat transfer process.
1754.6.4	Identify gas fuels and their combustion characteristics.

Air Conditioning-Residential

1754.7	Identify refrigerants by pressure/temperature relationship and select appropriate refrigerants and oils.
1754.7.1	describe the environmental concerns associated with refrigerants.
1754.7.2	Define refrigerants and identify desirable characteristics.
1754.7.3	Identify common refrigerants and their basic characteristics
1754.7.4	Identify various refrigerant containers and their safe handling requirements.
1754.7.5	Explain how heat is transferred from one substance to another.
1754.7.6	Describe pressure-temperature relationships
1754.7.7	Identify fluorocarbon refrigerants.
1754.7.8	Describe the use of ammonia as a refrigerant.
1754.7.9	Identify the various applications that require specific refrigerant characteristics.
1754.7.10	Identify the primary chemical classifications of common characteristics.
1754.7.11	Identify and describe compounded and blended azeotropic, near-azeotropic, and zeotropic refrigerants.
1754.7.12	Identify the important characteristics of refrigerant oils.
1754.7.13	Identify mineral-based and synthetic oils.
1754.7.14	Describe the various types and sources of oil contamination.
1754.7.15	Describe common practices associated with handling, charging, and removing oils.
1754.7.16	Identify issues of concern for all refrigerant conversions.
1754.7.17	Describe common practices related to popular refrigerant conversions.
1754.8	Troubleshoot system components and metering devices.
1754.8.1	Explain the function of refrigerant metering devices and their effect on refrigerants.

1754.8.2	Describe how refrigerants react as they pass through a metering device.
1754.8.3	Identify distributors and explain their relationship to metering device performance and operation.
1754.8.4	Identify and explain how fixed-orifice metering devices function.
1754.8.5	Identify and explain how capillary tubes function.
1754.8.6	Describe common problems associated with fixed metering devices.
1754.8.7	Identify and explain the operation of manual expansion valves.
1754.8.8	Identify and explain the operation of automatic expansion valves.
1754.8.9	Identify and explain the operation of thermal expansion valves.
1754.8.10	Identify and explain the operation of electric and electronically controlled expansion valves.
1754.8.11	Describe common problems associated with all types of expansion valves.
1754.8.12	Explain how thermal expansion valves are selected for a given application.
1754.8.13	Describe the installation practices and considerations related to thermal expansion valves.
1754.8.14	Identify electrical components used in HVAC/R systems and their functions.
1754.9	Understand how to recover, pressure-test, evacuate, and charge an electrical system, according to the EPA 608 Clean Air Act.
1754.9.1	Identify common health hazards associated with HVAC maintenance activities.
1754.9.2	Identify the basic refrigerant containment requirements of Section 608 of the Clean Air Act.
1754.9.3	Identify and explain how to operate refrigerant recovery and recycling equipment.
1754.9.4	Explain the basic principles of refrigerant circuit evacuation.
1754.9.5	Identify and explain how to operate the equipment used to evacuate refrigerant circuits.
1754.9.6	Identify and describe the equipment and components related to refrigerant charging.
1754.9.7	Explain how to properly charge various types of refrigerants using different methods.
1754.9.8	Describe the various devices used to detect refrigerant leaks.

Code of Conduct

1754.10	Simulated Workplace Manual.
1754.10.1	Demonstrate complete understanding of Simulated Workplace procedures.

Unions and Apprenticeship Programs

1754.11	Unions working with Contractors in Construction Trades.
1754.11.1	Construction Trade Unions in West Virginia with Apprenticeship programs.
1754.11.2	Apprenticeship opportunities in Construction trades.
1754.11.3	Applying for Apprenticeship in the Construction Trades.
1754.11.4	Pre-Job Training
1754.11.5	Working with your Supervisor and others.
1754.11.6	Harassment and Discrimination.
1754.11.7	Qualities of a Successful Apprentice
1754.11.8	Common Interview Questions.
1754.11.9	Interviewing tips for Construction Apprenticeships.
1754.11.10	Interviewing for Apprenticeships in Construction.

This course will continue to build student skill sets in areas of Troubleshooting Gas Heating; Troubleshooting Cooling; Heat Pumps; Basic Installation and Maintenance Practices; Sheet Metal Duct Systems; and Fiberglass and Flexible Duct Systems. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Warm Air Systems

1755.1	Install and size flues properly adhering to appropriate gas codes.
1755.1.1	Describe the role of forced-air gas furnaces in residential heating.
1755.1.2	Identify gas fuels and their combustion characteristics.
1755.1.3	Describe the types of gas furnaces and how they operate.
1755.1.4	Identify and describe the equipment and controls used in gas furnaces.
1755.1.5	Describe the basic installation and maintenance requirements for gas furnaces.
1755.1.6	Describe the contents of flue gases and related concerns.
1755.1.7	Explain the basic principles of combustion and ventilation.
1755.1.8	Identify vented appliance categories.
1755.1.9	Describe the construction of various venting systems.
1755.1.10	Describe the venting considerations for natural-draft furnaces.
1755.1.11	Describe the venting considerations for induced-draft furnaces.
1755.1.12	Describe understanding of the International Fuel Gas Codebook (IFGC).
1755.1.13	Explain the importance of complying with local and international Gas Codes.
1755.2	Perform preventive maintenance procedures, including combustion analysis and calculating efficiency.
1755.2.1	Identify common health hazards associated with HVAC maintenance activities.
1755.2.2	Describe the common inspection and maintenance procedures for gas heating equipment
1755.2.3	Describe the common inspection and maintenance procedures for DX cooling and heat pump systems.
1755.2.4	Describe the common inspection and maintenance procedures for various system accessories.
1755.2.5	Describe how to properly complete common HVAC service reports.
1755.2.6	Describe the Coefficient of Performance (COP) and how it is determined.

Heat Pumps, Electric Heat

1755.3	Troubleshoot and test proper operation of heat pumps, reversing valve, defrost controls, etc.
1755.3.1	Explain how heat pumps can extract heat from air and water.
1755.3.2	Describe the Heating Seasonal Performance Factor (HSPF) and how it is determined.
1755.3.3	Describe the Seasonal Energy Efficiency Ratio (SEER) and how it is determined.
1755.3.4	Describe the refrigeration cycle of heat pumps.

1755.3.5	Identify the various types of heat pump systems.
1755.3.6	Describe the basic control strategies for heat pumps and defrost cycles.
1755.3.7	Identify unit components that are important to heat pump operation.
1755.3.8	Describe sources of supplemental and/or emergency heat used in heat pumps.
1755.3.9	Explain how electric heating equipment operates.
1755.3.10	Identify the major components of an electric heater.
1755.3.11	Describe the operation of electric heating equipment used with heat pumps.
1755.4	Perform preventive maintenance procedures for heat pumps, including calculating system efficiency.
1755.4.1	describe the Coefficient of Performance (COP) and how it is determined
1755.4.2	describe the Heating Seasonal Performance Factor (HSPF) and how it is determined
1755.4.3	describe the Seasonal Energy Efficiency Ratio (SEER) and how it is determined
1755.4.4	Describe the common inspection and maintenance procedures for DX cooling and heat pump systems
1755.4.5	Perform preventive maintenance procedures on heat pumps.
1755.4.6	Describe how to properly complete common HVAC service reports

Refrigeration

1755.5	Troubleshoot refrigerant components using proper testing procedures.
1755.5.1	Describe the various devices used to detect refrigerant leaks
1755.5.2	Describe how leak detection is approached based on the current refrigerant charge in the system
1755.5.3	Identify the basic refrigerant containment requirements of Section 608 of the Clean Air Act
1755.5.4	Identify and explain how to operate refrigerant recovery and recycling equipment
1755.5.5	Explain the basic principles of refrigerant circuit evacuation
1755.5.6	Identify and explain how to operate the equipment used to evacuate refrigerant circuits
1755.5.7	Identify and describe the equipment and components related to refrigerant charging
1755.5.8	Explain how to properly charge various types of refrigerants using different methods
1755.6	Describe various refrigerant components using proper testing procedures.
1755.6.1	Identify the basic refrigerant containment requirements of Section 608 of the Clean Air Act.
1755.6.2	Identify common material-handling safety precautions.
1755.6.3	Identify the various applications that require specific refrigerant characteristics.
1755.6.4	Explain the function of metering devices.
1755.6.5	Describe how refrigerants react as they pass through a metering device.
1755.6.6	Identify the primary chemical classifications of common characteristics.
1755.6.7	Describe the environmental concerns associated with refrigerants.
1755.6.8	Identify and describe compounded and blended azeotropic, near-azeotropic, and zeotropic refrigerants.
1755.6.9	Identify the safety classifications of refrigerants.
1755.6.10	Explain how to use P-T charts for compound, azeotropic, and near-azeotropic refrigerants to calculate superheat and subcooling.
1755.6.11	Explain how to use P-T charts for zeotropic refrigerants to calculate superheat and subcooling.
1755.6.12	Identify the important characteristics of refrigerant oils.
1755.6.13	Identify mineral-based and synthetic oils.
1755.6.14	Identify fluorocarbon refrigerants
1755.6.15	Describe the use of ammonia as a refrigerant
1755.6.16	Identify various refrigerant containers and their safe handling requirements
1755.6.17	Identify issues of concern for all refrigerant conversions.
1755.6.18	Describe common practices related to popular refrigerant conversions.

1755.7	Service and repair defrost system controls and components.
1755.7.1	Explain the function of a refrigeration defrost system.
1755.7.2	Explain the purpose of a defrost timer in a refrigeration system.
1755.7.3	Demonstrate the ability to troubleshoot and repair defrost system controls and components.

Airflow and Ductwork

1755.8	Maintain appropriate indoor air quality equipment (air cleaners, humidification, etc.)
1755.8.1	Explain the importance of maintaining indoor air quality and the factors to be controlled.
1755.8.2	Explain the processes and equipment used to control humidity levels.
1755.8.3	Identify the equipment and devices used to control air cleanliness.
1755.8.4	Identify the factors related to the quality of indoor air.
1755.8.5	Describe the elements of human comfort and their relationship to air properties.
1755.8.6	Explain the relationship between air and moisture content.
1755.8.7	Describe the processes and equipment used to humidify and dehumidify air.
1755.8.8	Identify the various types of media-based air filters.
1755.8.9	Describe the operation of non-media-based air filtration and purification equipment.
1755.8.10	Explain how dampers and economizers are used to control the introduction of fresh air.
1755.8.11	Describe the function and operation of energy and heat recovery ventilation systems.
1755.9	Measure temperature change, calculate CFM, and perform other system operation measurements.
1755.9.1	Explain the process for calculating (CFM) Cubic Feet Per Minute in a room.
1755.9.2	Describe the Heating Seasonal Performance Factor (HSPF) and how it is determined.
1755.9.3	Describe the Seasonal Energy Efficiency Ratio (SEER) and how it is determined.
1755.9.4	Describe how to calculate CFM when choosing a fan or air conditioning system.
1755.9.5	Describe how the Coefficient of Performance (COP) is determined.

Unions and Apprenticeship Programs

1755.10	Unions working with Contractors in Construction Trades.
1755.10.1	Construction Trade Unions in West Virginia with Apprenticeship programs.
1755.10.2	Apprenticeship opportunities in Construction trades.
1755.10.3	Applying for Apprenticeship in the Construction Trades.
1755.10.4	Pre-Job Training
1755.10.5	Working with your Supervisor and others.
1755.10.6	Harassment and Discrimination.
1755.10.7	Qualities of a Successful Apprentice
1755.10.8	Common Interview Questions.
1755.10.9	Interviewing tips for Construction Apprenticeships.
1755.10.10	Interviewing for Apprenticeships in Construction.

This course introduces the student to the knowledge base and technical skills of the Electrical Trades industry. Electrical Trades 1 begins with instruction in Basic Safety; Introduction to Construction Math; Introduction to Hand Tools; Introduction to Power Tools; Introduction to Construction Drawings; Basic Rigging; Basic Communication Skills; Basic Employability Skills; and Introduction to Materials Handling. Students will then begin developing skill sets related to the fundamentals of electricity such as Orientation to the Electrical Trade, and Electrical Safety. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Introduction to the Electrical Construction Technology Career

1756.1	Discuss workplace safety and common energy-related hazards.
1756.1.1	Discuss safety rules and regulations for electricians, including the necessary precautions for avoiding various job site hazards.
1756.1.2	Explain the importance of safety, the causes of workplace incidents, and the process of hazard recognition and control.
1756.1.3	Identify potential respiratory hazards and the basic respirators used to protect workers against those hazards.
1756.1.4	Describe basic job-site electrical safety guidelines.
1756.1.5	Identify common energy-related hazards and explain how to avoid them.
1756.1.6	Identify hazards associated with hot work.
1756.2	Identify career-related professional organizations and their purpose.
1756.2.1	Explain the purpose and history of the NEC®.
1756.2.2	Explain the purpose of the National Electrical Manufacturers Association and the NFPA.
1756.2.3	Discuss the history and current role of Electrical Trade Unions.

OSHA Regulations and Electrical Safety Practices

1756.3	Identify proper use of personal protective equipment (PPEs) according to NFPA 70E standards.
1756.3.1	Discuss the NFPA 70E requirements for Arc Flash Electrical Safety.
1756.3.2	Describe which Personal Protective Equipment (PPE) is required by the NFPA.
1756.3.3	Discuss how the NFPA 70E Standards are enforced on construction sites.
1756.4	Explain the purpose of OSHA.
1756.4.1	Discuss the history and purpose of OSHA and how it promotes safety on the job.
1756.4.2	Identify safe working practices in the construction environment.

1756.5	Identify procedures for fire, ladder, and environmental safety according to OSHA standards (including lock-out/tag-out).
1756.5.1	Identify fire hazards and describe basic firefighting procedures.
1756.5.2	Identify and describe the safe use of ladders and stairs.
1756.5.3	Identify various exposure hazards commonly found on job sites.
1756.5.4	Identify hazards associated with environmental extremes.
1756.5.5	Explain the importance of lockout/tagout and describe basic procedures.
1756.5.6	Identify confined spaces and describe the related safety considerations.

Identification and Selection of Tools, Materials, and Components

1756.6	Identify and correctly use hand and power tools.
1756.6.1	Discuss the various types of hand tools and how they are used.
1756.6.2	Identify the various types of measurement and layout tools and explain how each is used.
1756.6.3	Identify and explain how to use various types of screwdrivers.
1756.6.4	Identify and explain how to use various types of hammers and demolition tools.
1756.6.5	Identify and explain how to use various types of chisels and punches.
1756.6.6	Identify and explain how to use various types of non-adjustable and adjustable wrenches.
1756.6.7	Discuss and explain how to use various types of socket and torque wrenches.
1756.6.8	Identify and explain how to use rules and other measuring tools.
1756.6.9	Identify and explain how to use various types of levels and layout tools.
1756.6.10	Discuss and explain how to use various types of clamps.
1756.6.11	Describe how to use other common hand tools.
1756.6.12	Identify and describe how to use miscellaneous power tools.
1756.6.13	Identify and explain how to use common power drills and bits.
1756.6.14	Identify and explain how to use a circular saw.
1756.6.15	Identify and explain how to use miter and cutoff saws.
1756.6.16	Identify and explain how to use pneumatic and powder-actuated fastening tools.
1756.6.17	Explain how to use various grinders and grinder attachments.
1756.6.18	Identify and explain how to use a hammer drill.
1756.6.19	Identify and explain how to use saber and reciprocating saws.
1756.7	Identify and select proper conductor cable type.
1756.7.1	Discuss the types and applications of conductors and covers proper wiring techniques and appropriate NEC® requirements.
1756.7.2	Explain the cable markings and describe the insulation and jacket material, conductor size and type, number of conductors, temperature rating, voltage rating, and permitted uses.
1756.7.3	Determine the allowable ampacity of a conductor for a given application.
1756.7.4	Identify the NEC® requirements for color coding of conductors.
1756.7.5	install conductors in a raceway system.

1756.8	Identify the function and purpose of various specialty equipment, including Ground Fault Circuit Interrupter (GFCI), Arc-Fault Circuit Interrupter (AFCI), Tamper Resistant, and Transient Voltage Surge Suppressor (TVSS).
1756.8.1	Discuss the methods and procedures used in the selection and installation of circuit breakers and fuses.
1756.8.2	Explain the necessity of overcurrent protection devices in electrical circuits.
1756.8.3	Define the terms associated with fuses and circuit breakers.
1756.8.4	Describe the operation of a circuit breaker.
1756.8.5	Apply the National Electrical Code® (NEC®) requirements for overcurrent devices.
1756.8.6	Describe how overload relays operate.
1756.8.7	Explain how to test control circuits.
1756.8.8	Discuss the function and purpose of a Ground Fault Circuit Interrupter (GFCI).
1756.8.9	Discuss the purpose and function of an Arc-Fault Circuit Interrupter (AFCI).
1756.8.10	Explain the purpose and function of a Tamper Resistant, and Transient Voltage Surge Protector (TVSS).
1756.9	Identify commonly used listed and labeled equipment.
1756.9.1	Identify and describe the most commonly listed and labeled equipment used by electricians.

AC Theory, Magnetic Theory, and DC Theory

1756.10	Identify characteristics of AC circuits.
1756.10.1	Explain the principles of alternating current.
1756.10.2	Calculate the phase relationship between two AC waveforms.
1756.10.3	Describe the voltage and current phase relationship in a resistive AC circuit.
1756.10.4	Describe the voltage and current transients that occur in an inductive circuit.
1756.10.5	Define inductive reactance and state how it is affected by frequency.
1756.10.6	Describe the voltage and current transients that occur in a capacitive circuit.
1756.10.7	Define capacitive reactance and state how it is affected by frequency.
1756.10.8	Explain true power as it relates to AC circuits.
1756.10.9	Explain apparent power as it relates to AC circuits.
1756.10.10	Explain reactive power as it relates to AC circuits.
1756.10.11	Explain power factor as it relates to AC circuits.
1756.10.12	Explain basic transformer action.
1756.11	Explain capacitance, inductance, impedance, current, voltage, and resistance.
1756.11.1	Define capacitive reactance and state how it is affected by frequency.
1756.11.2	Explain the relationship between voltage and current in an RL circuit.
1756.11.3	Explain the relationship between voltage and current in an RC circuit.
1756.11.4	Explain the relationship between voltage and current in an LC circuit.
1756.11.5	Explain the relationship between voltage and current in an RLC circuit.
1756.11.6	Define electrodes and explain the resistance requirements for electrodes using NEC Section 250.53 A 2 Exception.
1756.12	Calculate power consumption, dissipation, and loss.
1756.12.1	Explain how to calculate power consumption.

1756.12.2	Explain how to calculate power dissipation.
1756.12.3	Explain how to calculate power loss.
1756.12.4	Demonstrate how to calculate power consumption, dissipation, and loss using the proper testing equipment.
1756.13	Demonstrate principles of magnetic theory.
1756.13.1	Explain the principles of magnetic theory.
1756.13.2	Demonstrate the principles of magnetic theory.
1756.14	Identify materials as insulators, conductors, and semi-conductors.
1756.14.1	Identify what types of materials acts as conductors.
1756.14.2	Explain the difference between conductors and insulators.
1756.14.3	Identify cable markings, describe the insulation, and jacket material, conductor size and type, number of conductors, temperature rating, voltage rating, and permitted uses.
1756.14.4	Determine the allowable ampacity of a conductor for a given application.
1756.14.5	Identify the NEC® requirements for color coding of conductors.
1756.15	Identify characteristics and components of DC circuits.
1756.15.1	Identify and describe the characteristics and components of DC circuits.

Circuit Theorems and Conversions

1756.16	Identify and apply various circuit theorems, including Ohm's Law, Kirchoff's Law, Watt's Law, and Electron Theory.
1756.16.1	Demonstrate understanding of electrical concepts used in Ohm's law. It includes atomic theory, electromagnetic force, resistance, and electric power equations. It also covers series, parallel, and series-parallel circuits.
1756.16.2	Calculate, using Kirchhoff's voltage law, the voltage drop in series, parallel, and series-parallel circuits.
1756.16.3	Calculate, using Kirchhoff's current law, the total current in parallel and series-parallel circuits.
1756.16.4	Explain the unknown parameters in series, parallel, and series-parallel circuits using Ohm's Law.
1756.16.5	Demonstrate understanding of Electron Theory.
1756.17	Identify and apply various mathematical conversions, including scientific, engineering, and metric notations/conversions.
1756.17.1	Identify different whole numbers and their place values.
1756.17.2	Demonstrate the ability to add and subtract whole numbers.
1756.17.3	Demonstrate the ability to multiply and divide whole numbers.
1756.17.4	Define equivalent fractions and show how to find the lowest common denominators.
1756.17.5	Describe improper fractions and demonstrate how to change an improper fraction to a mixed number.
1756.17.6	Demonstrate the ability to add and subtract fractions.
1756.17.7	Demonstrate the ability to multiply and divide fractions.
1756.17.8	Describe decimals and their place values.
1756.17.9	Demonstrate the ability to add, subtract, multiply, and divide decimals.
1756.17.10	Demonstrate the ability to convert decimals, fractions, and percentages.
1756.17.11	Identify and demonstrate how to use rulers.

1756.17.12	Identify and convert units of length measurement between the imperial and metric systems.
1756.17.13	Identify and convert units of weight measurement between the imperial and metric systems.
1756.17.14	Identify and convert units of volume measurement between the imperial and metric systems.
1756.17.15	identify and convert units of temperature measurement between the imperial and metric systems.

Electrical Trades 2 will continue to build student skill sets in areas such as Introduction to Electrical Circuits; Electrical Theory; Introduction to the National Electrical Code®; Device Boxes; Hand Bending; Raceways and Fittings; Conductors and Cables; Basic Electrical Construction Drawings; Residential Electrical Services; and Electrical Test Equipment. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Conductors and Cables

1757.1	Identify and select the proper conductor cable type.
1757.1.1	Discuss the types and applications of conductors and covers proper wiring techniques and appropriate NEC® requirements.
1757.1.2	Explain the cable markings and describe the insulation and jacket material, conductor size and type, number of conductors, temperature rating, voltage rating, and permitted uses.
1757.1.3	Determine the allowable ampacity of a conductor for a given application.
1757.1.4	Identify the NEC® requirements for color coding of conductors.
1757.2	Identify and select proper conduit, boxes, and fittings.
1757.2.1	Explain how to select the appropriate conduit, boxes, and fittings.
1757.2.2	Use NEC Table 250.122 to size the equipment grounding conductor for raceways and equipment.
1757.3	Identify commonly used listed and labeled equipment.
1757.3.1	Identify and describe the most common equipment used in electrical work.

National Electrical Code (NEC)

1757.4	Explain NEC and how it is organized.
1757.4.1	Explain the purpose and history of the NEC®.
1757.4.2	Describe the layout of the NEC®.
1757.4.3	Discuss the role of the National Electrical Code® in residential wiring and describe how to determine electric service requirements for dwellings.
1757.4.4	Demonstrate how to navigate the NEC®.
1757.4.5	Describe the purpose of the National Electrical Manufacturers Association and the NFPA.
1757.4.6	Explain the role of nationally recognized testing laboratories.
1757.5	Explain procedures involved in NEC wiring methods, materials, and protection regulations.
1757.5.1	Identify the NEC® requirements for color coding of conductors.
1757.5.2	Apply the National Electrical Code® (NEC®) requirements for overcurrent devices.

1757.5.3	Describe general motor protection requirements as delineated in the National Electrical Code® (NEC®).

1757.6	Identify residential service entrance requirements.
1757.6.1	Identify and explain the requirements for basic electrical service entrance.
1757.6.2	Explain the role of the National Electrical Code® in residential wiring and describe how to determine electric service requirements for dwellings.
1757.6.3	Explain the grounding requirements of a residential electric service.
1757.6.4	Calculate and select service-entrance equipment.
1757.6.5	Select the proper wiring methods for various types of residences.
1757.6.6	Compute branch circuit loads and explain their installation requirements.
1757.6.7	Explain the types and purposes of equipment grounding conductors.
1757.6.8	Explain the purpose of ground fault circuit interrupters and tell where they must be installed.
1757.6.9	Describe rules for installing electric space heating and HVAC equipment.
1757.6.10	Describe the installation rules for electrical systems around swimming pools, spas, and hot tubs.
1757.6.11	Explain how wiring devices are selected and installed.
1757.6.12	Describe the installation and control of lighting fixtures.
1757.7	Properly apply NEC tables and charts.
1757.7.1	Discuss the types and applications of conductors and covers proper wiring techniques and appropriate NEC® requirements.
1757.7.2	Identify the NEC® requirements for color coding of conductors.
1757.8	Describe proper bonding and grounding methods.
1757.8.1	Describe the NEC® requirements and procedures for proper grounding and bonding.
1757.8.2	Explain the purpose of grounding and bonding and the scope of NEC Article 250.
1757.8.3	Distinguish between a short circuit and a ground fault.
1757.8.4	Define the National Electrical Code® requirements related to bonding and grounding.
1757.8.5	Distinguish between grounded systems and equipment grounding.
1757.8.6	Use NEC Table 250.66 to size the grounding electrode conductor for various AC systems.
1757.8.7	Explain the function of the grounding electrode system and determine the grounding electrodes.
1757.8.8	Define electrodes and explain the resistance requirements for electrodes using NEC Section 250.56.
1757.8.9	Use NEC Table 250.122 to determine the minimum size for equipment grounding conductors (EGC).
1757.8.10	Explain the function of the main and system bonding jumpers in the grounding system.
1757.8.11	Explain main and system bonding jumpers for various applications.
1757.8.12	Size the main bonding jumper for a service utilizing multiple service disconnecting means.
1757.8.13	Explain the importance of bonding equipment in clearing ground faults in a system.
1757.8.14	Explain the purposes of the grounded conductor (neutral) in the operation of overcurrent devices.

Wiring, Circuits, and Installation

1757.9	Select appropriate wiring for specific installations (residential and commercial).

1757.9.1	Explain how to select the proper wiring for specific applications.
1757.9.2	Demonstrate the ability to select the appropriate residential and commercial installations.

Construction Drawings

1757.10	Introduction to construction drawings
1757.10.1	Identify various types of construction drawings, including their fundamental components and features.
1757.10.2	Identify and describe the purpose of the five basic construction drawing components.
1757.10.3	Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.
1757.10.4	Explain the use of dimensions and various drawing scales.
1757.10.5	Identify and describe how to use engineer's and architect's scales.
1757.10.6	Identify the types and uses of construction drawings, information about the format and content of basic electrical construction drawings and their use in conveying specific construction requirements, and the standard format for specifications.
1757.10.7	Describe the information included in the title block of a construction drawing.
1757.10.8	Identify the types of lines used on construction drawings.
1757.10.9	Using an architect's scale, state the actual dimensions of a given drawing component.
1757.10.10	Interpret electrical drawings, including site plans, floor plans, and detail drawings.
1757.10.11	Interpret equipment schedules found on electrical drawings.
1757.10.12	Describe the type of information included in electrical specifications.

Meters, Measurements, and Testing

1757.11	Identify characteristics, uses, and connections of meters and measuring devices.
	Explain how to test control circuits.
1757.11.1	Explain the purpose and use of voltmeters, ohmmeters, clamp-on ammeters, multimeters, megohmmeters, and motor and phase rotation testers.
1757.11.2	Identify the safety hazards associated with the various types of test equipment.
1757.11.3	Describe the basic safety and category ratings.
1757.11.4	Explain the operations of and describe the ohmmeter.
1757.11.5	Explain the operations of and describe the clamp-on ammeter.
1757.11.6	Explain the operations of and describe the multimeter.
1757.11.7	Explain the operations of and describe the megohmmeter.
1757.11.8	Explain the operations of and describe the motor and phase rotation testers.
1757.11.9	Select the appropriate meter for a given work environment based on category ratings.
1757.12	Identify meter safety procedures.
1757.12.1	Identify the safety hazards associated with the various types of test equipment.
1757.12.2	Describe how to safely operate an ohmmeter.
1757.12.3	Describe how to safely operate a clamp-on ammeter.
1757.12.4	Describe how to safely operate a multimeter.

1757.12.5	Describe how to safely operate a megohmmeter.

Electrical Trades III will continue to build student skill sets in areas of Alternating Current; Motors: Theory and Application; Electric Lighting; and Conduit Bending. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Alternating Current

1758.1	Identify characteristics of AC circuits.
1758.1.1	Explain the principles of alternating current.
1758.1.2	Calculate the peak and effective voltage or current values for an AC waveform.
1758.1.3	Calculate the phase relationship between two AC waveforms.
1758.1.4	Describe the voltage and current phase relationship in a resistive AC circuit.
1758.1.5	Describe the voltage and current transients that occur in an inductive circuit.
1758.1.6	Define inductive reactance and state how it is affected by frequency.
1758.1.7	Describe the voltage and current transients that occur in a capacitive circuit.
1758.1.8	Define capacitive reactance and state how it is affected by frequency.
1758.1.9	Explain the relationship between voltage and current in an RL circuit.
1758.1.10	Explain the relationship between voltage and current in an RC circuit.
1758.1.11	Explain the relationship between voltage and current in an LC circuit.
1758.1.12	Explain the relationship between voltage and current in an RLC circuit.
1758.1.13	Explain true power as it relates to AC circuits.
1758.1.14	Explain apparent power as it relates to AC circuits.
1758.1.15	Explain reactive power as it relates to AC circuits.
1758.1.16	Explain power factor as it relates to AC circuits.
1758.1.17	Explain basic transformer action.

Motors: Theory and Application

1758.2	Describe characteristics of various types of motors.
1758.2.1	Describe the operation and applications of various types of motors and how motors are rated and covers motor enclosures and braking requirements.
1758.2.2	Explain the relationships among speed, frequency, and the number of poles in a three-phase induction motor.
1758.2.3	Define controller.
1758.2.4	Define duty cycle.

1758.2.5	Define full-load amps.
1758.2.6	Define interrupting rating.
1758.2.7	Define thermal protection.
1758.2.8	Define overcurrent.
1758.2.9	Define overload.
1758.2.10	Define power factor.
1758.2.11	Define rated full-load speed.
1758.2.12	Define rated horsepower.
1758.2.13	Define service factor.
1758.2.14	Describe the various types of motor enclosures.
1758.2.15	Explain the relationships among speed, frequency, and the number of poles in a three-phase induction motor.
1758.2.16	Define percent slip and speed regulation.
1758.2.17	Describe the component parts and operating characteristics of a three-phase synchronous motor.
1758.2.18	Describe the design and operating characteristics of various DC motors.
1758.2.19	Describe general motor protection requirements as delineated in the National Electrical Code® (NEC®).
1758.2.20	Define the braking requirements for AC and DC motors.
1758.2.21	describe the component parts and operating characteristics of a three-phase wound-rotor induction motor.
1758.3	Identify and connect motor connections per nameplate (Delta/Wye and single-phase).
1758.3.1	Explain how motors are rated.
1758.3.2	Define NEMA design letter.
1758.4	Test, troubleshoot, and reverse motor rotation.
1758.4.1	Explain how the direction of a three-phase motor is changed.
1758.4.2	Describe how to test an electric motor.
1758.5	Select short-circuit and overload protection for specific applications.
1758.5.1	Describe short circuit and overload protections and their specific applications.
1758.5.2	Explain how to select the appropriate short circuit and overload protection.
1758.6	Identify and interpret motor nameplate information (e.g., voltage and phases).
1758.6.1	Explain how to read and interpret the information on a NEMA motor nameplate.

Electric Lighting

1754.7	Identify the methods and procedures used in the handling and installation of types of lamps and lighting fixtures.
1754.7.1	Describe the characteristics of light.
1754.7.2	Recognize and explain the advantages and disadvantages of incandescent lamps.
1754.7.3	Recognize and explain the advantages and disadvantages of halogen lamps.
1754.7.4	Recognize and explain the advantages and disadvantages of fluorescent lamps.
1754.7.5	Recognize and explain the advantages and disadvantages of high-intensity discharge (HID) lamps.
1754.7.6	Properly select and install various lamps in lighting fixtures.

1754.7.7	Recognize and describe the installation requirements for surface-mounted lighting fixtures.
1754.7.8	Recognize and describe the installation requirements for recessed lighting fixtures.
1754.7.9	Recognize and describe the installation requirements for suspended lighting fixtures.
1754.7.10	Recognize and describe the installation requirements for track-mounted lighting fixtures.
1754.7.11	Recognize ballasts and describe their use in fluorescent and HID lighting fixtures.
1754.7.12	Explain the relationship of Kelvin temperature to the color of light produced by a lamp.
1754.7.13	Recognize basic occupancy sensors, photoelectric sensors, and timers used to control lighting circuits and describe how each device operates.

Conduit Bending

1758.8	Identify how to bend and thread and install Conduit.
1758.8.1	Identify the methods for hand bending and installing conduit.
1758.8.2	Demonstrate the methods and procedures used in conduit bending.
1758.8.3	Determine conduit bends.
1758.8.4	Demonstrate how to make 90° bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.
1758.8.5	Demonstrate how to cut, ream, and thread conduit.
1758.9	Identify the function and purpose of various specialty equipment, including Ground Fault Circuit Interrupter (GFCI), Arc-Fault Circuit Interrupter (AFCI), Tamper-Resistant, and Transient Voltage Surge Suppressor (TVSS).
1758.9.1	Explain the purpose of grounding and bonding and the scope of NEC Article 250.
1758.9.2	Explain the purposes of the grounded conductor (neutral) in the operation of overcurrent devices.
1758.9.3	Apply the National Electrical Code® (NEC®) requirements for overcurrent devices.
1758.9.4	Describe the operation of a circuit breaker.
1758.9.5	Explain the purpose and function of a Ground Fault Circuit Interrupter (GFCI).
1758.9.6	Explain the function and purpose of an Arc-Fault Circuit Interrupter (AFCI).
1758.9.7	Describe the function and purpose of a Tamper-Resistant, and Transient Voltage Surge Suppressor (TVSS).
1758.10	Explain capacitance, inductance, impedance, current, voltage, and resistance.
1758.10.1	Define capacitive reactance and state how it is affected by frequency.
1758.10.2	Describe the voltage and current transients that occur in an inductive circuit.
1758.10.3	Explain the principles of alternating current.
1758.10.4	Describe the voltage and current phase relationship in a resistive AC circuit.
1758.10.5	Define what is meant by electrical impedance.
1758.11	Identify characteristics and components of DC circuits.
1758.11.1	Define the following terms: voltage, current, resistance and power.
1758.11.2	Measure voltage, current and resistance using industry standard electrical measuring devices.
1758.11.3	Analyze and explain series, parallel, and series parallel (combination) circuits.
1758.11.4	Draw each type of circuit and calculate the circuit values.
1758.11.5	Explain and apply Ohm's Law.
1758.11.6	Compute conductance and resistance of conductors.

Circuit Theorems and Conversions

1758.12	Interpret Meter Readings.
1758.12.1	Explain the purpose and use of voltmeters, ohmmeters, clamp-on ammeters, multimeters, megohmmeters, and motor and phase rotation testers.
1758.12.2	Explain the operations of and describe the voltmeter.
1758.12.3	Explain the operations of and describe the ohmmeter
1758.12.4	Explain the operations of and describe the clamp-on ammeter
1758.12.5	Explain the operations of and describe the multimeter
1758.12.6	Explain the operations of and describe the megohmmeter
1758.12.7	Explain the operations of and describe the motor and phase rotation testers

Code of Conduct

1758.13	Simulated Workplace Manual.
1758.13.1	Demonstrate knowledge and complete understanding of Simulated Workplace practices.

Apprenticeship Awareness

1758.14	Unions working with Contractors in Construction Trades.
1758.14.1	Construction Trade Unions in West Virginia with Apprenticeship programs.
1758.14.2	Apprenticeship opportunities in Construction trades.
1758.14.3	Applying for Apprenticeship in the Construction Trades.
1758.14.4	Pre-Job Training
1758.14.5	Working with your Supervisor and others.
1758.14.6	Harassment and Discrimination.
1758.14.7	Qualities of a Successful Apprentice
1758.14.8	Common Interview Questions.
1758.14.9	Interviewing tips for Construction Apprenticeships.
1758.14.10	Interviewing for Apprenticeships in Construction.

Electrical Trades IV will continue to build student skill sets in areas of Pull and Junction Boxes; Conductor Installations; Cable Tray; Conductor Terminations and Splices; Grounding and Bonding; Circuit Breakers and Fuses; and Control Systems and Fundamental Concepts. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Device Boxes

1759.1	Select Pull Boxes and Junction Boxes
1759.1.1	Demonstrate how to select and size outlet boxes, pull boxes, and junction boxes pursuant to NEC® requirements.
1759.1.2	Describe the different types of nonmetallic and metallic boxes.
1759.1.3	Calculate the NEC® fill requirements for boxes under 100 cubic inches.
1759.1.4	Identify the appropriate box type and size for a given application.
1759.1.5	Select and demonstrate the appropriate method for mounting a given box.

Grounding and Bonding

1759.2	Describe proper bonding and grounding methods
1759.2.1	Explain the purpose of grounding and bonding and the scope of NEC Article 250.
1759.2.2	Define the National Electrical Code® requirements related to bonding and grounding.
1759.2.3	Distinguish between grounded systems and equipment grounding.
1759.2.4	Use NEC Table 250.66 to size the grounding electrode conductor for various AC systems.
1759.2.5	Use NEC Table 250.122 to size the equipment grounding conductor for raceways and equipment.
1759.2.6	Explain the function of the main and system bonding jumpers in the grounding system.
1759.2.7	Size the main bonding jumper for a service utilizing multiple service disconnecting means.
1759.2.8	Explain the importance of bonding equipment in clearing ground faults in a system.
1759.2.9	Explain the purposes of the grounded conductor (neutral) in the operation of overcurrent devices.
1759.2.10	Define electrodes and explain the resistance requirements for electrodes using NEC Section 250.56.

Control Systems and Fundamental Concepts

1759.3	Select appropriate wiring for specific installations.
1759.3.1	Demonstrate understanding of the NEC® requirements and procedures used in the selection and installation of contactors and relays.
1759.3.2	Select contactors and relays for use in specific electrical systems.
1759.3.3	Read and interpret wiring diagrams involving contactors and relays.

1759.3.4	Describe the operating principles of contactors and relays.
1759.3.5	Explain how mechanical contactors operate.
1759.3.6	Explain how solid-state contactors operate.
1759.3.7	Install contactors and relays according to the NEC® requirements.
1759.3.8	Select and install contactors and relays for lighting control.
1759.3.9	Describe how overload relays operate.
1759.3.10	Connect a simple control circuit.
1759.3.11	Test control circuits.
1759.4	Install Circuit Breakers and Fuses
1759.4.1	Describe the methods and procedures used in the selection and installation of circuit breakers and fuses.
1759.4.2	Explain the necessity of overcurrent protection devices in electrical circuits.
1759.4.3	Define the terms associated with fuses and circuit breakers.
1759.4.4	Describe the operation of a circuit breaker.
1759.4.5	Apply the National Electrical Code® (NEC®) requirements for overcurrent devices.
1759.4.6	Describe the operation of single-element and time delay fuses.

Raceways and Fittings

1759.5	Install cabling, raceways, conduit, boxes, wiring, devices, and trims.
1759.5.1	Explain the requirements of the National Electrical Code® (NEC®) for bending conduit.
1759.5.2	Methods and procedures used in conduit bending.
1759.5.3	Describe the process of conduit bending using power tools.
1759.5.4	Identify all parts of electric and hydraulic benders.
1759.5.5	Compute the radius, degrees in bend, developed length, and gain for conduit up to six inches.
1759.5.6	Demonstrate the ability to install conduit and wiring.

Basic Employability Skills

1759.6	Explore Basic Employability Skills
1759.6.1	Describe the construction business and the opportunities offered by the trades.
1759.6.2	Explain how workers can enter the construction workforce.
1759.6.3	Describe critical thinking and barriers to solving problems.
1759.6.4	Describe how to solve problems using critical thinking.
1759.6.5	Describe problems related to planning and scheduling.
1759.6.6	Identify good personal and social skills.
1759.6.7	Explain how to resolve conflicts with co-workers and supervisors.
1759.6.8	Explain how to give and receive constructive criticism.
1759.6.9	Identify and describe various social issues of concern in the workplace.
1759.6.10	Describe how to work in a team environment and how to be an effective leader.

This course introduces the student to the knowledge base and technical skills regarding blueprint reading for electricians. Areas of study include building plans and specifications, blueprint, and schematic reading. Emphasis will be placed on career exploration, job-seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and 1762.s. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Building Plans and Specifications for Electrical Installations

1762.1	Interpret Building Plans and Specifications for Electrical Installations.
1762.1.1	Demonstrate ability to interpret building plans, specifications, symbols, and notations.
1762.1.2	Differentiate between the six major plan groups consisting of civil, architectural, structural, mechanical, plumbing, and electrical.
1762.1.3	Analyze the purpose and functions of symbols and notations used within electrical drawings.

Blueprint Reading for Electrical Installations

1762.2	Read and interpret Electrical Installation Blueprints.
1762.2.1	Electrical projects and electrical blueprints.
1762.2.2	Identify basic electrical blueprint components, symbols, and applications.
1762.2.3	Classify drawings as pictorial, schematic, or ladder.
1762.2.4	Interpret and apply drawing dimensions in completing electrical projects.
1762.2.5	Compare components shown on a plan to the corresponding schedule.
1762.2.6	Evaluate electrical blueprint specifications.
1762.2.7	Perform take-offs and estimate material costs.

Schematic Reading for Electrical Installations

1762.3	Read and interpret Electrical Installation schematics.
1762.3.1	Interpret electrical project schematics.
1762.3.2	Identify various parts and components using schematic drawings.
1762.3.3	List and schematically represent the components that make up a basic electrical circuit.
1762.3.4	Demonstrate proper flow sequence in reading a block or ladder diagram.
1762.3.5	Construct and analyze a basic electrical circuit using a schematic diagram.

This course introduces the student to the knowledge base and technical skills for Fundamentals of Electricity. Areas of study include electrical safety, electrical math concepts, and basic circuits. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Electrical Safety

1763.1	Electrical Safety
1763.1.1	Basic electrical safety.
1763.1.2	Describe the effect of current on a human body.
1763.1.3	Explain what to do for victims of electrical shock.
1763.1.4	Describe typical shock hazards in industry.
1763.1.5	Identify various types of safety devices used with electricity.
1763.1.6	List general safety precautions when working with electricity.
1763.1.7	List and describe the safe use of basic hand tools and power tools used in the field of electricity.
1763.1.8	Demonstrate and use properly an ammeter, ohmmeter, and a voltmeter.
1763.1.9	Explain the difference between power and control circuits.
1763.1.10	Define electric charge and electric current.
1763.1.11	Differentiate between insulators, conductors, and semi-conductors.
1763.1.12	Define current, voltage, and resistance.
1763.1.13	Explain the theory of ohm's law.
1763.1.14	Utilize a multi-meter.
1763.1.15	Describe the law of magnetism.
1763.1.16	List the steps to fill out a lock-out tag.

Electrical Math Concepts

1763.2	Electrical Math Concepts
1763.2.1	Accurate measurement practices.
1763.2.2	Algebraic computations.
1763.2.3	Critical thinking skills.
1763.2.4	Demonstrate the use of English and Metric measurement.
1763.2.5	Perform mathematical computations as they relate to electrical control activities.
1763.2.6	Interpret various charts, graphs, and drawings.
1763.2.7	Generate ideas and design solutions to problems.
1763.2.8	Explain the theory of Ohm's law.
1763.2.9	List basic terms, components, and symbols.
1763.2.10	Demonstrate the basic needs and usages of blueprint specifications.
1763.2.11	Utilize a multi-meter.

Basic Circuits

1763.3	Basic Circuits
1763.3.1	Basic electrical circuitry.
1763.3.2	Constructing, troubleshooting, and recording the readings of a circuit.
1763.3.3	Select proper settings and ranges, interpret values indicated on digital multimeters (DMM).
1763.3.4	Differentiate between alternating current and direct current and identify common applications for each.
1763.3.5	Explain the difference between conductors and insulators.
1763.3.6	Explain the difference between digital and analog meters.
1763.3.7	Explain how voltage, current, and resistance are related to each other.
1763.3.8	Calculate electrical values in series and parallel circuits.
1763.3.9	Apply solderless terminals and wire nuts.
1763.3.10	Properly remove insulation and make pigtail and device terminations.
1763.3.11	Exhibit the ability to safely and correctly use electrical instruments to measure voltage and resistance.
1763.3.12	Measure velocity, horsepower, revolutions per minute (rpm), amperage, circuitry, and voltage in units or parts to diagnose problems, using ammeters, voltmeters, wattmeters, and other testing devices.
1763.3.13	Find the total amount of resistance in a series, parallel, and s series parallel circuit.
1763.3.14	Calculate, using Kirchoff's Voltage Law, the voltage drop in series, parallel, and s series-parallel circuit.
1763.3.15	Test faulty equipment to diagnose malfunctions using test equipment or software.

This course introduces the student to the knowledge base and technical skills for industrial and commercial wiring. Areas of study include conduit and raceways, and commercial load calculations and configurations. Emphasis will be placed on career exploration, job-seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Conduit and Raceways

1765.1	Install Conduit and Raceways.
1765.1.1	Demonstrate understanding of National Electrical Code (NEC) requirements for raceways systems and conduit bending.
1765.1.2	List NEC requirements for the installation and construction of various conduit and raceway systems.
1765.1.3	Plan layout and installation of electrical wiring, equipment, or fixtures, based on job specifications and local codes.
1765.1.4	Place conduit, pipes, or tubing inside designated partitions, walls, or other concealed areas, and pull insulated wires/cables through the conduit to complete circuits between boxes.

Commercial Load Calculations and Configurations

1765.2	Perform Commercial Load Calculations.
1765.2.1	Calculate commercial loads using NEC single-phase and three-phase transformers, delta, and wye configurations.
1765.2.2	Calculate the following: window loads, lighting loads, luminary loads, receptacle loads, and general lighting loads.
1765.2.3	Inspect electrical connections, wiring, relays, charging resistance boxes, and storage batteries, following wiring diagrams.
1765.2.4	Connect wires to circuit breakers and transformers.
1765.2.5	Identify safety precautions when working with transformers.
1765.2.6	Compare various types of transformer connections.
1765.2.7	Terminate dual-voltage transformers for high- and low-voltage operations.
1765.2.8	Inspect electrical systems, equipment, or components to identify hazards, defects, or the need to adjust or repair.

This course introduces the student to the knowledge base and technical skills for concepts in the Integrated Electrical Lab. Areas of study include electrical installation project rough-in procedure, test and check circuits, and termination and trim-out. Emphasis will be placed on career exploration, job-seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Electrical Installation

1766.1	Complete Electrical Installation Projects.
1766.1.1	Demonstrate ability to complete an electrical installation project.
1766.1.2	Lay out an electrical floor plan.
1766.1.3	Calculate the minimum number and type of branch circuits required.
1766.1.4	Evaluate the plans to make certain that all codes and specifications are met.

Rough-In Procedure

1766.2	Perform Rough-in Procedure.
1766.2.1	Perform rough-in procedures.
1766.2.2	Explain the sequential order in rough-in installation.
1766.2.3	Complete installation according to the floor plan.

Testing Electrical Circuits

1766.3	Test and Check Circuits.
1766.3.1	Demonstrate the ability to test and check electrical circuits.
1766.3.2	Demonstrate proper use and application of electrical test equipment.
1766.3.3	Verify that the electrical rough-in is done in a workmanlike manner.

Terminate and Trim-Out

1766.4	Terminate and Trim-Out.
1766.4.1	Demonstrate ability to terminate and trim-out projects.
1766.4.2	Verify the conductor length is maintained in all boxes for termination.
1766.4.3	Conclude that conductors are electrically and mechanically secure.
1766.4.4	Install devices and luminaries.
1766.4.5	Install faceplates, covers, and panel fronts.
1766.4.6	Diagnose a project.

This course introduces the student to the knowledge base and technical skills for the National Electrical Code (NEC). Areas of study include demonstrating skills in the use of the NEC and applying calculations to ensure NEC standards are met. Emphasis will be placed on career exploration, job-seeking skills, and personal and professional ethics.

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NEC Book Configurations

1767.1	NEC Book Configurations.
1767.1.1	Reading and navigating the NEC.
1767.1.2	Explain the history and the purpose of the Code.
1767.1.3	Explain the chapter layout of the NEC.
1767.1.4	List installations that the NEC covers and those not covered.
1767.1.5	List the sequence of organizational components of the NEC.
1767.1.6	List the steps for finding information in the NEC>

NEC Calculations

1767.2	NEC Calculations.
1767.2.1	Use math skills to solve NEC calculations to NEC standards.
1767.2.2	Determine conductor size and ampacity, overcurrent protection, grounding, bonding, and grounded conductor size.
1767.2.3	Determine the steps for calculating service entrance for a single-family dwelling unit.
1767.2.4	Determine the steps for calculating service entrance for a commercial building.
1767.2.5	Determine box fill.

This course introduces the student to the knowledge base and technical skills for residential wiring. Areas of study include wiring data, service entrance equipment, luminary and receptacle outlets, protective devices, appliance and special circuits, and low-voltage systems. Emphasis will be placed on career exploration job-seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

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Wiring Data.

1769.1	Identify and understand wiring Data.
1769.1.1	Read and interpret floor plans.
1769.1.2	Design an electrical layout of a floor plan.
1769.1.3	Validate the floor plan to meet minimum National Electrical Code (NEC) specifications.

Service Entrance Equipment

1769.2	Install Service Entrance Equipment.
1769.2.1	Demonstrate ability to install service entrance equipment.
1769.2.2	List and install the components of a service entrance.
1769.2.3	Determine the clearances for service drop per NEC regulations.
1769.2.4	Explain installations of the underground (lateral) service entrance.

Luminaries and Receptacle Outlets

1769.3	Demonstrate understanding of Luminaries and Receptacle Outlets.
1769.3.1	Identify the components in a circuit.
1769.3.2	Install luminaries, switches, and receptacles.
1769.3.3	Troubleshoot luminaries, switches, and receptacles.

Protective Devices

1769.4	Identify and understand the operations of Protective Devices.
1769.4.1	Explain the function of protective devices and the application of protective devices in a circuit.
1769.4.2	Explain the differences between overload, overcurrent, and short circuit.
1769.4.3	Install ground fault circuit interrupter and arc circuit interrupter breakers and receptacles.
1769.4.4	Describe the operations of fuses and circuit breakers.

Appliance and Special Circuits

1769.5	Identify and install Appliances and Special Circuits.
1769.5.1	Identify the NEC requirements for installing various appliances.
1769.5.2	Outline NEC requirements for appliances and special circuits.
1769.5.3	Install baseboard and wall-mounted heating units with controls.
1769.5.4	Install various fans.
1769.5.5	Install various appliances.

Low-Voltage Systems

1769.6	Identify and install Low-Voltage Systems
1769.6.1	Define low-voltage systems.
1769.6.2	Install and troubleshoot doorbells and chime systems.
1769.6.3	Install low-voltage thermostats for heat controls.
1769.6.4	Install and/or explain low-voltage landscape lighting systems.

This course introduces the student to the knowledge base and technical skills for concepts in rotating devices and control circuitry. Areas of study include control circuitry and motor controls. Emphasis will be placed on career exploration, job-seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

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Control Circuitry

1771.1	Demonstrate understanding of Control Circuitry.
1771.1.1	Interpret wiring diagrams to construct motor control circuits.
1771.1.2	Identify electrical symbols and interpret electrical diagrams.
1771.1.3	Demonstrate ability to properly connect common types of motors.
1771.1.4	Study blueprints, schematics, manuals, or other specifications to determine installation procedures.
1771.1.5	Identify and use common electrical symbols on wiring diagrams.
1771.1.6	Differentiate between power and control circuits on electrical diagrams.
1771.1.7	Remove and replace defective parts such as coil leads, carbon brushes, and wires using soldering equipment.
1771.1.8	Rewire electrical systems and repair/replace electrical accessories.

Motor Controls

1771.2	Demonstrate understanding of Motor Controls.
1771.2.1	Identify relays and starters
1771.2.2	Identify and understand automatic circuits.
1771.2.3	Identify and compare alternating current (AC) and direct current (DC) motors.
1771.2.4	Explain the difference between manual and automatic circuits.
1771.2.5	Identify the equipment and parts needed for automatic circuits.
1771.2.6	Differentiate between power and control circuits on electrical diagrams.
1771.2.7	Explain the operation of basic control circuits.
1771.2.8	List and identify motor and motor control symbols.
1771.2.9	Explain the purpose and uses of pilot devices.
1771.2.10	Install various types of electronic and mechanical sensors and pilot devices.
1771.2.11	Design and explain counter circuits.
1771.2.12	Construct basic AC and DC circuits for manual and automatic controls.
1771.2.13	Install jogging, plugging, and reversing circuits.
1771.2.14	Design and explain relays and relay circuits.
1771.2.15	Install overload relays in control circuits.
1771.2.16	Explain the difference between relay and magnetic starters.
1771.2.17	Adjust various types of time delay relays.
1771.2.18	Install, test, and troubleshoot various types of single-phase and three-phase motors in a circuit.
1771.2.19	Use a phase rotation meter.

This course introduces the student to the knowledge base and technical skills of the Building Maintenance and Operations industry. The students will complete modules in Basic Safety; Introduction to Construction Math; Introduction to Hand Tools; Introduction to Power Tools; Introduction to Construction Drawings; Basic Rigging; Basic Communication Skills; Basic Employability Skills; and Introduction to Materials Handling.

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Code of Conduct

1774.1	Simulated Workplace Manual.
1774.1.1	Demonstrate understanding of Simulated Workplace policies and procedures.

Safety

1774.2	Use Tools and Equipment Safely.
1774.2.1	Explain the importance of safety, the causes of workplace incidents, and the process of hazard recognition and control.
1774.2.2	Explain the purpose of OSHA and how it promotes safety on the job.
1774.2.3	Explain the safe work requirements for elevated work, including fall protection guidelines.
1774.2.4	Identify and describe the safe use of ladders and stairs.
1774.2.5	Identify and describe the safe use of scaffolds.
1774.2.6	Describe how to avoid struck-by and caught-in-between hazards.
1774.2.7	Describe the common energy-related hazards and explain how to avoid them.
1774.2.8	Describe and demonstrate the proper use of personal protective equipment (PPE) to prevent bodily injury.
1774.2.9	Describe basic job-site electrical safety guidelines.
1774.2.10	Explain the importance of lockout/tagout and describe basic procedures.
1774.2.11	Identify potential respiratory hazards and the basic respirators used to protect workers against those hazards.
1774.2.12	Identify various exposure hazards commonly found on job sites.
1774.2.13	Identify hazards associated with environmental extremes.
1774.2.14	Identify hazards associated with hot work.
1774.2.15	Identify fire hazards and describe basic firefighting procedures.
1774.2.16	Identify and describe the power tools commonly used by carpenters.
1774.2.17	Explain how to safely use various types of hand tools.
1774.2.18	Demonstrate how to safely use other common hand tools.
1774.2.19	Identify and demonstrate how to safely use miscellaneous power tools.
1774.2.20	Identify and describe the basic use of PPE used to protect workers from bodily injury.
1774.2.21	Discuss other specific job-site safety hazards.
1774.3	Demonstrate Electrical Safety.
1774.3.1	Demonstrate understanding of the basic safety rules and regulations for electricians, including the necessary precautions for avoiding various job site hazards.
1774.3.2	Describe basic job-site electrical safety guidelines.

1774.3.3	Identify and describe the proper PPE required when working with electricity.
1774.3.4	Identify electrical hazards and how to avoid or minimize them in the workplace.
1774.3.5	Explain the role of the National Electrical Code® in residential wiring and describe how to determine electric service requirements for dwellings.
1774.3.6	Explain the grounding requirements of a residential electric service.
1774.3.7	Explain the types and purposes of equipment grounding conductors.
1774.3.8	Explain the purpose of ground fault circuit interrupters and tell where they must be installed.
1774.3.9	Describe the installation rules for electrical systems around swimming pools, spas, and hot tubs.
1774.3.10	Explain how wiring devices are selected and installed.
1774.3.11	Describe the installation and control of lighting fixtures.
1774.4	Respond to Emergency situations (e.g., First Aid).
1774.4.1	Demonstrate knowledge of basic safety procedures.
1774.4.2	Recognize and discuss the main causes of accidents.
1774.4.3	Discuss the research agencies that are responsible for emergencies in the workplace.
1774.4.4	Develop a plan which outlines the procedures for handling an accident.
1774.4.5	Establish procedures for safe evacuation of the worksite in the event of an emergency.
1774.4.6	Follow all safety procedures and wear PPE as required for specified task.
1774.4.7	Demonstrate knowledge of First Aid procedures.
1774.5	Demonstrate safe use of chemicals and hazardous materials (e.g., SDS, OSHA).
1774.5.1	Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).
1774.5.2	Understand hazards associated with chemicals in the work area.
1774.5.3	Identify measures to protect from hazards associated with chemicals in the work area
1774.6	Use (PPE) Personal Protective Equipment.
1774.6.1	Identify the basic PPE used to protect workers from bodily injury.
1774.6.2	Describe and demonstrate the proper use of essential PPE to protect workers from bodily injury.
1774.6.3	Wear appropriate PPE as required for specified task.

Tools and Materials

1774.7	Select tools appropriate for task.
1774.7.1	Identify and describe the hand tools commonly used in industry.
1774.7.2	Identify and describe the power tools commonly used in industry.
1774.7.3	Demonstrate the ability to select the proper tool for each job.
1774.8	Demonstrate appropriate care of tools.
1774.8.1	Identify and describe the power tools commonly used in industry.
1774.8.2	Describe the general safe use and maintenance of power tools.
1774.9	Read instruments and measuring devices.
1774.9.1	Identify and demonstrate how to use measuring tapes.
1774.9.2	Identify and explain how to use rules and other measuring tools
1774.9.3	Explain how to use various types of measurement and layout tools
1774.10	Select Hardware, Fasteners, and Adhesives.
1774.10.1	Demonstrate knowledge of various hardware, fasteners, and adhesives.
1774.10.2	Explain how to select the appropriate hardware or fastener to use for a job.
1774.11	Estimate and order materials.
1774.11.1	Demonstrate accuracy in calculating and measuring graphical work required to complete career/technical assignments and projects.

1774.11.2	Demonstrate the ability to interpret plans and drawings and accurately estimate the quantity of materials needed to complete a project.

Masonry

1774.12	Form and place concrete.
1774.12.1	Categorize basic layout using levels and measuring tools.
1774.12.2	Summarize various reinforcements and how to place them.
1774.12.3	Evaluate information needed when ordering concrete.
1774.12.4	Explain the process of depositing, spreading, consolidating, and striking of concrete in a form.
1774.12.5	Explain the tools and equipment used for placing and finishing concrete.
1774.12.6	Identify various concrete forming systems and their components
1774.12.13	Demonstrate the ability to pour and finish concrete.
1774.13	Lay and Repair Bricks and Blocks
1774.13.1	Demonstrate understanding of modern masonry materials and techniques.
1774.13.2	Describe personal protective equipment used in masonry.
1774.13.3	Describe the basic safety precautions when working with masonry materials.
1774.13.4	Display the skills, attitudes, and abilities needed to be a successful mason.
1774.13.5	Explain how stone is used in construction.
1774.13.6	Describe how wall structures are created using masonry units.
1774.13.7	Describe and demonstrate how to install concrete masonry units.
1774.13.8	Describe and demonstrate how to install masonry reinforcement and accessories.
1774.13.9	Identify the characteristics of concrete masonry units.
1774.13.10	Explain how to set up, lay out, and bond concrete masonry units.
1774.13.11	Explain how to lay and tool concrete masonry units.
1774.13.12	Explain how to clean concrete masonry units.
1774.13.13	Describe the various types of concrete and interlocking pavers.
1774.13.14	Identify the characteristics of brick.
1774.13.15	Explain how to set up, lay out, and bond brick.
1774.13.16	Explain how to lay and tool brick.
1774.13.17	Explain how to clean brick.
1774.13.8	Explain how to cut brick with chisels and hammers.
1774.14	Install ceramic floor and wall tiles.
1774.14.1	Describe how to properly cut and fit ceramic tiles.
1774.15.2	Demonstrate how to properly install floor and wall tiles.
1774.16.3	Describe the process for cutting and shaping ceramic tiles.
1774.15	Install moisture barriers
1774.15.1	Explain the concept of heat transfer.
1774.15.2	Describe the need for moisture control in various types of masonry construction, and the techniques used to eliminate moisture problems.
1774.15.3	Identify the purpose and installation procedures for flashing.
1774.15.4	Explain the purpose of and installation procedures for weep vents.
1774.15.5	Explain the purpose of underlayment and waterproof membrane.
1774.15.6	Demonstrate the process of installing a moisture barrier.

Building Maintenance and Operations II will continue to build student skill sets in areas such as Handling and Placing Concrete; Introduction to Masonry; and Masonry Units and Installation Techniques. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts.

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Carpentry

1775.1	Identify and install rough carpentry including sub-flooring and framing.
1775.1.1	Discuss the different grades of lumber available.
1775.1.2	Explain how plywood is manufactured and cite common applications for plywood in construction.
1775.1.3	Identify the different types of framing systems.
1775.1.4	Describe the construction methods for floor systems and identify floor system materials.
1775.1.5	Describe the different floor system components.
1775.1.6	Define sill plate and describe its role in floor framing.
1775.1.7	Explain how to lay out sill plates and girders for floor joists.
1775.1.8	Identify the components of a wall system.
1775.1.9	Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and fire-stops.
1775.1.10	List the four steps involved in erecting a wall.
1775.1.11	Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and fire-stops.
1775.1.12	Explain the correct procedure to estimate the materials required to frame walls.
1775.1.13	Describe the correct procedure to assemble, erect, and brace exterior walls for a frame building.
1775.1.14	Discuss the components of a wall system.
1775.1.15	Explain the correct procedure to assemble, erect, and brace exterior walls for a frame building.
1775.1.16	List the four steps involved in erecting a wall.
1775.1.17	Explain the components of ceiling framing.
1775.2	Identify and install appropriate interior finish carpentry, including insulation, drywall, trim work, and cabinetry.
1775.2.1	Identify the various types of hardwoods and softwoods used in construction projects.
1775.2.2	Explain the process of installing drywall.
1775.2.3	List the different types of insulation and how they are installed.
1775.2.4	Discuss the types of wood commonly used to construct cabinets.
1775.2.5	Demonstrate knowledge of joints and other construction features of cabinet components and their related hardware and fasteners.
1775.2.6	Explain the process of assembling, sanding, and finishing cabinets.
1775.2.7	Explain how to prepare and apply laminate to a countertop.

1775.2.8	Identify the various types of insulation and their characteristics.
1775.2.9	Describe the various installation methods for insulation.
1775.2.10	Components of a drywall assembly.
1775.2.11	Identify drywall fasteners and list their uses.
1775.2.12	Identify drywall accessories and state their applications.
1775.2.13	List the tools used for drywall application.
1775.2.14	Describe the procedure for drywall construction.
1775.2.15	Identify the hand tools used in drywall finishing.
1775.2.16	Describe the process for finishing drywall.
1775.2.17	Identify common problems when finishing drywall.
1775.2.18	Describe how to estimate window, door, floor, and ceiling trim.
1775.2.19	Identify the various ceiling trim tools.
1775.2.20	Identify tool and equipment safety guidelines when working with window, door, floor, and ceiling trim.
1775.2.21	Identify the different types of base moldings.
1775.2.22	Identify the different types of wall moldings.
1775.2.23	Identify the different types of ceiling moldings.
1775.2.24	Identify the different types of window trim and door trim.
1775.2.25	Explain how to properly cut trim.
1775.2.26	Explain how to properly fasten trim.
1775.2.27	Explain how to properly install base molding.
1775.2.28	Explain how to properly install door trim.
1775.2.29	Explain how to properly install window trim.
1775.2.30	The types of wood commonly used to construct cabinets.
1775.2.31	Identify and describe the safe use of jointers, planers, shapers, and routers.
1775.2.32	Identify and describe the safe use of sanders, drill presses, and brad guns.
1775.2.33	Identify different types of cabinets, including wall and base cabinets.
1775.2.34	Recognize cabinet components, hardware, and their purpose.
1775.2.35	Describe countertops and surface preparation for cabinet installation.
1775.2.36	Explain the installation of wall cabinets, base cabinets, and countertops.
1775.3	Identify and install exterior finish carpentry, including siding, decking, and porches.
1775.3.1	Identify safety hazards that are present when working at elevations.
1775.3.2	Identify the different types of wood siding.
1775.3.3	Describe surface preparation that must be performed prior to installing exterior finish materials.
1775.3.4	Identify various types of fixed, sliding, and swinging windows.
1775.3.5	Describe the estimating procedure for exterior finish projects.
1775.3.7	Describe the process for constructing residential decks and porches.
1775.3.8	Describe the various types and applications of exterior finish materials.
1775.3.9	Identify the types of wood siding.
1775.3.10	Identify vinyl and metal siding materials and components.
1775.3.11	List applications for fiber-cement siding.

1775.3.12	Discuss the types of veneer finishes.
1775.3.13	List specialty exterior finishes.
1775.3.14	Explain the purpose of flashing.
1775.4	Read and interpret drawings.
1775.4.1	Identify various types of construction drawings
1775.4.2	Identify and describe the purpose of the five basic construction drawing compounds.
1775.4.3	Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.
1775.4.4	Identify and explain the use of dimensions and various drawing scales.
1775.4.5	Identify and describe how to use engineers and architect's scales.
1775.5	Identify and install exterior rough carpentry and coverings (e.g., roof coverings, cornices, sheathings).
1775.5.1	Identify potential hazards when working on roofs.
1775.5.2	Identify the hand tools used when working on roofing projects.
1775.5.3	Identify the power tools used when working on roofing projects.
1775.5.4	Identify fasteners used on roofing projects.
1775.5.5	Identify composition shingles and their applications.
1775.5.6	Identify roll-roofing applications.
1775.5.7	Identify wood shakes and shingles and their applications.
1775.5.8	Identify tile/slate roofing materials and their applications.
1775.5.9	Identify metal roofing and its applications.
1775.5.10	Identify built-up roofing and its applications.
1775.5.11	Identify single-ply roofing and its applications.
1775.5.12	Explain the purpose of underlayment and waterproof membrane.
1775.5.13	Discuss the purpose of drip edge, flashing, and roof ventilation.
1775.5.14	Describe how to properly prepare a roof deck.
1775.5.15	Explain how to install composition shingles.
1775.5.16	Explain how to install metal roofing.
1775.5.17	Describe how to install roll roofing.
1775.5.18	Discuss roof projections, flashing, and ventilation.
1775.5.19	Describe the safety hazards when working with exterior finish materials.
1775.5.20	Describe surface preparation that must be performed prior to installing exterior finish materials.
1775.5.21	Explain how to install cornices.
1775.5.22	Describe how to install wood siding.
1775.5.23	Describe how to install vinyl and metal siding.
1775.5.24	Describe how to install fiber-cement siding.
1775.5.25	Explain how to install sheathing.
1775.5.26	Discuss the types of furring and insulation that might be applied to exterior walls.
1775.5.27	Explain how to establish a straight reference line.
1775.5.28	Explain how to install cornices.

Paint and Wall Covering

1775.6	Demonstrate knowledge of cleaning and surface preparation.
1775.6.1	Explain how to prepare a surface for paint or stain.
1775.6.2	Discuss the various wall covering options.
1775.7	Display knowledge of interior wall and ceiling finish products.
1775.7.1	Demonstrate knowledge of the various ceiling finish products.
1775.8	Display knowledge of painting and staining applications.
1775.8.1	Explain the difference between indoor and outdoor paints and their applications.
1776.6.2	Describe the difference between water-based and oil-based paints.
1776.6.3	Identify the safety concerns associated with paint and stain.
1776.6.4	Describe the criteria for selecting the proper paint or stain for various applications.
1776.6.5	Demonstrate the ability to paint indoor and outdoor surfaces.

Building Maintenance and Operations III will continue to build student skill sets in areas of Floor Systems; Wall and Ceiling Framing; Roof Framing; and Roofing Applications.

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Electrical

1776.1	Remove or replace electrical equipment, components, and appliances.
1776.1.1	Identify safety rules and regulations for electricians, including the necessary precautions for avoiding various job site hazards.
1776.1.2	Explain electrical safety issues concerning lockout/tagout procedures, confined space entry, respiratory protections, and fall protection systems.
1776.1.3	Develop a task plan and a hazard assessment for a given task and select the appropriate PPE and work methods to safely perform the task.
1776.1.4	Demonstrate the ability to replace electrical components and various electrical appliances.
1776.2	Install and troubleshoot low-voltage circuits.
1776.2.1	Define voltage and identify the ways in which it can be produced.
1776.2.2	Explain the difference between conductors and insulators.
1776.2.3	Explain the operations of and describe the voltmeter.
1776.2.4	Explain the operations of and describe the ohmmeter
1776.2.5	Describe the operations of and describe the clamp-on ammeter
1776.2.6	Explain the operations of and describe the multimeter
1776.2.7	Explain the operations of and describe the megohmmeter
1776.2.8	Select the appropriate meter for a given work environment based on category ratings.
1776.2.9	Identify the safety hazards associated with the various types of test equipment.
1776.2.10	Demonstrate the ability to install and troubleshoot low-voltage circuits.
1776.3	Identify electrical architectural symbols.
1776.3.1	Explain the basic layout of a set of construction drawings.
1776.3.2	Interpret electrical drawings, including site plans, floor plans, and detail drawings.
1776.3.3	Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines
1776.3.4	Interpret equipment schedules found on electrical drawings.
1776.3.5	Describe the type of information included in electrical specifications.
1776.4	Maintain electrical systems and emergency generators.
1776.4.1	Explain the methods and procedures used in the selection and installation of circuit breakers and fuses.
1776.4.2	Explain the necessity of overcurrent protection devices in electrical circuits.
1776.4.3	Define the terms associated with fuses and circuit breakers.
1776.4.4	Describe the routine maintenance concerns for emergency power generators.
1776.5	Identify and maintain (GFCI) Ground Fault Circuit Interrupters.

1776.5.1	Explain the purpose of ground fault circuit interrupters and tell where they must be installed.
1776.5.2	Explain the importance of bonding equipment in clearing ground faults in a system.
1776.5.3	Describe the purposes of the grounded conductor (neutral) in the operation of overcurrent devices.

Plumbing

1776.6	Identify, maintain, and install plumbing equipment.
1776.6.1	Identify the basic hand and power tools used in the plumbing trade.
1776.6.2	Demonstrate how to safely use, properly care for, and maintain plumbing tools.
1776.6.3	Demonstrate the ability to select the proper tool(s) for tasks.
1776.6.4	Demonstrate the ability to install and repair plumbing systems.
1776.7	Identify, maintain, and repair piping.
1776.7.1	Identify the various types of plastic pipe.
1776.7.2	Identify the techniques used in hanging and supporting plastic pipe.
1776.7.3	Demonstrate how to properly measure, cut, and join and support plastic pipe.
1776.7.4	Identify the various types of copper tube.
1776.7.5	Demonstrate how to measure, ream, cut, join, and groove copper tube.
1776.7.6	Identify the types of fittings and valves used with copper tube.
1776.7.7	Identify the various types of cast-iron pipe.
1776.7.8	Demonstrate how to properly measure, cut, join, and support cast-iron piping.
1776.7.9	Identify the types of steel pipe and fittings used in plumbing applications.
1776.7.10	Identify the types of fittings and valves used with steel pipe.
1776.7.11	Demonstrate how to properly measure, cut, join, and support steel pipe.
1776.8	Repair and replace plumbing fixtures.
1776.8.1	Identify common types of sinks, lavatories, and faucets.
1776.8.2	Identify the basic types of materials used in the manufacture of plumbing fixtures.
1776.8.3	Demonstrate how to choose the proper fixtures and faucets for a variety of installations.
1776.8.4	Demonstrate the ability to repair and replace the various types of plumbing fixtures.
1776.9	Identify plumbing architectural symbols.
1776.9.1	Interpret plumbing-related information from a set of drawings.
1776.9.2	Identify various plumbing drawings and describe how the different views are used.
1776.9.3	Identify the basic symbols used in schematic drawings of pipe assemblies.
1776.9.4	Describe how code requirements apply to certain drawings.
1776.10	Perform weatherization procedures.
1776.10.1	Identify the specific plumbing concerns associated with extreme temperatures.
1776.10.2	Demonstrate how to properly weatherize and protect the various plumbing pipes and fixtures.
1776.11	Identify and maintain various pumps.
1776.11.1	Identify the components and functions of a water distribution system and the relationships among the components.
1776.11.2	Demonstrate the ability to identify, service and maintain various pumps.

Building Maintenance and Operations will continue to build student skill sets in areas of Exterior Finishing; Basic Stair Layout; Electrical Safety; and Residential Electrical Services.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

General Maintenance

1777.1	Identify and measure appropriate filters for various equipment.
1777.1.1	Demonstrate the ability to inspect and clean or replace various filters.
1777.2	Employ various practices of weather proofing and energy conservation.
1777.2.1	Explain the purpose of flashing.
1777.2.2	Demonstrate knowledge of weatherproofing installation.
1777.3	Identify and maintain security and property equipment.
1777.3.1	Identify and explain how to maintain various security systems equipment.
1777.4	Identify general principles of welding.
1777.4.1	Describe the basic principles of welding.

Grounds and Equipment Maintenance

1777.5	Maintain power equipment (e.g., filters, oil changes, spark plugs, belts, blade sharpening, batteries).
1777.5.1	Explain how to perform diagnostic and service on two and four stroke-cycle engines and accessories.
1777.5.2	Demonstrate the ability to repair and maintain gasoline engines used to power equipment such as portable saws, lawn mowers, generators, and compressors.
1777.5.3	Describe how to adjust points, valves, carburetors, distributors, and spark plug gaps, using feeler gauges.
1777.5.4	Explain how to repair or replace defective parts such as magnetos, water pumps, gears, pistons, and carburetors, using hand tools.
1777.6	Exhibit knowledge of proper lawn installation and maintenance.
1777.6.1	Demonstrate knowledge of basic horticulture.
1777.6.2	Explain how to plant and cultivate lawns or gardens.
1777.6.3	Discuss how to spread topsoil or straw over seeded soil to hold soil in place.
1777.6.4	List the tools and equipment used in turf and landscape maintenance.
1777.6.5	Explain how to mow and edge lawns, using power mowers or edgers.
1777.7	Plant and maintain trees and shrubs.
1777.7.1	Explain how to plant seeds, bulbs, foliage, flowering plants, grass, ground covers, trees, or shrubs and apply mulch for protection, using gardening tools.
1777.7.2	Interpret landscaping designs to determine where to lay sod, sow grass, or plant flowers or foliage.
1777.7.3	Attach wires from planted trees to support stakes.
1777.7.4	Demonstrate how to use hand tools, such as shovels, rakes, pruning saws, saws, hedge or brush trimmers, or axes.

HVAC (Heating, Ventilation, and Air Cooling)

1777.8	Demonstrate knowledge of HVAC fundamentals.
1777.8.1	Explain the basic principles of heating, ventilation, air conditioning, and refrigeration.
1777.8.2	Identify common safety principles and organizations.
1777.8.3	Describe the importance of LEED construction and energy management.
1777.8.4	Describe trade licensing and certification requirements.
1777.8.5	Identify important codes and permits.
1777.8.6	Identify residential, commercial, and industrial career opportunities.
1777.8.7	Explain the various refrigerant classifications and describe their environmental impact.
1777.8.8	Identify the basic refrigerant containment requirements of Section 608 of the Clean Air Act.
1777.9	Maintain HVAC systems.
1777.9.1	Explain the principles that guide HVAC/R installation and service techniques.
1777.9.2	Explain how to use pressure-temperature (P-T) charts to calculate superheat and subcooling.
1777.9.3	Describe common practices associated with handling, charging, and removing oils.
1777.9.4	Describe the various devices used to detect refrigerant leaks.
1777.9.5	Identify and explain how to operate the equipment used to evacuate refrigerant circuits.
1777.9.6	Explain how to properly charge various types of refrigerants using different methods.
1777.9.7	Identify common gaskets, packing materials, seals, and bearings.

Unions and Apprenticeship Programs

1777.10	Discuss Unions working with Contractors in Construction Trades.
1777.10.1	Construction Trade Unions in West Virginia with Apprenticeship programs.
1777.10.2	Discuss Apprenticeship opportunities in Construction trades.
1777.10.3	Explore the process of applying for Apprenticeship in the Construction Trades.
1777.10.4	Define Pre-Job Training.
1777.10.5	Describe the process of working with your supervisor and others.
1777.10.6	Discuss Harassment and Discrimination policies.
1777.10.7	Describe the Qualities of a Successful Apprentice.
1777.10.8	Discuss Common Interview Questions.
1777.10.9	Discuss Interviewing tips for Construction Apprenticeships.
1777.10.10	Discuss Interviewing for Apprenticeships in Construction.

This course introduces the student to the knowledge base and technical skills for concepts in Basic Plumbing and Electricity. Areas of study include basic plumbing skills, advanced plumbing repair and basic electrical skills. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Basic Plumbing Skills

1803.1	Basic Plumbing Skills
1803.1.1	Basic plumbing skills.
1803.1.2	Identify terms, tools, materials, and fixtures common to plumbing repair.
1803.1.3	Measure, cut, join, and apply fittings to various types of pipes and tubing.
1803.1.4	Open clogged lines using chemicals, plunger, snake, or auger.
1803.1.5	Winterize water supply lines, traps, and drains.

Advanced Plumbing Repair

1803.2	Advanced Plumbing Repair
1803.2.1	Plumbing repair.
1803.2.2	Test to detect leaks on water pipes and repair leaking faucets and pipes.
1803.2.3	Clean gas furnace burner chamber and thermocouple, test for leaks and ventilate vapor from confined area.
1803.2.4	Maintain water heaters and furnaces including: pressure safety valve, temperature adjustment and lighting pilot lights.

Basic Electrical Skills

1803.3	Basic Electrical Skills
1803.3.1	Basic electrical skills.
1803.3.2	Identify terms, tools materials, and fixtures common to electrical repair.
1803.3.3	Replace defective fixtures such as: receptacles, switches, outlets, sockets, cords, plugs, and wiring.
1803.3.4	Replace fluorescent and incandescent bulbs.
1803.3.5	Remove and replace faulty burners and oven heating elements in electric ranges.
1803.3.6	Test fuses and electrical circuits for power.
1803.3.7	Remove, replace, and adjust thermostats.
1803.3.8	Remove and replace ballasts and starters in fluorescent fixtures.

This course introduces the student to the knowledge base and technical skills for all courses in the Fundamentals of Facilities Maintenance Program of Study. Areas of study include career planning, basic safety, locating information and following technical instructions, basic carpentry, and facility components. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Career Planning

1805.1	Career Planning
1805.1.1	Career opportunities related to facilities maintenance.
1805.1.2	Research careers related to facilities maintenance and the training required for those careers.
1805.1.3	Develop appropriate attitudes and behaviors needed for success in facilities maintenance.
1805.1.4	Identify sources of information about a career in facilities maintenance.

Basic Safety

1805.2	Basic Safety
1805.2.1	Basic safety as it relates to maintaining facilities and landscapes.
1805.2.2	Recognize and follow general shop safety guidelines.
1805.2.3	Utilize appropriate personal protective equipment.
1805.2.4	Demonstrate proper lifting techniques.
1805.2.5	Select and erect ladders and scaffolding in accordance with safety regulations.
1805.2.6	Mix, apply, store, and dispose of job-related chemicals.
1805.2.7	Select fire extinguishers for each class of fire.

Locating Information and Following Technical Instructions

1805.3	Locating Information and Following Technical Instructions
1805.3.1	Locating information and following technical instructions.
1805.3.2	Interpret scale drawings.
1805.3.3	Identify and define common architectural drawing symbols.
1805.3.4	Research and follow technical information regarding specifications, codes, and instructions.
1805.3.5	Read and complete work orders.

Basic Carpentry Skills

1805.4	Basic Carpentry Skills
1805.4.1	Basic Carpentry skills.
1805.4.2	Utilize common carpentry tools and equipment.
1805.4.3	Maintain tools and equipment used in the carpentry trade.
1805.4.4	Construct simple wall, floor, and roof frames.
1805.4.5	Repair flooring: including vinyl and ceramic floor tile.
1805.4.6	Remove old finishes and apply new ones to a variety of different materials.
1805.4.7	Prepare a wall for papering and hang wallpaper.

Fundamentals of Facilities Maintenance**Course #: 1805****Allowable Teacher Endorsement:** 0200, 0201, 7025, 7027, 7028, 7720

1805.4.8	Repair windows by removing glass, cutting new glass, and glazing in the new window.
1805.4.9	Remove and replace damaged window screens.
1805.4.10	Repair stairways by removing and replacing stringers, treads, and risers.
1805.4.11	Repair and replace doors and hardware.
1805.4.12	Cut angles and cope joints on moldings and install trim and fill nail holes.
1805.4.13	Caulk windows and doors.
1805.4.14	Install weather stripping.
1805.4.15	Join, level, and install gutters and down spouts.
1805.4.16	Clean gutters and downspouts and install leaf guards.

This course introduces the student to the knowledge base and technical skills for concepts in the building construction Program of Study. Areas of study include site layout and preparation, form construction, steel framing, suspended ceilings, and floor coverings. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Site Layout and Preparation

1820.1	Site Layout and Preparation
1820.1.1	Site layout and preparation.
1820.1.2	Summarize basic layout of a commercial site.
1820.1.3	Compare various layout instruments and describe their uses.
1820.1.4	Assess elevation differences.
1820.1.5	Construct batter boards.
1820.1.6	Compare, choose, and estimate fill and base materials for site preparation.

Form Construction

1820.2	Form Construction
1820.2.1	Concrete forms.
1820.2.2	Design and construct forms for concrete footings.
1820.2.3	Design and construct forms for concrete flat work.
1820.2.4	Design and construct forms for vertical concrete work.
1820.2.5	Select and arrange cylinder forms for a concrete pour.
1820.2.6	Design and construct forms for concrete stairs.

Steel Framing

1820.3	Steel Framing
1820.3.1	Materials, fasteners, and methods of steel framing.
1820.3.2	Compare and evaluate the uses of steel framing components.
1820.3.3	Compare and evaluate the uses of various steel fasteners.
1820.3.4	Compare and evaluate the uses of various steel construction tools and equipment.
1820.3.5	Analyze, choose, and apply steel framing methods.

Suspended Ceilings

1820.4	Suspended Ceilings
1820.4.1	Materials and fasteners needed to complete a suspended ceiling.
1820.4.2	Investigate and compare different types of suspended ceilings.
1820.4.3	Evaluate and determine the appropriate applications for suspended ceilings.
1820.4.4	Measure, layout and install a suspended ceiling.

Floor Coverings

1820.5	Floor Coverings
1820.5.1	Measure, layout and install vinyl tile.
1820.5.2	Measure, layout and install ceramic tile.
1820.5.3	Measure, layout and install carpet.
1820.5.4	Measure, layout and install appropriate floor trim.

This course introduces the student to the knowledge base and technical skills for concepts in the Building Construction Program of Study. Areas of study include estimation, concrete construction, finishing concepts, properties of concrete, tools and equipment, concrete placement, work site preparation, finishing techniques, curing, and protecting and troubleshooting concrete problems. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Concrete Construction and Finishing Concepts

1821.1	Concrete Construction and Finishing Concepts
1821.1.1	Concrete construction finishing concepts.
1821.1.2	Analyze terms and summarize characteristics of concrete.
1821.1.3	Analyze and summarize the properties and processes of concrete.
1821.1.4	Assess and differentiate in the career potentials in concrete finishing.

Concrete Safety

1821.2	Concrete Safety
1821.2.1	Concrete safety.
1821.2.2	Determine and properly use the proper types of personal protective equipment for the work site.
1821.2.3	Analyze and summarize the guidelines for dressing appropriately for concrete work.
1821.2.4	Analyze and summarize how to safely handle concrete when forming, placing, curing, and finishing.
1821.2.5	Summarize safety precautions to use when working in extreme hot and cold.
1821.2.6	Summarize safety precautions to use when working with hazardous materials.
1821.2.7	Summarize safety precautions to follow when handling and maintaining concrete construction tools.

Analyzing Properties of Concrete

1821.3	Analyzing Properties of Concrete
1821.3.1	Concrete properties.
1821.3.2	Analyze the properties of concrete.
1821.3.3	Summarize how the properties of concrete are used in construction.
1821.3.4	Determine how the properties of concrete influence mix, placement, finishing, durability, and performance.
1821.3.5	Summarize quality control tests on concrete ingredients, fresh concrete, and hardened concrete.
1821.3.6	Mix a batch of concrete.
1821.3.7	Perform and analyze a slump test on a batch of concrete.

Tools and Equipment in Concrete Construction

1821.4	Tools and Equipment in Concrete Construction
1821.4.1	Concrete tools and equipment.
1821.4.2	Evaluate tools and equipment used in concrete construction and describe the use of each.
1821.4.3	Differentiate and properly use the trade terms associated with concrete, concrete tools, and equipment.

Worksite Preparation for Concrete Placement

1821.5	Worksite Preparation for Concrete Placement
1821.5.1	Preparing a worksite for concrete placement.
1821.5.2	Categorize basic layout using levels and measuring tools.
1821.5.3	Evaluate, grade, and build forms for horizontal placement.
1821.5.4	Perform compaction activities on sub grades.
1821.5.5	Summarize various joints and where to locate them.
1821.5.6	Summarize various reinforcements and how to place them.
1821.5.7	Evaluate information needed when ordering concrete.

Placing Concrete

1821.6	Placing Concrete
1821.6.1	Concrete placement.
1821.6.2	Summarize how concrete is conveyed and placed.
1821.6.3	Create a pre-placement checklist.
1821.6.4	Demonstrate the proper use of tools and equipment for placing concrete.
1821.6.5	Demonstrate the process of depositing, spreading, consolidating, and striking off concrete in a form.
1821.6.6	Demonstrate the proper use of trade terms with the appropriate processes and equipment.

Basic Concrete Finishing Techniques

1821.7	Basic Concrete Finishing Techniques
1821.7.1	Finishing concrete.
1821.7.2	Summarize the basic finishing process.
1821.7.3	Demonstrate proper use of float, edger, groover, and trowel.
1821.7.4	Measure, mark, and cut joints with a saw.
1821.7.5	Apply a broom finish.
1821.7.6	Apply a rubbish finish.
1821.7.7	Demonstrate the proper use of trade terms with the appropriate process and equipment.

Curing and Protecting Concrete

1821.8	Curing and Protecting Concrete
1821.8.1	Curing and protecting concrete.
1821.8.2	Summarize the process of curing concrete.
1821.8.3	Categorize and summarize the methods of curing concrete.
1821.8.4	Demonstrate the proper use of trade terms with the appropriate processes and equipment.

Troubleshooting Basic Concrete Construction Problems

1821.9	Troubleshooting Basic Concrete Construction Problems
1821.9.1	Concrete procedures and troubleshooting concepts.
1821.9.2	Analyze the basic finishing process.
1821.9.3	Demonstrate proper use of float, edger, groover, and trowel.
1821.9.4	Measure, mark, and cut joints with a saw.

This course introduces the student to the knowledge base and technical skills for concepts in the Building Construction Program of Study. Areas of study include identifying various blueprints, terms, symbols, components, dimensions, classifications, and construction task objectives. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Blueprint Identification

1822.1	Blueprint Identification
1822.1.1	Blueprints for a construction project.
1822.1.2	Categorize and evaluate basic blueprint terminology.
1822.1.3	Categorize and evaluate basic blueprint symbols.
1822.1.4	Categorize and evaluate basic blueprint components.
1822.1.5	Categorize and evaluate various blueprint schedules.

Using Blueprints to Identify Dimensions

1822.2	Using Blueprints to Identify Dimensions
1822.2.1	Scales used in various blueprints.
1822.2.2	Summarize and demonstrate proper use of an architectural scale.
1822.2.3	Convert actual measurements to scale measurements.
1822.2.4	Design and develop a scale drawing for a specific project.

Identify Blueprint Classifications

1822.3	Identify Blueprint Classifications
1822.3.1	Interpreting and summarizing sectional and detail drawings.
1822.3.2	Evaluate and interpret plot plans.
1822.3.3	Evaluate and interpret foundation plans.
1822.3.4	Evaluate and interpret elevation plans.
1822.3.5	Evaluate and interpret sectional views.
1822.3.6	Evaluate and interpret detail drawings.

This course introduces the student to the knowledge base and technical skills for concepts in the Building Construction Program of Study. Areas of study include estimation, insulation, vapor barriers, interior wall coverings, interior finish, and exterior finish. Emphasis will be placed on career exploration, job seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Insulation and Vapor Barriers

1823.1	Insulation and Vapor Barriers
1823.1.1	Insulation and vapor barriers.
1823.1.2	Install insulation in walls, ceilings, and floors.
1823.1.3	Evaluate the type and determine the necessity for vapor barriers and properly install them.
1823.1.4	Prepare a written cost estimate for insulation of specific project.

Interior Wall Finish

1823.2	Interior Wall Finish
1823.2.1	Interior wall finishes.
1823.2.2	Estimate and hand drywall on interior walls and ceilings.
1823.2.3	Properly finish drywall (nail holes, seams, and corners).
1823.2.4	Prime and paint interior walls.
1823.2.5	Properly install paneling and appropriate trim.
1823.2.6	Prepare a written cost estimate for an interior finish project.

Interior Finish

1823.3	Interior Finish
1823.3.1	Interior finishes.
1823.3.2	Install doors and door locksets.
1823.3.3	Measure, cut, and install baseboards, door, and window casings.
1823.3.4	Measure, cut and install various wall coverings.
1823.3.5	Measure, cut and install various floor coverings.
1823.3.6	Install cabinets.
1823.3.7	Prepare a written cost estimate for a specific interior project.

Exterior Finish

1823.4	Exterior Finish
1823.4.1	Exterior finishes.
1823.4.2	Estimate and install fascia and soffit on eaves and rake.
1823.4.3	Install attic ventilation.
1823.4.4	Properly install exterior siding.
1823.4.5	Paint exterior surfaces.
1823.4.6	Prepare a written cost estimate for a specific exterior finish project.

Finishing Carpentry

Allowable Teacher Endorsement: 7021, 7028

Course #: 1823

This course introduces the student to the knowledge base and technical skills for concepts in the Building Construction Program of Study. Areas of study include floor framing, wall framing, roof framing and post and beam construction. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to advanced framing practices.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Floor Framing

1824.1	Floor framing.
1824.1.1	Research prefabricated floor components.
1824.1.2	Evaluate and compare various prefabricated floor components.
1824.1.3	Estimate and lay out various prefabricated floor components.
1824.1.4	Evaluate and use various floor framing fasteners.
1824.1.5	Prepare a written estimate and complete a project using prefabricated floor components.

Metal Wall Framing

1824.2	Metal wall framing.
1824.2.1	Analyze metal wall framing.
1824.2.2	Analyze and compare metal framing components.
1824.2.3	Demonstrate metal cutting techniques.
1824.2.4	Demonstrate metal fastening techniques.
1824.2.5	Estimate materials for and complete a project using metal construction materials.
1824.2.6	Assess criteria needed for utility installation in metal framing.

Roof Framing Systems

1824.3	Roof framing systems.
1824.3.1	Review roof framing systems.
1824.3.2	Measure, lay out, cut, and install hip roof systems.
1824.3.3	Measure, lay out, cut, and install gambrel roof systems.
1824.3.4	Measure, lay out, cut, and install roof dormer.
1824.3.5	Measure, lay out, cut, and install valley roof systems.
1824.3.6	Measure, lay out, cut, and install roof trusses.

Post and Beam Construction

1824.4	Post and beam construction.
1824.4.1	Review post and beam construction.
1824.4.2	Analyze and categorize post and beam construction components.
1824.4.3	Estimate materials needed for a post and beam construction project.
1824.4.4	Perform various cutting and joining techniques for post and beam construction.

Framing Practices and Applications

Allowable Teacher Endorsement: 7021, 7028

Course #: 1824

This course introduces the student to the knowledge base and technical skills for concepts in the Building Construction Program of Study. Areas of study include foundation and framing procedures and foundation and framing applications. Emphasis will be placed on career exploration, job-seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Review Foundation and Framing Procedures

1828.1	Review Foundation and Framing Procedures
1828.1.1	Foundation and framing procedures.
1828.1.2	Review, demonstrate, and develop foundations procedures.
1828.1.3	Review, demonstrate, and develop floor framing procedures.
1828.1.4	Review, demonstrate, and develop wall framing procedures.
1828.1.5	Review, demonstrate, and develop roof system framing procedures.
1828.1.6	Review, demonstrate, and develop interior finishing procedures.
1828.1.7	Review, demonstrate, and develop exterior finishing procedures.

Implementation of Foundation and Framing Procedures and Applications

1828.2	Implementation of Foundation and Framing Procedures and Applications
1828.2.1	Foundation and framing procedures and applications.
1828.2.2	Choose, implement, and practice foundation applications.
1828.2.3	Choose, implement, and practice floor framing applications.
1828.2.4	Choose, implement, and practice wall framing applications.
1828.2.5	Choose, implement, and practice roof system framing applications.
1828.2.6	Choose, implement, and practice interior finish applications.
1828.2.7	Choose, implement, and practice exterior finish applications.
1828.2.8	Prepare a written cost estimate for a specific construction project.

This course introduces the student to the knowledge base and technical skills for concepts in the Building Construction Program of Study. Areas of study include estimation, masonry materials, rough in plumbing systems and installation of finish plumbing. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundation Objectives

1829.1	Foundation Objectives
1829.1.1	Safety and foundation objectives.
1829.1.2	Categorize and demonstrate the safe use of masonry tools and equipment.
1829.1.3	Lay out and square a foundation using a transit and the 6, 8, 10 method.
1829.1.4	Analyze and explain the size of footings for various masonry applications.
1829.1.5	Analyze and justify the components of mortar and properly prepare a usable mortar mixture.
1829.1.6	Analyze and demonstrate proper waterproofing and ventilation in a foundation.
1829.1.7	Lay out and construct a project using masonry units to produce a corner and install units to a line.
1829.1.8	Prepare a written cost estimate for a masonry project.

Rough in a Plumbing System

1829.2	Rough in a Plumbing System
1829.2.1	Safety skills and rough plumbing systems.
1829.2.2	Categorize and demonstrate the safe use of plumbing tools and equipment.
1829.2.3	Categorize and demonstrate the proper use of various materials and processes.
1829.2.4	Assemble DWV system according to code.
1829.2.5	Complete a plastic plumbing project using pipe and fittings per given diagram.
1829.2.6	Complete a copper plumbing project using pipe and fittings per given diagram.
1829.2.7	Prepare a written cost estimate for a plumbing project.

Install Finish Plumbing

1829.3	Install Finish Plumbing
1829.3.1	Installing finish plumbing.
1829.3.2	Properly install various plumbing fixtures (commode, lavatory, bathtub, and/or shower).
1829.3.3	Install shut off valves, faucets, and screw-on fittings.
1829.3.4	Evaluate and/or demonstrate the installation of a hot water heater.
1829.3.5	Prepare a given fixture cost estimate for a given structure.

This course introduces the student to the knowledge base and technical skills of the carpentry industry. The students will complete modules in Basic Safety; Introduction to Construction Math; Introduction to Hand Tools; Introduction to Power Tools; Introduction to Construction Drawings; Basic Rigging; Basic Communication Skills; Basic Employability Skills; and Introduction to Materials Handling. Students will then begin developing skill sets related to the fundamentals of Carpentry such as Orientation to the Trade; Building Materials, Fasteners, and Adhesives; and Hand and Power Tools.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1842.2	Display comprehension of workplace/job-site safety procedures (OSHA).
1842.2.1	Define incidents and the significant costs associated with them.
1842.2.2	Identify the common causes of incidents and their related consequences.
1842.2.3	Identify and describe various fall hazards.
1842.2.4	Identify and describe the safe use of ladders and stairs.
1842.2.5	Identify and describe the safe use of scaffolds.
1842.2.6	Identify and explain how to avoid struck-by and caught-in-between hazards.
1842.2.7	Describe basic job-site electrical safety guidelines.
1842.2.8	Explain the importance of lockout/tagout and describe basic procedures.
1842.2.9	Identify fire hazards and describe basic firefighting procedures.
1842.2.10	Identify confined spaces and describe the related safety considerations.
1842.1	Demonstrate safe material handling processes.
1842.1.1	Demonstrate knowledge of the basic concepts of material handling and common safety precautions.
1842.1.2	Demonstrate knowledge of various types of material handling equipment and describe how they are used.
1842.1.3	Describe the basic concepts of material handling and manual lifting.
1842.1.4	Identify common material handling precautions.
1842.1.5	Identify non-motorized material-handling equipment and describe how they are used.
1842.1.6	Identify motorized material-handling equipment and describe how they are used.
1842.3	Exhibit knowledge of SDS and personal protective equipment (PPE).
1842.3.1	Describe the process related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of the Safety Data Sheet (SDS).
1842.3.2	Identify and describe the basic use of PPE used to protect workers from bodily injury.
1842.3.3	Identify potential respiratory hazards and the basic respirators used to protect workers from hazards.
1842.3.4	Identify various exposure hazards commonly found on jobsites.
1842.3.5	Identify hazards associated with environmental extremes.
1842.3.6	Identify and describe equipment and methods used in fall prevention and fall arrest.
1842.4	Display understanding of hand tool safety issues.
1842.4.1	Describe the safe use and maintenance of levels.
1842.4.2	Describe the safe use and maintenance of squares.
1842.4.3	Describe the safe use and maintenance of planes.
1842.4.4	Describe the safe use and maintenance of clamps.

1842.4.5	Describe the safe use and maintenance of hand saws.
1842.5	Display understanding of power tool safety issues.
1842.5.1	Describe the general safe use and maintenance of power tools.
1842.5.2	Describe the safe use of power saws.
1842.5.3	Describe the safe use of drill presses.
1842.5.4	Describe the safe use of routers and laminate trimmers.
1842.5.5	Describe the safe use of portable power plans.
1842.5.6	Describe the safe use of power metal shears.
1842.5.7	Describe the safe use of pneumatic and cordless nailers and staplers.

Tools and accessories

1842.6	Use and maintain hand tools.
1842.6.1	Identify and explain how to use various types of hammers and demolition tools.
1842.6.2	Identify and explain how to use various types of chisels and punches.
1842.6.3	Identify and explain how to use various types of screwdrivers.
1842.6.4	Identify and explain how to use various types of non-adjustable and adjustable wrenches.
1842.6.5	Identify and explain how to use various types of socket and torque wrenches.
1842.6.6	Identify and explain how to use various types of pliers and wire cutters.
1842.6.7	Identify and explain how to use handsaws.
1842.6.8	Identify and explain how to use various types of utility knives.
1842.6.9	Identify and explain how use various types of clamps.
1842.7	Use and maintain power tools.
1842.7.1	Identify and explain how to use common power drills and bits.
1842.7.2	Identify and explain how to use a hammer drill.
1842.7.3	Identify and explain how to use pneumatic drills and impact wrenches.
1842.7.4	Identify and explain how to use a circular saw.
1842.7.5	Identify and explain how to use saber and reciprocating saws.
1842.7.6	Identify and explain how to use a portable band saw.
1842.7.7	Identify and explain how to use miter and cutoff saws.
1842.7.8	Identify and explain how to use various types of grinders.
1842.7.9	Identify and explain how to use pneumatic and powder actuated fastening tools.
1842.8	Use and maintain measuring, layout, and marking tools.
1842.8.1	Identify and demonstrate how to use rulers.
1842.8.2	Identify and demonstrate how to use measuring tapes.
1842.8.3	Identify and explain how to use various types of levels and layout tools.

Blueprint Reading and Estimation Skills

1842.9	Demonstrate awareness of general building codes.
1842.9.1	Explain the importance of building codes in construction.
1842.9.2	Apply building codes to the building process.
1842.9.3	Demonstrate a general knowledge of building codes.
1842.10	Display comprehension of dimensions and scales.
1842.10.1	Describe the methods of dimensioning construction drawings.
1842.10.2	Identify and explain the use of dimensions and various drawing scales.
1842.10.3	Identify and explain how to use engineer's and architect's scales.
1842.11	Read and understand various views and elevations.

1842.11.1	Identify the various types of construction drawings and describe each.
1842.11.2	Identify and describe the purpose of the five basic construction drawing components.
1842.11.3	Compare and contrast residential and commercial construction drawings.
1842.11.4	Describe the purpose of a civil drawing.
1842.11.5	Describe the use of architectural drawings and symbols.
1842.11.6	Describe the use of structural drawings.
1842.11.7	Describe the purpose of mechanical, electrical, and plumbing drawings.
1842.11.8	Compare drawings from two different disciplines.
1842.12	Display understanding of symbols, lines, and details.
1842.12.1	Identify the different types of lines used in construction drawings.
1842.12.2	Identify selected architectural symbols commonly used to represent materials on plans.
1842.12.3	Identify selected electrical, mechanical, and plumbing symbols commonly used on plans.
1842.12.4	Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.
1842.12.5	Describe the information included in a typical window or door schedule.
1842.12.6	Describe the purpose of a finish schedule.
1842.12.7	Identify selected abbreviations commonly used on plans.
1842.13	Extrapolate information from a set of plans.
1842.13.1	Explain the importance of referencing mechanical, electrical, and plumbing plans.
1842.13.2	List items commonly shown on architectural drawings.
1842.13.3	Describe information typically shown on structural drawings.
1842.13.4	Explain the importance of specifications.
1842.13.5	Describe the format of specifications.
1842.13.6	Describe the proper procedure for reading a set of prints.
1842.14	Estimate material quantities.
1842.14.1	Calculate lumber quantities.
1842.14.2	Calculate panel quantities.
1842.14.3	Identify what a square of material is.
1842.14.4	Calculate the volume of concrete required for rectangular and cylindrical shapes.
1842.14.5	Describe how to estimate the amount of sill plate, sill sealer, and termite shield.
1842.14.6	Describe how to estimate the amount of beam or girder material.
1842.14.7	Describe how to estimate the amount of lumber needed for joists and joist headers.
1842.14.8	Describe how to estimate bridging.
1842.14.9	Describe how to estimate the amount of subfloor material required.
1842.14.10	Explain how to estimate the amount of material needed for a header.
1842.14.11	Describe how to estimate the number of studs required.
1842.14.12	Describe how to estimate the amount of diagonal bracing required.
1842.14.13	Describe how estimate the number of ceiling joists required for a building.
1842.14.14	Determine the materials needed for a gable roof.
1842.14.15	Describe how to estimate quantities for various types of siding.
1842.14.16	Describe how to estimate roofing materials.
1842.14.17	Explain how to perform a material take-off for drywall.
1842.14.18	Explain how to perform a material take-off for drywall fasteners.
1842.14.19	Explain how to estimate windows and doors.

Carpentry 2 will continue to build student skill sets in areas such as Reading Plans and Elevations; Floor Systems; Wall and Ceiling Framing; Roof Framing; Introduction to Concrete, Reinforcing Materials, and Forms; Windows and Exterior Doors; Basic Stair Layout.

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Carpentry Related Mathematics

1843.1	Perform basic mathematical operations: whole numbers, fractions, and decimals.
1843.1.1	Identify different whole numbers and their place values.
1843.1.2	Demonstrate the ability to add and subtract whole numbers.
1843.1.3	Demonstrate the ability to multiply and divide whole numbers.
1843.1.4	Define equivalent fractions and show how to find the lowest common denominators.
1843.1.5	Describe improper fractions and demonstrate how to change an improper fraction to a mixed number.
1843.1.6	Demonstrate the ability to add and subtract fractions.
1843.1.7	Demonstrate the ability to multiply and divide fractions.
1843.1.8	Describe decimals and their place values.
1843.1.9	Demonstrate the ability to add, subtract, multiply, and divide decimals.
1843.1.10	Demonstrate the ability to convert between decimals, fractions, and percentages.
1843.2	Perform linear, square, and cubic computations.
1843.2.1	Demonstrate the ability to calculate the area of triangles.
1843.2.2	Demonstrate the ability to calculate the area of rectangles.
1843.2.3	Demonstrate the ability to calculate the area of circles.
1843.2.4	Demonstrate the ability to calculate the volume of three-dimensional shapes.
1843.2.5	Identify various types of angles.
1843.2.6	Demonstrate the use of perimeter.
1843.3	Perform algebraic and geometric functions.
1843.3.1	Identify basic geometric shapes and their characteristics.
1843.3.2	Explain various types of angles used in construction.
1843.3.3	Determine the length of the hypotenuse of a triangle.

Foundations, Forms, and Concrete

1843.4	Lay out foundation.
1843.4.1	Describe how to use the 3/4/5 method to establish a square corner.
1843.4.2	Explain how to use various instruments for foundation layout.
1843.4.3	Explain the use of batter boards in foundation layout.
1843.4.4	Explain how the width of a foundation is determined.
1843.4.5	Categorize basic layout using levels and measuring tools.
1843.5	Construct and align footing and foundation forms.
1843.5.1	Identify foundation forming methods and materials.
1843.5.2	Identify methods of aligning foundation forms.
1843.5.3	Explain methods of leveling foundation forms.

1843.5.4	Explain the placement of anchor bolts in a foundation.
1843.5.5	Evaluate, grade, and build forms for horizontal placement.
1843.6	Install, brace, align, and remove formwork.
1843.6.1	Explain the parts of various types of forms and form systems.
1843.6.2	Explain the safety procedures associated with the construction and use of concrete forms.
1843.6.3	Erect, plumb, and brace a simple concrete form with reinforcement.
1843.6.4	Describe how concrete walls are constructed.
1843.6.5	Explain slump and its role in the placement and strength of concrete.
1843.6.6	Summarize various reinforcements and how to place them.
1843.7	Understand concrete characteristics.
1843.7.1	Describe the different characteristics of concrete.
1843.7.2	Explain the basic safety precautions when working with masonry materials.
1843.7.3	Describe the composition of concrete.
1843.7.4	Identify types of concrete reinforcement materials and describe their uses.
1843.7.5	Identify types of admixtures and the effects of each type.
1843.7.6	Describe how to place concrete.
1843.7.7	Explain the process of hydration and the curing process.
1843.7.8	Explain the process of depositing, spreading, consolidating, and striking off concrete in a form.
1843.7.9	Summarize various joints and where to locate them.

Rough framing

1843.8	Demonstrate understanding of floor systems.
1843.8.1	Describe how to check a foundation for squareness.
1843.8.2	Describe the general components of a platform framed structure.
1843.8.3	List the differences between platform framing and balloon framing.
1843.8.4	Describe the characteristics of post and beam framing.
1843.8.5	Define sill plate and describe its role in floor framing.
1843.8.6	List and recognize different types of beams, girders, and supports.
1843.8.7	List and recognize different types of floor joists.
1843.8.8	List and recognize different types of bridging.
1843.8.9	Explain the purposes of subfloor and underlayment.
1843.8.10	Name the methods used to lay out and fasten sill plates to the foundation.
1843.8.11	Describe the proper procedure for installing a beam or girder.
1843.8.12	Describe how to lay out sill plates and girders for floor joists.
1843.8.13	Describe how to lay out and install floor joists for partitions and floor openings.
1843.8.14	Explain how to install joists for projections or cantilevered floors.
1843.9	Demonstrate understanding of wall systems.
1843.9.1	Identify methods used to construct corner posts.
1843.9.2	Describe how to frame partition intersections.
1843.9.3	Explain the purpose of headers and describe how they are constructed.
1843.9.4	Describe how metal framed walls are constructed.
1843.9.5	Describe how to properly lay out a wood frame wall.
1843.9.6	Explain how to lay out wall openings.
1843.9.7	List the steps involved in assembling a wall.
1843.9.8	Identify where fire stops are to be installed and explain how they are installed.
1843.9.9	List the four steps involved in erecting a wall.

1843.9.10	Explain the difference between standard interior wall systems and alternative interior wall systems.
1843.9.11	Explain the benefits of steel framing.
1843.10	Demonstrate understanding of roof systems.
1843.10.1	Describe the correct procedure for laying out ceiling joists.
1843.10.2	Describe how to cut and install ceiling joists on a wood frame building.
1843.10.3	Identify two types of dormers.
1843.10.4	Describe how to use a framing square and a Speed Square TM for roof framing.
1843.10.5	Explain how to lay out rafter locations.
1843.10.6	Describe how to determine the length of a common rafter.
1843.10.7	Explain the correct procedure for laying out and cutting a common rafter.
1843.10.8	Describe how to install rafters.
1843.10.9	Describe how to frame a gable overhang.
1843.10.10	Explain how to frame an opening in a roof.
1843.10.11	Identify the various types and components of trusses.
1843.10.12	Identify the basics of truss installation.
1843.10.13	Identify the basics of truss bracing.
1843.11	Calculate, lay out, and install stairs.
1843.11.1	Identify how residential and commercial stairways differ.
1843.11.2	Define headroom.
1843.11.3	Define stringer and explain when more than two stringers are used.
1843.11.4	Define treads and risers and explain the importance of uniform tread depths and riser heights.
1843.11.5	List the minimum stairway width requirements for residential and commercial structures.
1843.11.6	Describe the difference between handrails and guards.
1843.11.7	Identify situations that carpenters may be confronted with when framing stairwells.
1843.11.8	Explain how to calculate the riser height, tread depth, and total run for a stairway.
1843.11.9	Describe how to calculate stairwell opening sizes.
1843.11.10	Explain how to lay out and cut a stringer.
1843.11.11	Describe how to properly reinforce a stringer.
1843.11.12	Summarize how concrete stairways are formed.

Carpentry 3 will continue to build student skill sets in the areas of Commercial Drawings; Roofing Applications; Thermal and Moisture Protection; and Exterior Finishing. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Exterior finish

1844.1	Identify and install cornice and trim.
1844.1.1	Identify the components of a cornice.
1844.1.2	Describe the types of cornice.
1844.1.3	Explain how to install cornices.
1844.2	Calculate and install roofing.
1844.2.1	Identify potential safety hazards when working on roofs.
1844.2.2	Discuss the fall protection equipment required when working on roofs.
1844.2.3	Identify proper personal protective equipment (PPE) and hazard control devices used when working on roofs.
1844.2.4	Identify the hand tools used when working on roofing projects.
1844.2.5	Identify the power tools used when working on roofing projects.
1844.2.6	Identify fasteners used on roofing projects.
1844.2.7	Identify composition shingles and their applications.
1844.2.8	Identify various roofing materials and their applications.
1844.2.9	Explain the purpose of underlayment and waterproof membrane.
1844.2.10	Discuss the purpose of drip edge, flashing, and roof ventilation.
1844.2.11	Describe how to properly prepare a roof deck.
1844.2.12	Explain how to install composition shingles, metal roofing, and roll roofing.
1844.2.13	Discuss roof projections, flashing, and ventilation.
1844.3	Identify, prepare, and install windows and doors.
1844.3.1	Identify the different types and compositions of residential doors.
1844.3.2	Identify the different types and compositions of commercial doors.
1844.3.3	Identify the common types of exterior doors and explain how they are constructed.
1844.3.4	Identify the differences between residential and commercial doors.
1844.3.5	Describe the uses and benefits of wood door jambs and frames.
1844.3.6	Describe the uses and benefits of metal door jambs and frames.
1844.3.7	Identify the different types of door hardware used in residential applications.
1844.3.8	Identify the different types of door hardware used in commercial applications.
1844.3.9	Describe the various installation techniques for residential doors and hardware.
1844.3.10	Describe the various installation techniques for commercial doors and hardware.
1844.3.11	Describe hardware finish classifications.
1844.3.12	Identify various types of fixed, sliding, and swinging windows.
1844.3.13	Demonstrate knowledge of the requirements for proper window installation.
1844.3.14	Demonstrate knowledge of the requirements for proper door installation.

1844.3.15	Demonstrate knowledge of the various types of locksets used on exterior doors and explain how they are installed.
1844.4	Calculate, lay out, and install siding.
1844.4.1	Identify safety hazards that are present when working at elevations.
1844.4.2	Describe safety hazards when working with hand and power tools, equipment, and exterior finish materials.
1844.4.3	Identify types of wood siding.
1844.4.4	Identify vinyl and metal siding materials and components.
1844.4.5	List applications for fiber cement siding.
1844.4.6	Discuss the types of veneer finishes.
1844.4.7	List specialty exterior finishes.
1844.4.8	Explain the purpose of flashing.
1844.4.9	Describe surface preparation that must be performed prior to installing exterior finish materials.
1844.4.10	Discuss the types of furring and insulation that might be applied to exterior walls.
1844.4.11	Explain how to establish a straight reference line.
1844.4.12	Describe how to install wood siding.
1844.4.13	Describe how to install fiber cement siding.

Carpentry 4 will continue to build student skill sets in areas of Cold-Formed Steel Framing; Drywall Installation; Drywall Finishing; Doors and Door Hardware; Suspended Ceilings; Window, Door, Floor, and Ceiling Trim; Cabinet Installation; and Cabinet Fabrication.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Interior finish

1845.1	Install insulation.
1845.1.1	Describe various ways that air infiltration can be minimized or prevented.
1845.1.2	List the personal protective equipment (PPE) that is required when working with insulation.
1845.1.3	Describe how to safely handle insulation.
1845.1.4	Explain how to determine R-value requirements.
1845.1.5	Describe flexible insulation and list its characteristics.
1845.1.6	Describe loose-fill insulation and list its characteristics.
1845.1.7	Describe reflective insulation and list its characteristics.
1845.1.8	List miscellaneous types of insulation.
1845.1.9	Explain how to install flexible, loose-fill, rigid/semi-rigid, and reflective insulation.
1845.1.10	List various methods to control moisture in a structure.
1845.1.11	Identify methods to waterproof a structure.
1845.2	Install and finish interior walls and ceilings.
1845.2.1	List the types of gypsum products.
1845.2.2	Identify drywall fasteners and list their uses.
1845.2.3	Identify drywall accessories and state their applications.
1845.2.4	List the tools used for drywall application.
1845.2.5	Describe the procedure for drywall construction.
1845.2.6	List special applications for drywall.
1845.2.7	Describe single-ply drywall installation.
1845.2.8	Describe how fire-rated walls are constructed.
1845.2.9	List multi-ply drywall applications.
1845.2.10	Describe how to prioritize walls.
1845.2.11	Describe how to select the proper trim.
1845.2.12	Describe the purposes of tapes, compounds, coatings, and sanding materials.
1845.2.13	Identify the hand tools used in drywall finishing.
1845.2.14	Identify the automatic tools used in drywall finishing.
1845.2.15	Describe the process for finishing drywall.
1845.2.16	Describe the hand finishing procedures involved in drywall finishing.
1845.2.17	Describe the automatic taping and finishing procedures involved in drywall finishing.
1845.2.18	Identify common joint problems when finishing drywall.
1845.2.19	Identify common compound problems when finishing drywall.
1845.2.20	Identify common fastener problems when finishing drywall.
1845.2.21	Identify common problems when finishing drywall.

1845.3	Install interior doors.
1845.3.1	Identify the different types of doors and how they are installed.
1845.3.2	Identify the different types and composition of residential and commercial doors.
1845.3.3	Identify the various types of door jambs and frames.
1845.3.4	Identify the different types of door hardware.
1845.3.5	Describe the various installation techniques for doors and hardware.
1845.3.6	List and identify specific items included on a typical door schedule.
1845.3.7	Describe the hardware finish classifications.
1845.4	Install standing and running trim.
1845.4.1	Identify the proper personal protective equipment required when working with window, door, floor, and ceiling trim.
1845.4.2	Identify tool and equipment safety guidelines when working with window, door, floor, and ceiling trim.
1845.4.3	Identify the different types of base moldings.
1845.4.4	Identify the different types of wall moldings.
1845.4.5	Identify the different types of ceiling moldings.
1845.4.6	Identify the different types of window and door trim.
1845.4.7	Explain how to properly cut trim.
1845.4.8	Explain how to properly fasten trim.
1845.4.9	Explain how to properly install base molding.
1845.4.10	Explain how to properly install ceiling molding.
1845.4.11	Explain how to properly install door trim.
1845.4.12	Explain how to properly install window trim.
1845.5	Install cabinets and associated hardware.
1845.5.1	Describe the safety hazards when installing cabinets.
1845.5.2	Identify the different types of cabinets.
1845.5.3	Identify cabinet components and hardware and describe their purpose.
1845.5.4	Explain how to lay out and install a basic set of cabinets.

This course introduces the student to the knowledge base and technical skills of the Masonry industry. Masonry 1 begins with instruction in Basic Safety; Introduction to Construction Math; Introduction to Hand Tools; Introduction to Power Tools; Introduction to Construction Drawings; Basic Rigging; Basic Communication Skills; Basic Employability Skills; and Introduction to Materials Handling. Students will then begin developing skill sets related to the fundamentals of Masonry such as Introduction to Masonry, and Masonry Tools and Equipment. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1846.1	Identify and use PPE (personal protective equipment).
1846.1.1	Identify and describe the basic use of PPE used to protect workers from bodily injury.
1846.1.2	Discuss the proper use of personal protective equipment in masonry.
1846.1.3	Describe the importance of using tools and equipment safely.
1846.1.4	Explain the PPE requirements for working safely from elevated surfaces.
1846.1.5	Identify potential respiratory hazards and the basic respirators used to protect workers against those hazards.
1846.2	Demonstrate knowledge of workplace/jobsite safety procedures, including lock-out/tag-out.
1846.2.1	Identify the common causes of workplace incidents and their related consequences.
1846.2.2	Explain the importance of lockout/tagout and describe basic procedures.
1846.3	Exhibit understanding of OSHA safety standards and SDS.
1846.3.1	Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).
1846.4	Erect and use scaffolds safely.
1846.4.1	Identify and describe various fall hazards.
1846.4.2	Identify and describe equipment and methods used in fall prevention and fall arrest.
1846.4.3	Identify and describe the safe use of scaffolds.
1846.5	Display understanding of ladder safety.
1846.5.1	Identify and describe the safe use of ladders and stairs
1846.5.2	Demonstrate the ability to safely use all types of ladders.

Craft Knowledge

1846.6	Explain the history of the craft.
1846.6.1	Discuss the origin and history of the Masonry craft.
1846.7	Identify job opportunities in the masonry industry.
1846.7.1	Explain employment opportunities available in the masonry/construction workforce.
1846.7.2	Explain how workers can enter the construction/masonry workforce.
1846.7.3	Demonstrate the ability to relate skills and abilities to possible career pathways.
1846.8	Identify craft terminology.

1846.8.1	Demonstrate an understanding of masonry trade terminology.
1846.8.2	Identify masonry tools and supplies by their accepted trade names.
1846.8.3	Describe modern masonry materials and techniques.

Hand and Power Tools

1846.9	Identify, use, and properly care for hand tools.
1846.9.1	Describe and discuss the hand tools used in the masonry profession.
1846.9.2	Demonstrate how to use and maintain various types of hand tools.
1846.9.3	Demonstrate how to properly use various types of cutting and shaping tools.
1846.9.4	Identify and explain how to use various types of hammers and demolition tools.
1846.9.5	Identify and explain how to use various types of chisels and punches.
1846.9.6	Identify and explain how to use various types of screwdrivers.
1846.9.7	Identify and explain how to use various types of non-adjustable and adjustable wrenches.
1846.9.8	Identify and explain how to use various types of socket and torque wrenches.
1846.9.9	Identify and explain how to use various types of pliers and wire cutters.
1846.9.10	Identify and explain how to use various types of levels and layout tools.
1846.9.11	Identify and explain how to use handsaws.
1846.9.12	Identify and explain how to use various types of files and utility knives.
1846.9.13	Identify and explain how to use shovels and picks.
1846.9.14	Identify and explain how to use various types of clamps.
1846.10	Identify, use, and properly care for power tools.
1846.10.1	Identify and describe how to use and maintain miscellaneous power tools.
1846.10.2	Describe how to use various types of power saws.
1846.10.3	Identify and explain how to use pneumatic drills and impact wrenches.
1846.10.4	Identify and explain how to use a circular saw.
1846.10.5	Identify and explain how to use saber and reciprocating saws.
1846.10.6	Identify and explain how to use miter and cutoff saws.
1846.10.7	Identify and explain how to use various types of grinders.
1846.10.8	Identify and explain how to use pneumatic and powder-actuated fastening tools.
1846.10.9	Identify and explain the uses of hydraulic jacks.
1846.10.10	Describe how to properly set up, use and maintain a motorized mixer.

Math and Measurements

1846.11	Exhibit comprehension of construction masonry-related mathematics.
1846.11.1	Explain the mathematical concepts used in masonry.
1846.11.2	Explain how to read a six-foot rule.
1846.11.3	Explain the purpose of specifications, standards, and codes used in the building industry and the sections that pertain to masonry.
1846.12	Exhibit understanding of measurements and conversions.
1846.12.1	Recognize and identify modular increments.
1846.12.2	Describe how to determine areas and circumferences.
1846.12.3	Identify lines, symbols, and abbreviations used on drawings.
1846.12.4	Identify scales and dimensions used on drawings.
1846.12.5	Explain how to use the 3-4-5 ratio to square a corner.
1846.13	Estimate/calculate materials needed.
1846.13.1	Explain how to estimate the total cost of a proposed masonry job.

1846.13.2	Estimate the cost of the materials, labor, unit/ labor costs and sales tax.

Professionalism

1846.14	Exhibit understanding of communication/leadership skills.
1846.14.1	Demonstrate methods of supervision such as giving and receiving feedback and instruction.
1846.15	Display understanding of professional ethics and behavior.
1846.15.1	Demonstrate ethical attitudes and work habits that support career retention and advancement.
1846.15.2	Develop and present a statement of their personal work ethic beliefs.
1846.15.3	Practice professionalism in punctuality, appropriate dress, task completion, etc.

Masonry II will continue to build student skill sets in areas such as Measurements, Drawings, and Specifications; Mortar; and Masonry Units and Installation Techniques. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Hand and Power Tools

1847.1	Identify, use, and properly care for hand tools.
1847.1.1	Demonstrate how to use and maintain various types of hand tools.
1847.1.2	Identify some of the hazards associated with different types of hand tools.
1847.1.3	Identify and demonstrate how to use various types of hammers and demolition tools.
1847.1.4	Identify and demonstrate how to use various types of chisels and punches.
1847.1.5	Identify and demonstrate how to use various types of screwdrivers.
1847.1.6	Identify and demonstrate how to use various types of non-adjustable and adjustable wrenches.
1847.1.7	Identify and demonstrate proper use of various types of socket and torque wrenches.
1847.1.8	Identify and demonstrate how to use various types of pliers and wire cutters.
1847.1.9	Identify and demonstrate proper use of various types of levels and layout tools.
1847.1.10	Identify and explain how to use handsaws.
1847.1.11	Identify and demonstrate proper use of various types of files and utility knives.
1847.1.12	Identify and demonstrate how to use shovels and picks.
1847.1.13	Identify and explain how to use various types of clamps.
1847.2	Identify, use, and properly care for power tools.
1847.2.1	Identify and demonstrate proper use of miscellaneous power tools.
1847.2.2	Identify some of the hazards associated with the operation of power tools.
1847.2.3	Describe how to use various types of power saws.
1847.2.4	Identify and demonstrate how to use pneumatic drills and impact wrenches.
1847.2.5	Identify and demonstrate how to use a circular saw.
1847.2.6	Identify and demonstrate how to use saber and reciprocating saws.
1847.2.7	Identify and demonstrate how to use miter and cutoff saws.
1847.2.8	Identify and demonstrate how to use various types of grinders.
1847.2.9	Identify and demonstrate how to use pneumatic and powder-actuated fastening tools.
1847.2.10	Identify and explain how to safely use hydraulic jacks.
1847.2.11	Demonstrate how to properly set up, use and maintain a motorized mixer.

Materials

1847.3	Identify and select materials, including synthetic stone and brick products.
1847.3.1	Demonstrate the ability to select materials including synthetic stone and brick products.
1847.3.2	Explain the basic safety precautions when working with masonry materials.
1847.3.3	Describe how to mix mortar and lay masonry units.
1847.3.4	Explain how concrete masonry units (CMUs or block) are used in construction.
1847.3.5	Explain how clay masonry units (brick) are used in construction.
1847.3.6	Explain how stone is used in construction.
1847.3.7	Describe how mortar and grout are used in masonry construction.
1847.3.8	Describe how synthetic stone and brick products are used in construction.
1847.4	Identify various mortars (M, S, N, O) and cements (Type I, II, III) and their uses.
1847.4.1	Describe the types and uses of masonry mortar.
1847.4.2	Define and describe the use of plastic mortar.
1847.4.3	Define and describe the use of hardened mortar.
1847.4.4	Describe the effects of improper proportioning and poor-quality materials.
1847.5	Identify material sizes.
1847.5.1	Identify whole numbers and how to work with them mathematically.
1847.5.2	Demonstrate accuracy in calculating and measuring graphical work required to complete career/technical assignments and projects.
1847.5.3	Analyze tables, charts, graphs and multiple data sources to complete career/technical assignments and projects.

Blueprints and Specifications

1847.6	Read and interpret written specifications.
1847.6.1	Interpret the basic parts of a set of drawings and the information found on each type.
1847.6.2	Read and interpret simple drawings.
1847.6.3	Use construction drawings to estimate material quantities.
1847.6.4	Explain the importance of following local; state and national codes and standards.
1847.7	Identify and interpret lines and symbols.
1847.7.1	Identify lines, symbols, and abbreviations used on drawings.
1847.7.2	Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.
1847.8	Read and interpret drawings and plans.
1847.8.1	Identify types of construction drawings.
1847.8.2	Explain the purpose of specifications, standards, and codes.
1847.8.3	Identify scales and dimensions used on drawings.

Masonry Structure Maintenance

1847.9	Restore and repoint masonry units.
1847.9.1	Explain the process of repointing masonry units.
1847.9.2	Describe the process of removing old mortar before repointing.
1847.9.3	Explain the importance of restoring or repointing masonry.
1847.9.4	Discuss the common mistakes when repointing brickwork.
1847.10	Select and use masonry cleaning agents.

1847.10.1	List and describe the various masonry cleaning agents.
1847.10.2	Explain how to clean concrete masonry units.
1847.10.3	Describe the proper way to clean brick.
1847.10.4	List the various hazards and precautions when working with masonry cleaners.

Apprenticeship Awareness

1847.11	Apprenticeship Basics.
1847.11.1	Explain the basic principles of an apprenticeship program.
1847.11.2	Discuss some of the benefits associated with participation in an apprenticeship program.
1847.11.3	Explain Apprenticeship components and models.
1847.11.4	Discuss businesses and partners.
1847.11.5	Discuss some of the common myths associated with Apprenticeship.

This course will continue to build student skill sets in areas of Residential Plans and Drawing Interpretation; Residential Masonry; Grout and Other Reinforcement; and Metal Work in Masonry. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Blueprints and Specifications

1848.1	Read and interpret written specifications.
1848.1.1	Identify the basic parts of a set of residential drawings and the information found on each type of drawing.
1848.1.2	Explain how to use scales and dimensions in residential drawings.
1848.1.3	Explain how to interpret the various types of residential drawings.
1848.1.4	Explain how to use the rule-of-thumb method.
1848.1.5	Explain how to use estimating aids.
1848.1.6	Describe how to estimate material quantities from residential drawings.
1848.2	Identify and interpret lines and symbols.
1848.2.1	Identify keys and legends, as well as selected lines, architectural terms, abbreviations, and symbols on residential drawings.
1848.2.2	Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines
1848.2.3	Identify and describe the purpose of the five basic construction drawing components
1848.3	Read and interpret drawings and plans.
1848.3.1	Identify the different types of construction drawings.
1848.3.2	Identify lines, symbols, and abbreviations used on drawings.
1848.3.3	Demonstrate knowledge and understanding of the mathematical concepts used in masonry.
1848.3.4	Discuss the basic parts of a set of drawings and the information found on each type.
1848.3.5	Explain the purpose of specifications, standards, and codes used in the building industry and the sections that pertain to masonry.
1848.3.6	Identify scales and dimensions used on drawings.
1848.3.7	Identify and demonstrate how to use rulers
1848.3.8	Identify and demonstrate how to use measuring tapes
1848.3.9	Explain how to read mason's rules.

Project Layout

1848.4	Square a building, use 3-4-5/Pythagorean theorem.
1848.4.1	Define Pythagorean theorem and explain how it is used.
1848.4.2	Demonstrate how to do Pythagorean theorem on a calculator.
1848.4.3	Demonstrate the process of squaring a building using Pythagorean theorem.

1848.4.4	Explain how to use the 3-4-5 ratio to square a corner.
1848.4.5	Identify basic geometric shapes and their characteristics
1848.4.6	Demonstrate the ability to calculate the area of two-dimensional shapes
1848.4.7	Demonstrate the ability to calculate the volume of three-dimensional shapes
1848.5	Install a corner/story pole and determine heights.
1848.5.1	Describe how a story pole is used when laying brick or block.
1848.5.2	Explain some of the advantages of using story poles.
1848.5.3	Define and describe how to use a corner pole.
1848.6	Identify masonry bond types.
1848.6.1	Identify and discuss the five different bonds in Masonry.
1848.6.2	Explain which is the best bond, and why.
1848.6.3	Explain which bond is the weakest and why.
1848.7	Install a metal door/window frame.
1848.7.1	Identify the methods and materials used to install masonry openings.
1848.7.2	Describe how to use and install door and window frames.
1848.7.3	Describe how to use and install chases and recesses.
1848.7.4	Explain how to use and install windowsills.
1848.7.5	Describe how to use and install steel lintels.
1848.8	Lay out and construct control joints.
1848.8.1	Explain the structural principles and fundamental uses of basic types of walls.
1848.8.2	Explain the requirement for and function of control joints and expansion joints.
1848.8.3	Describe the installation of control joints and expansion joints.
1848.8.4	Identify the effects of temperature and moisture on control joints and expansion joints.
1848.9	Identify and install anchor bolts and masonry fasteners.
1848.9.1	Identify the methods and materials used to tie two masonry wythes together.
1848.9.2	Describe how to use and install flexible anchors.
1848.9.3	Identify the structural principles and fundamental uses of anchored veneer walls.
1848.9.4	Describe how to use and install horizontal anchors.
1848.9.5	Explain how to use and install rigid ties and bolts.
1848.9.6	Describe how to use and install seismic reinforcements.
1848.9.7	Describe how to use and install bearing plates.
1848.9.8	Describe how to use and install saddles.
1848.9.9	Describe the process of toothing and discuss the shortcomings of using this process.
1848.9.10	Describe how to use and install saddles.
1848.9.11	Explain how to lay out and construct corbeling.

Brick

1848.10	Set up job site.
1848.10.1	Describe the process of setting up a masonry job site.
1848.10.2	Explain what must be done during the Layout and design phase of setting up.
1848.11	Lay brick to the line.
1848.11.1	Explain what is meant by laying brick to the line.
1848.11.2	Discuss the importance of this process.
1848.11.3	Identify the characteristics of brick.
1848.11.4	Explain how to set up, lay out, and bond brick.
1848.11.5	Explain how to lay and tool brick.

1848.11.6	Explain how to clean brick.
1848.11.7	Explain how to cut with chisels and hammers.
1848.11.8	Explain how to cut with masonry hammers.
1848.12	Tool off/joint units.
1848.12.1	Identify the uses of control joints.
1848.13	Build brick leads and corners.
1848.13.1	Lay out and construct angled corners.
1848.13.2	Lay out and construct intersecting walls.
1848.13.3	Describe how to use corner poles, lines, and fasteners.
1848.14	Identify and construct steps and components.
1848.14.1	Describe the various types of steps.
1848.14.2	Explain how to recognize patterns and tread designs.
1848.14.3	Explain how to set clay brick in steps.
1848.14.4	Explain how to build a concrete base.
1848.15	Install masonry pavers.
1848.15.1	Describe the characteristics, uses, and installation techniques for clay brick and concrete pavers.
1848.15.2	Describe the various types of clay brick pavers.
1848.15.3	Explain how to install clay brick pavers.
1848.15.4	Describe the various types of concrete and interlocking pavers.
1848.15.5	Explain how to install concrete and interlocking pavers.
1848.16	Identify and install wall ties and accessories.
1848.16.1	Describe how to use and install rigid ties and bolts.
1848.16.2	Explain how to use and install strap ties.
1848.16.3	Describe how to use and install saddles.
1848.17	Identify and position various types of lintels.
1848.17.1	Describe how to use and install steel lintels.
1848.17.2	Explain how to install precast lintels.
1848.17.3	Explain how to install bond beams and bond beam lintels.
1848.18	Identify types of arches.
1848.18.1	List and discuss the different types of arches.
1848.18.2	Describe how various types of arches are constructed.

Fireplaces and Chimneys

1848.19	Identify parts of fireplace/chimney.
1848.19.1	Explain the basic theory of the fireplace.
1848.19.2	Describe the parts of a fireplace.
1848.19.3	Explain how to lay out chimneys and fireplaces.
1848.19.4	Explain how to begin the fireplace.
1848.19.5	Explain how to finish the fireplace.
1848.19.6	Describe a multi-opening fireplace.
1848.20	Install fireplace/chimney components.
1848.20.1	Discuss the safety considerations involved in building a chimney.
1848.20.2	Explain the key points of workmanship.
1848.20.3	Demonstrate the ability to lay out and build a fireplace.
1848.20.4	Demonstrate the ability to lay out and build a chimney.

1848.21	Display familiarity with building codes.
1848.21.1	Demonstrate understanding of the purpose of specifications, standards, and codes used in the building industry and the sections that pertain to masonry.

Code of Conduct

1848.22	Simulated Workplace Manual.
1848.22.1	Demonstrate complete knowledge and understanding of Simulated Workplace procedures.

History of Apprenticeship

1848.23	Apprenticeships Basics.
1848.23.1	Explain the basic principles of an apprenticeship program.
1848.23.2	Explain Apprenticeship components and models.
1848.23.3	Discuss some of the benefits associated with participation in an apprenticeship program.
1848.23.4	Discuss some of the common myths associated with Apprenticeship.
1848.23.5	Discuss how apprenticeship has been used to exploit workers in the past.
1848.23.6	List some early examples of apprenticeship programs.
1848.23.7	Describe the expansion of apprenticeship programs during the Industrial Revolution.
1848.23.8	Describe what a modern Apprenticeship program looks like today.
1848.23.9	Discuss support of Apprenticeship programs in our state today.

This course will continue to build student skill sets in areas of Advanced Laying Techniques; Construction Techniques and Moisture Control; and Construction Inspection and Quality Control. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Flashing, Weeps, and Insulation

1849.1	Install Flashing correctly.
1849.1.1	Describe the need for moisture control in various types of masonry construction, and the techniques used to eliminate moisture problems.
1849.1.2	Explain the purpose of and installation procedures for flashing.
1849.2	Install Weep Holes correctly.
1849.2.1	Explain the purpose of and installation procedures for weep holes and weep vents.
1849.2.2	Describe where weep holes are required to be installed.
1849.2.3	Explain what happens without properly placed weep holes.
1849.3	Install Insulation correctly.
1849.3.1	Explain the concept of heat transfer.
1849.3.2	Explain the purpose of and installation procedures for internal insulation.
1849.3.3	Explain the purpose of and installation procedures for external insulation.
1849.3.4	Explain the purpose of and installation procedures for waterproofing.
1849.3.5	Explain the purpose of and installation procedures for flashing.
1849.3.6	Explain the role played by weather data and information in masonry construction.
1849.3.7	Explain the various techniques used to provide adequate protection during hot weather masonry construction.
1849.3.8	Explain the various techniques used to provide adequate protection during cold weather masonry construction.

Project Layout

1849.4	Identify masonry bond types.
1849.4.1	Identify the characteristics of concrete masonry units.
1849.4.2	Describe masonry cement.
1849.4.3	Describe preblended mortars.
1849.4.4	Describe the types of masonry mortar.
1849.4.5	Describe plastic mortar.

1849.4.6	Explain how to set up, lay out, and bond concrete masonry units.
1849.4.7	Explain how to set up, lay out, and bond brick.
1849.4.8	Describe the effects of improper proportioning and poor-quality materials.
1849.4.9	Explain the effects of extreme weather and tempering.
1849.5	Lay out and construct control joints.
1849.5.1	Explain the requirement for and function of control joints and expansion joints.
1849.5.2	identify the uses of control joints.
1849.5.3	identify the uses of expansion joints.
1849.5.4	Describe how to install control joints and expansion joints.
1849.5.5	Identify the effects of temperature and moisture on control joints and expansion joints.
1849.6	Identify and install anchor bolts and masonry fasteners.
1849.6.1	Discuss the methods and materials used to tie two masonry wythes together.
1849.6.2	Describe how to install masonry reinforcements.
1849.6.3	Describe how to use and install seismic reinforcements.
1849.6.4	Describe how to use and install flexible anchors.
1849.6.5	Describe how to use and install horizontal anchors.
1849.6.6	Describe how to use and install rigid ties and bolts.
1849.6.7	Describe how to use and install bearing plates.
1849.6.8	Describe how to use and install strap ties.

Unions and Apprenticeship Programs

1849.7	Discuss local Unions working with Contractors in Construction Trades.
1849.7.1	Discuss the construction Trade Unions in West Virginia with apprenticeship programs.
1849.7.2	Apprenticeship opportunities in Construction trades.
1849.7.3	Discuss how to apply for an Apprenticeship in the Construction trades.
1849.7.4	Define Pre-Job Training.
1849.7.5	Discuss tips for working with your supervisor and others.
1849.7.6	Define Harassment and Discrimination.
1849.7.7	Describe the qualities of a successful Apprentice
1849.7.8	Review common Interview questions.
1849.7.9	Discuss interviewing tips for Construction Apprenticeships.
1849.7.10	Conduct mock interviews for Apprenticeships in Construction.

This course introduces the student to the foundational principles and techniques of illustration. This course covers a wide range of topics, including traditional and digital illustration methods, color theory, composition, and typography. Students will learn to create compelling visual narratives and develop their unique artistic styles through hands-on projects and assignments. Emphasis will be placed on understanding and applying design elements and principles, ethical use of creative materials, and professional practices in the illustration field. Additionally, students will explore various career opportunities within digital media and visual communications, equipping them with the skills and knowledge necessary for success in the creative industry.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Computer Literacy

1851.1	Demonstrate knowledge of computer terminology.
1851.1.1	Explain fundamental computer terminology relevant to illustration, including terms such as pixels, resolution, layers, file formats (e.g., JPEG, PNG, PSD), raster graphics, vector graphics, and digital brushes.
1851.1.2	Describe common interface elements and tools within digital illustration software, such as menus, toolbars, panels, palettes, and navigation controls.
1851.1.3	Navigate through the software interface, locating and explaining the purpose and functionality of each element.
1851.1.4	Demonstrate basic proficiency in accessing and using essential tools for illustration task.
1851.1.5	Describe the sequential steps involved in a typical illustration workflow, from initial sketching and composition to final rendering and export.
1851.1.6	Demonstrate how to create and organize layers, selecting and manipulating objects, and applying digital brushes and effects.
1851.2	Identify and operate peripherals and other network devices.
1851.2.1	Demonstrate proficiency in operating peripheral devices essential for digital illustration tasks, including setting up and calibrating graphics tablets, adjusting input settings, and using specialized input tools such as styluses and pressure-sensitive pens.
1851.2.2	Perform basic illustration tasks, such as sketching, drawing, selecting, and manipulating digital objects.
1851.2.3	Identify and describe common network devices and technologies that may impact digital illustration workflows, such as routers, switches, modems, and networked storage devices.
1851.2.4	Understand the role of network devices in facilitating file sharing, collaboration, and remote access to digital assets, and explore strategies for optimizing network performance and security in a digital illustration environment.
1851.3	Demonstrate appropriate knowledge, security, and use of software (e.g., securely sending PDFs).
1851.3.1	Discuss safeguarding personal and client data, protecting intellectual property, and preventing unauthorized access to digital assets.
1851.3.2	Examine security threats and vulnerabilities in digital workflows, such as malware, phishing attacks, and data breaches.
1851.3.3	Demonstrate how to securely send PDFs and other file formats to clients, collaborators, and printers.
1851.4	Apply basic troubleshooting and maintenance skills (e.g. troubleshooting peripherals).

1851.4.1	Acquire basic troubleshooting skills and techniques for addressing hardware and software problems in digital illustration setups.
1851.4.2	Research preventive maintenance practices to optimize the performance and longevity of hardware and software components used in digital illustration.
1851.5	Demonstrate file management and storage skills (e.g. naming convention).
1851.5.1	Understand the principles of effective file organization, including the importance of consistent naming conventions, folder structures, and file versioning.
1851.5.2	Apply appropriate naming conventions to digital illustration files, ensuring clarity, consistency, and relevance in file names.
1851.5.3	Demonstrate proficiency in utilizing various storage solutions and platforms for managing digital illustration files.
1851.6	Describe procedures involved in importing and exporting.
1851.6.1	Differentiate differences between importing and exporting, compatibility and quality preservation, and the implications of file compression and conversion in digital workflows.
1851.6.2	Demonstrate how to navigate import menus, select files or folders for import, specify import settings (e.g., resolution, color mode), and verify imported content within the illustration workspace.
1851.6.3	Demonstrate how to access export options and settings, specify output formats and parameters (e.g., file type, resolution, compression), and review exported files to ensure quality and accuracy before distribution or publication.

Typography

1851.7	Demonstrate knowledge of typographic terminology.
1851.7.1	Identify and define key typographic terms such as serif, sans-serif, baseline, x-height, ascender, descender, kerning, tracking, leading, and typeface.
1851.7.2	Analyze and critique different typefaces and text layouts in various design contexts.
1851.8	Identify the anatomy and classification of type.
1851.8.1	Identify and label the key components of type anatomy, including terms such as baseline, cap height, x-height, ascender, descender, counter, serif, bowl, and stem.
1851.8.2	Explain the use of typography in professional illustrations, explaining how typographic elements enhance the visual message and user experience.
1851.8.3	Classify typefaces into major categories such as serif, sans-serif, script, decorative, and monospace, and understand the characteristics that distinguish each category.
1851.8.4	Define features and appropriate uses of each type category through written descriptions and visual examples.
1851.8.5	Analyze and evaluate the use of different type classifications in various design contexts, considering factors such as readability, tone, and visual hierarchy.
1851.9	Demonstrate understanding and calculation of type measurements.
1851.9.1	Understand key typographic measurements, including points, picas, ems, ens, and pixels, and their relevance in digital and print design.
1851.9.3	Explain how type measurements to create well-proportioned and visually appealing typographic layouts in their illustration projects.
1851.10	Identify and use proofreader's marks.
1851.10.1	Identify and recognize common proofreader's marks, including symbols for insertion, deletion, capitalization, punctuation, and spacing corrections.
1851.10.2	Apply proofreader's marks to various types of text, practicing the correct usage of these marks to indicate necessary corrections in written and printed materials.

1851.11	Set type through character and paragraph formatting.
1851.11.1	Understand various character formatting options, including font style, size, weight, and color.
1851.11.2	Apply paragraph formatting techniques, such as alignment (left, right, center, justified), indentation, line spacing (leading), and paragraph spacing.

Digital Literacy and Application

1851.12	Demonstrate knowledge of basic design terminology (e.g., margin, trim).
1851.12.1	Explain key design terms such as margin, trim, bleed, gutter, alignment, hierarchy, white space, and composition.
1851.12.2	Apply their understanding of design terminology in the planning stages of their illustration projects.
1851.12.3	Discuss design projects using proper design terminology, demonstrating their ability to articulate design principles and choices effectively.
1851.13	Exhibit knowledge of design elements and principles.
1851.13.1	Understand different types of balance (e.g., symmetrical, asymmetrical, radial) and their effects on composition.
1851.13.2	Understand the different types of lines (e.g., straight, curved, wavy, zigzag) and their uses in illustration.
1851.13.3	Examine the importance of contrast in creating visual interest and emphasis.
1851.13.4	Understand the concept of emphasis and focal points in design.
1851.13.5	Explore how to create a sense of movement in illustrations through the use of lines, shapes, and composition.
1851.13.6	Understand the role of pattern in design and how repeating elements can create visual interest.
1851.13.7	Examine the concept of rhythm in design and how it can create a sense of movement and flow.
1851.13.8	Understand the importance of unity and coherence in design.
1851.13.9	Explore the role of proportion in design and how it affects the relationship between elements.
1851.13.10	Examine Study color harmony, color schemes (e.g., complementary, analogous, triadic), and their application in illustrations.
1851.13.11	Understand color theory, including the color wheel, primary, secondary, and tertiary colors.
1851.13.12	Explore concepts such as hue, saturation, and value, and their impact on design and emotion.
1851.13.13	Understand the basics of composition, including the rule of thirds, the golden ratio, and other compositional techniques.
1851.13.14	Explore techniques for sketching, refining, and finalizing concepts.
1851.13.15	Develop the skills to critique and analyze illustrations, identifying the effective use of design elements and principles.
1851.14	Exhibit knowledge of database management and variable data printing.
1851.14.1	Understand the basic concepts of database management, including the organization, storage, and retrieval of data.
1851.14.2	Explain key database terms and functions such as records, fields, tables, queries, and data sorting.
1851.14.3	Explain the concept of variable data printing (VDP) and its applications in personalized printing and mass customization.
1851.14.4	Explore how to use design software to integrate database information with design templates, creating customized prints such as personalized invitations, direct mailers, and marketing materials.
1851.15	Describe characteristics of design for different media (e.g., logos, magazines).
1851.15.1	Analyze the design elements utilized in different media such as logos, magazines, advertisements, and web interfaces, identifying key characteristics including typography, color schemes, layout, and visual hierarchy.

1851.15.2	Analyze examples of effective design in different media, examining how elements like color, typography, layout, and imagery are utilized to meet the specific requirements and goals of each medium.
1851.16	Choose appropriate visual stages of layout (e.g., thumbnail, comprehensive).
1851.16.1	Understand the different stages of layout development, including thumbnail sketches, rough layouts, and comprehensive (comp) layouts.
1851.17	Demonstrate understanding of related math (e.g., proportion, percentage).
1851.17.1	Demonstrate the ability to apply proportion in illustrations by accurately scaling objects, figures, and environments.
1851.17.2	Calculate and use percentages to mix colors accurately, understanding the relationship between different color components (e.g., RGB or CMYK) and their respective percentages in a color mixture.
1851.17.3	Experiment with color mixing techniques, adjusting color percentages to achieve desired hues, shades, and tones in their illustrations.

Color Theory and Application

1851.18	Identify color theory terminology (e.g., colors, RGB).
1851.18.1	Identify basic color theory terminology, including primary colors, secondary colors, tertiary colors, complementary colors, analogous colors, and monochromatic colors.
1851.18.2	Explore the relationships between different colors, experimenting with various color schemes and palettes.
1851.18.3	Understand digital color models such as RGB (Red, Green, Blue) and CMYK (Cyan, Magenta, Yellow, Black), and their role in digital illustration and design.
1851.18.4	Differentiate how RGB is used for creating colors on digital screens and devices, while CMYK is used for printing purposes, and how to convert between the two-color models.
1851.19	Identify colors to obtain shades, tints, or neutrals.
1851.19.1	Understand the concept of shades, tints, and neutrals as variations of colors achieved by adding black, white, or gray to a base color.
1851.19.2	Identify base colors from color palettes or color wheels and experiment with mixing or adjusting them to create shades, tints, and neutrals.
1851.19.3	Explore mixing paints or digital color swatches to achieve different levels of darkness (shades), lightness (tints), and neutrality (neutrals).
1851.20	Identify correct use of RGB and CMYK colors.
1851.20.1	Understand the differences between the RGB (Red, Green, Blue) and CMYK (Cyan, Magenta, Yellow, Black) color models, including their respective applications in digital and print media.
1851.20.2	Identify situations where RGB colors are appropriate, such as for digital illustrations, web graphics, and multimedia projects.
1851.20.3	Identify situations where CMYK colors are necessary, such as for print designs intended for commercial printing, including brochures, business cards, and packaging.

Digital Illustration and Drawing

1851.21	Identify drawing and digital illustration terminology.
1851.21.1	Define essential terms related to drawing and digital illustration.
1851.22	Identify drawing tools and materials.
1851.22.1	Explore the integration of traditional drawing skills with digital tools (e.g., scanning, sketches, printed photographs, etc.).
1851.23	Utilize different drawing techniques (e.g., stippling).

1851.23.1	Explore diverse drawing techniques in digital illustration.
1851.23.2	Define stippling, cross-hatching, contour lines, pointillism, and combining techniques.
1851.24	Modify Illustrations (e.g., thickness).
1851.24.1	Understand the impact of line weight (thickness) on visual communication.
1851.24.2	Explore layer management techniques in digital software.
1851.24.3	Experiment with custom brushes to achieve unique effects.
	Identify ways to import, export, and save images with peripheral devices.
1851.25.1	Discuss the importance of organizing and managing design files.
1851.25.2	Discuss compatibility and file formats.
1851.25.3	Discuss the benefits of cloud storage, accessibility, and backup

Production and Printing

1851.23	Identify production and printing terminology.
1851.23.1	Define and explain key production and printing terms, such as CMYK, DPI, bleed, and offset printing.
1851.24	Demonstrate proofing, preflighting, and final production.
1851.24.1	Perform a preflight check on their digital illustrations to ensure all elements meet professional print standards, including resolution, color profiles, and file formats.
1851.25	Determine what media/medium works best for a project and what to designate when specifying for output.
1851.25.1	Compare and contrast various media and mediums (e.g., digital, traditional, mixed media) to determine their suitability for different types of illustration projects.

Communication and Career Skills Within the Work Environment

1851.26	Identify careers within digital media and visual communications.
1851.26.1	Explore careers within the fields of digital media and visual communications, including roles such as graphic designer, illustrator, web designer, animator, art director, UX/UI designer, and multimedia artist.
1851.26.2	Identify the educational qualifications and skill sets necessary for various careers in digital media and visual communications.
1851.26.3	Research degree programs, certifications, and professional development opportunities.
1851.26.4	Analyze current industry trends and the job market outlook for careers in digital media and visual communications.
1851.26.5	Investigate emerging technologies, new media platforms, and evolving design practices, discussing how these factors influence career opportunities and demand for specific roles in the industry.
1851.27	Apply communication skills for marketing.
1851.27.1	Use design principles to convey clear, compelling messages that align with marketing objectives and target audience preferences.
1851.28	Demonstrate knowledge of ethical use (e.g., copyright infringement).
1851.28.1	Understand the basic principles of copyright laws, including what constitutes copyright infringement and the concept of fair use.
1851.28.2	Research the rights of creators and the legal protections for original works, as well as the limitations and exceptions under fair use for educational and transformative purposes.
1851.28.3	Explore various types of licenses (e.g., Creative Commons, royalty-free) and learn how to find and use legally licensed images, fonts, and other design elements in their projects.

Multimedia and Photography

1851.29	Define multimedia and photography terminology.

1851.29.1	Demonstrate comprehension of essential multimedia and photography terminology.
1851.29.2	Analyze visual elements in multimedia and photography, such as composition, lighting, color, and perspective, using terminology to describe and interpret their impact on visual storytelling and aesthetic appeal in illustration projects.
1851.30	Demonstrate use of cameras and accessories.
1851.30.1	Demonstrate proficiency in operating various types of cameras.
1851.30.2	Explore and utilize a range of camera accessories such as tripods, lenses, filters, remote shutter releases, and external flashes.
1851.30.3	Understand camera functions and how to achieve desired outcomes.
1851.31	Demonstrate knowledge of post-production with cameras.
1851.31.1	Understand the basic principles of copyright laws, including what constitutes copyright infringement and the concept of fair use.
1851.31.2	Research the rights of creators and the legal protections for original works, as well as the limitations and exceptions under fair use for educational and transformative purposes.
1851.31.3	Explore various types of licenses (e.g., Creative Commons, royalty-free) and learn how to find and use legally licensed images, fonts, and other design elements in their projects.
1851.32	Define aspects of audio technology.
1851.32.1	Understand audio technology terminology.
1851.32.2	Explore various applications of audio technology in illustration and multimedia production.
1851.32.3	Recognize how audio enhances storytelling and visual communication in different contexts.
1851.33	Demonstrate understanding of the preparation of multimedia presentations (e.g., HEIF files).
1851.33.1	Explore various multimedia file formats commonly used in presentations, such as HEIF (High Efficiency Image Format), MP4 (MPEG-4), WAV (Waveform Audio File Format), and PDF (Portable Document Format), understanding their features, advantages, and limitations.

Digital Image Manipulation

1851.34	Identify image terminology (e.g., vector) .
1851.34.1	Differentiate between different types of images, including vector-based and raster-based images, understanding their characteristics, advantages, and applications in illustration and graphic design projects.
1851.34.2	Understand key image terminology including terms such as resolution, pixel, DPI (dots per inch).
1851.35	Identify and explain various file formats (e.g., .pdf, .jpg, .png).
1851.35.1	Understand common file format terminology and extensions, including formats such as PDF (Portable Document Format), JPG (Joint Photographic Experts Group), PNG (Portable Network Graphics), SVG (Scalable Vector Graphics), and layered or vector-based formats used in graphic design and illustration.
1851.35.2	Recognize the characteristics and features of different file formats.
1851.35.3	Understand file formation compatibility with different software applications, ability to preserve image quality, support for transparency and layers, and suitability for print or web-based distribution.

This course introduces the student to the knowledge base and technical skills necessary to create and manipulate computer graphics. Areas of study include production, design projects, intermediate processes, digital cameras, animation, and student organizations. Students will demonstrate knowledge and technical expertise in digital editing.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Production

1853.1	Production
1853.1.1	Prepress concepts.
1853.1.2	Graphic design production skills.
1853.1.3	Incorporate photography into graphic design using digital photographic techniques.
1853.1.4	Scan and import images and text into graphic designs.
1853.1.5	Examine various input and storage devices.
1853.1.6	Recognize PDF format.
1853.1.7	Produce color separations for both spot and process color (CMYK) design projects.

Graphic Design

1853.2	Graphic Design
1853.2.1	Graphic layouts.
1853.2.2	Design projects.
1853.2.3	Layout a sign.
1853.2.4	Design a billboard layout.
1853.2.5	Design a logo.
1853.2.6	Convert numerical data to charts and graphs.
1853.2.7	Layout a package design.
1853.2.8	Design a point-of-purchase display.
1853.2.9	Retouch photographs using imaging software.
1853.2.10	Design a multi-page printed piece that incorporates signatures.
1853.2.11	Develop a digital portfolio.

Intermediate Processes

1853.3	Intermediate Processes
1853.3.1	Techniques of digital image editing.
1853.3.2	Use image-editing software to adjust brightness, contrast, levels, and color balance.
1853.3.3	Incorporate dodging and burning techniques.
1853.3.4	Use image editing software to change a color photograph to black and white.
1853.3.5	Use a digital airbrush.

Digital Cameras

1853.4	Digital Cameras
1853.4.1	Use of digital cameras.
1853.4.2	Manipulating digital images.
1853.4.3	Recognize the features of different types of digital cameras.
1853.4.4	Operate a camera and various accessories.
1853.4.5	Transfer images to the computer.
1853.4.6	Manipulate and organize images transferred from digital cameras.

This course provides the student with the opportunity to study advanced concepts and master technical skills in the creation and manipulation of graphics.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Working in the Design Industry

1854.1	Working in the Design Industry
1854.1.1	Identify the purpose, audience, and audience needs for preparing images.
1854.1.2	Determine whether content is relevant to the purpose, audience, and audience needs.
1854.1.3	Communicate with colleagues and clients about design plans.
1854.1.4	Demonstrate knowledge of techniques for communicating about design plans with peers and clients.
1854.1.5	Demonstrate knowledge of basic project management concepts.
1854.1.6	Determine the type of copyright, permissions, and licensing required to use specific content.
1854.1.7	Identify legal and ethical considerations for using third-party content, such as copyright, permissions, and licensing.
1854.1.8	Identify when and how to obtain permission to use images of people and locations.
1854.1.9	Demonstrate knowledge of key terminology related to digital images.
1854.1.10	Demonstrate knowledge of digital image terminology.
1854.1.11	Demonstrate knowledge of how color is created in digital images.

Project Setup and Interface

1854.2	Project Setup and Interface
1854.2.1	Create a document with the appropriate settings for web, print, and video.
1854.2.2	Set appropriate document settings for printed and onscreen image.
1854.2.3	Create a new document preset to reuse for specific project needs.
1854.2.4	Identify and manipulate elements of the Photoshop interface.
1854.2.5	Organize and customize the workspace.
1854.2.6	Configure application preferences.
1854.2.7	Use non-printing design tools in the interface to aid in design or workflow.
1854.2.8	Navigate a project.
1854.2.9	Use rulers.
1854.2.10	Use guides and grids.
1854.2.11	Import assets into a project.
1854.2.12	Open or import images from various devices.

Organizing Documents

1854.3	Organizing Documents
1854.3.1	Use layers to manage design elements.
1854.3.2	Use the Layers panel to modify layers.

1854.3.3	Manage layers in a complex project.
1854.3.4	Work with multiple layers.
1854.3.5	Flatten and merge layers.
1854.3.6	Recognize the different types of layers in the Layers panel.
1854.3.7	Modify layer visibility using opacity, blending modes, and masks.
1854.3.8	Adjust a layer's opacity, blending mode, and fill opacity.
1854.3.9	Create, apply, and manipulate masks.
1854.3.10	Understand the difference between destructive and nondestructive editing.
1854.3.11	Nondestructive editing: Smart Objects, Smart Filters, and adjustment layers.
1854.3.12	Destructive editing: painting, adjustments, erasing, and rasterizing.

Creating and Modifying Visual Elements

1854.4	Creating and Modifying Visual Elements
1854.4.1	Use core tools and features to create visual elements.
1854.4.2	Create images using a variety of tools.
1854.4.3	Modify and edit vector images using a variety of vector tools.
1854.4.4	Add and manipulate text using appropriate typographic settings.
1854.4.5	Use type tools to add typography to a design.
1854.4.6	Adjust character settings in a design.
1854.4.7	Adjust paragraph settings in a design.
1854.4.8	Convert text to graphics.
1854.4.9	Modify and refine selections using various methods.
1854.4.10	Make selections using a variety of tools.
1854.4.11	Save and load selections.
1854.4.12	Transform digital graphics and media.

This course introduces the student to the knowledge base and technical skills in desktop publishing. Areas of study include production skills, design projects, portfolio development, and student organizations. Students will demonstrate knowledge and technical expertise in page layout.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Working in the Design Industry

1855.1	Working in the Design Industry
1855.1.1	Identify the purpose, audience, and audience needs for preparing images.
1855.1.2	Determine whether content is relevant to the purpose, audience, and audience needs.
1855.1.3	Communicate with colleagues and clients about design plans.
1855.1.4	Demonstrate knowledge of techniques for communicating about design plans with peers and clients.
1855.1.5	Demonstrate knowledge of basic project management concepts.
1855.1.6	Determine the type of copyright, permissions, and licensing required to use specific content.
1855.1.7	Identify legal and ethical considerations for using third-party content, such as copyright, permissions, and licensing.
1855.1.8	Identify when and how to obtain permission to use images of people and locations.
1855.1.9	Demonstrate an understanding of key terminology related to digital images.
1855.1.10	Demonstrate knowledge of digital image terminology.
1855.1.11	Demonstrate knowledge of how color is created in digital images.
1855.1.12	Demonstrate knowledge of basic design principles and best practices employed in the design industry.

Project Setup and Interface

1855.2	Project Setup and Interface
1855.2.1	Create a document with the appropriate settings for web, print, and video.
1855.2.2	Set appropriate document settings for printed and onscreen images.
1855.2.3	Create document presets to reuse for specific project needs.
1855.2.4	Navigate, organize, and customize the application workspace.
1855.2.5	Identify and manipulate elements of the Illustrator interface.
1855.2.6	Organize and customize the workspace.
1855.2.7	Configure application preferences.
1855.2.8	Use non-printing design tools in the interface to aid in design or workflow.
1855.2.9	Navigate documents.
1855.2.10	Use rulers.
1855.2.11	Use guides and grids.
1855.2.12	Use views and modes to work efficiently with vector graphics.

Organizing Documents

1855.3	Organizing Documents
1855.3.1	Use layers to manage design elements.
1855.3.2	Use the Layers panel to modify layers.

1855.3.3	Manage layers in a complex project.
1855.3.4	Work with multiple layers.
1855.3.5	Modify layer visibility using opacity and masks.
1855.3.6	Adjust a layer's opacity.
1855.3.7	Create, apply, and manipulate clipping masks.

Creating and Modifying Visual Elements

1855.4	Creating and Modifying Visual Elements
1855.4.1	Use core tools and features to create visual elements.
1855.4.2	Create images using a variety of tools.
1855.4.3	Modify and edit vector images using a variety of vector tools.
1855.4.4	Add and manipulate text using appropriate typographic settings.
1855.4.5	Use type tools to add typography to a design.
1855.4.6	Use appropriate character settings in a design.
1855.4.7	Use appropriate paragraph settings in a design.
1855.4.8	Convert text to graphics.
1855.4.9	Manage text flow across multiple text areas.
1855.4.10	Make, manage, and manipulate selections.
1855.4.11	Select objects using a variety of tools.
1855.4.12	Modify and refine selections using various methods.

This course improves the student's ability to produce real-world designs for clients. Areas of study include advanced page layout, employability skills, and student organizations. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Working in the Design Industry

1856.1	Working in the Design Industry
1856.1.1	Identify the purpose, audience, and audience needs for preparing images.
1856.1.2	Determine whether content is relevant to the purpose, audience, and audience needs.
1856.1.3	Communicate with colleagues and clients about design plans.
1856.1.4	Demonstrate knowledge of techniques for communicating about design plans with peers and clients.
1856.1.5	Demonstrate knowledge of basic project management concepts.
1856.1.6	Determine the type of copyright, permissions, and licensing required to use specific content.
1856.1.7	Identify legal and ethical considerations for using third-party content, such as copyright, permissions, and licensing.
1856.1.8	Identify when and how to obtain permission to use images of people and locations.
1856.1.9	Demonstrate an understanding of key terminology related to digital images.
1856.1.10	Demonstrate knowledge of digital image terminology.
1856.1.11	Demonstrate knowledge of how color is created in digital images.
1856.1.12	Demonstrate knowledge of basic design principles and best practices employed in the design industry.

Project Setup and Interface

1856.2	Project Setup and Interface
1856.2.1	Create a document with the appropriate settings for web, print, and video.
1856.2.2	Set appropriate document settings for printed and onscreen images.
1856.2.3	Create document presets to reuse for specific project needs.
1856.2.4	Navigate, organize, and customize the application workspace.
1856.2.5	Identify and manipulate elements of the Illustrator interface.
1856.2.6	Organize and customize the workspace.
1856.2.7	Configure application preferences.
1856.2.8	Use non-printing design tools in the interface to aid in design or workflow.
1856.2.9	Navigate documents.
1856.2.10	Use rulers.
1856.2.11	Use guides and grids.
1856.2.12	Use views and modes to work efficiently with vector graphics.

Organizing Documents

1856.3	Organizing Documents
1856.3.1	Use layers to manage design elements.
1856.3.2	Use the Layers panel to modify layers.
1856.3.3	Manage layers in a complex project.
1856.3.4	Work with multiple layers.
1856.3.5	Modify layer visibility using opacity and masks.
1856.3.6	Adjust a layer's opacity.
1856.3.7	Create, apply, and manipulate clipping masks.

Creating and Modifying Visual Elements

1856.4	Creating and Modifying Visual Elements
1856.4.1	Use core tools and features to create visual elements.
1856.4.2	Create images using a variety of tools.
1856.4.3	Modify and edit vector images using a variety of vector tools.
1856.4.4	Add and manipulate text using appropriate typographic settings.
1856.4.5	Use type tools to add typography to a design.
1856.4.6	Use appropriate character settings in a design.
1856.4.7	Use appropriate paragraph settings in a design.
1856.4.8	Convert text to graphics.
1856.4.9	Manage text flow across multiple text areas.
1856.4.10	Make, manage, and manipulate selections.
1856.4.11	Select objects using a variety of tools.
1856.4.12	Modify and refine selections using various methods.

Principles of Page Layout

1856.5	Principles of Page Layout
1856.5.1	Page set up.
1856.5.2	Page layout.
1856.5.3	Complete real-world page layout projects for local businesses, industries, and organizations.
1856.5.4	Create a complicated business form and prepare it for reproduction.

This course provides an introduction to the essential knowledge and technical skills for the Graphic Design. Students will learn about graphic design equipment and materials, computer skills, copyright laws, and design principles. Emphasis is placed on personal and professional ethics and exploring career opportunities in graphic design. Through problem-solving techniques, hands-on laboratory activities, and real-world learning opportunities, students will develop a comprehensive understanding of graphic design concepts, preparing them for future careers in the industry.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Computer Literacy

1857.1	Explore and apply basic computer operation skills.
1857.1.1	Understand the user interface and tools commonly used in graphic design software (e.g., Adobe Creative Suite, Canva, GIMP).
1857.1.2	Identify essential keyboard shortcuts for efficient workflow.
1857.1.3	Demonstrate file management and storage skills.
1857.1.4	Demonstrate basic computer skills such as differentiating file formats, utilize various input and output devices, and determine appropriate software for each project.
1857.1.5	Use terms related to computer skills in advertising and graphic design correctly and appropriately.
1857.1.6	Examine and utilize industry standard vector-based illustration software (i.e., Adobe Illustrator, Corel Draw, Inkscape, etc.).
1857.1.7	Examine and utilize industry standard image manipulation software (i.e., Adobe Photoshop, Gimp, Pixar, etc.).
1857.1.8	Examine and utilize industry standard page layout software. (i.e., Adobe InDesign).

Digital Literacy and Application

1857.9	Exhibit knowledge of design elements and principles.
1857.9.1	Demonstrate how design elements and principles contribute to the overall effectiveness of the design.
1857.9.2	Examine the importance of contrast in creating visual interest and emphasis.
1857.10	Describe characteristics of design for different media (e.g., logos, magazines).
1857.10.1	Identify and describe the distinct characteristics and design considerations specific to various media formats, such as logos, magazines, websites, and advertisements
1857.11	Choose appropriate visual stages of layout (e.g., thumbnail, comprehensive).
1857.11.1	Demonstrate an understanding of the visual stages of layout development in graphic design, including thumbnail sketches, rough layouts, and comprehensive layouts
1857.12	Demonstrate understanding of related math (e.g., proportion, percentage).

Color Theory and Application

1857.13	Identify color theory terminology (e.g., colors, RGB)
1857.13.1	Explain basic principles of color theory and digital color management in advertising and graphic design.

1857.13.2	Explain the role of color in marketing and branding and identify examples of effective use of color in existing advertising and graphic design works.
1857.14	Demonstrate the use of color to create impact or effect.
1857.14.1	Analyze the psychological and emotional effects of color.
1857.15	Identify colors to obtain shades, tints, or neutrals.
1857.15.1	Differentiate between shades, tints, and neutrals.
1857.16	Choose and apply appropriate color scheme.
1857.16.1	Analyze the characteristics of various color schemes such as monochromatic, complementary, analogous, and triadic.
1857.16.2	Select the most suitable scheme based on the intended message and target audience of a design project.
1857.16.3	Analyze and explain the use of color theory in existing graphic design works, including advertising and corporate branding.
1857.17	Identify correct use of RGB and CMYK colors.
1857.17.1	Distinguish between RGB and CMYK color modes, understanding their respective uses in digital and print design.
1857.17.2	Convert colors between the two modes accurately.

Digital Illustration and Drawing

1857.18	Identify drawing and digital illustration terminology.
1857.18.1	Define common Graphic Design terminology.
1857.18.2	Understand how line weight and style impact visual communication.
1857.18.3	Explain the difference between raster (pixel-based) and vector (path-based) graphics and when to use each type.
1857.18.4	Develop graphics and layouts for product illustrations, company logos, etc.
1857.19	Identify drawing tools and materials.
1857.19.1	Identify and describe common traditional drawing tools, such as pencils (HB, 2B, 4B), charcoal, ink pens, and graphite sticks.
1857.19.2	Recognize different types of graphics tablets (e.g., pen displays, pen tablets).
1857.19.3	Understand the concept of layers in digital design.
1857.19.4	Identify various brush types (e.g., round, textured, scatter).
1857.20	Modify illustrations (e.g., thickness)
1857.20.1	Discuss the impact of scaling on visual composition.
1857.20.2	Use layers to isolate and modify specific parts of an illustration
1857.21	Identify ways to import, export, and save images (e.g., scanning, digitizing).
1857.21.1	Demonstrate importing, exporting, and saving images for appropriate media/medium.

Production and Printing

1857.22	Identify production and printing terminology.
1857.22.1	Identify and describe the steps involved in the prepress, press, and post-press stages of the printing process, including file preparation, proofing, and finishing techniques.
1857.22.2	Create a print-ready digital illustration that adheres to professional standards, including proper resolution, color mode, and bleed settings
1857.23	Demonstrate proofing, preflighting, and final production.
1857.23.1	Demonstrate the ability to proof their illustrations by creating and evaluating test prints, making necessary adjustments to ensure color accuracy, alignment, and overall quality.

1857.24	Determine what media/medium works best for a project and what to designate when specifying for output.
1857.24.1	Identify media by common size, weight, number, and finish.
1857.24.2	Compare and contrast various media and mediums (e.g., digital, traditional, mixed media) to determine their suitability for different types of illustration projects.

Communication and Career Skills

1857.25	Apply communication skills for marketing
1857.25.1	Demonstrate personal presentation skills (e.g., speaking, listening, writing).
1857.25.2	Demonstrate ability to accept and/or give constructive criticism.
1857.25.3	Apply effective communication skills for marketing purposes, including conducting research, brainstorming ideas, and utilizing sales techniques
1857.25.4	Use technology to create a variety of audio, visual, written, and electronic presentations.

Multimedia and Photography

1857.26	Define multimedia and photography terminology.
1857.26.1	Explore photography terminology including aperture, shutter speed, ISO, focal length, depth of field, and composition rules.
1857.26.2	Manipulate camera settings to achieve specific photographic effects.
1857.26.3	Discuss the use of multimedia and photography terminology as part of the creative process.
1857.27	Demonstrate use of cameras and accessories.
1857.27.1	Demonstrate proficiency in operating a digital camera, including adjusting settings such as aperture, shutter speed, ISO, and white balance to achieve desired photographic effects.
1857.27.2	Explore the use of photography accessories such as tripods, filters, lenses, and external flashes.
1857.28	Demonstrate knowledge of post-production with cameras.
1857.28.1	Understand the importance of non-destructive editing practices in post-production.
1857.28.2	Identify elements of the image manipulation software user interface and demonstrate knowledge of their functions.
1857.28.2	Identify appropriate resolution for projects.
1857.29	Define aspects of audio technology.
1857.29.1	Identify and define key aspects of audio technology, including concepts such as sound waves, frequency, amplitude, pitch, and volume.
1857.29.2	Explore the principles of digital audio technology, including sampling, bit depth, compression, and file formats.
1857.29.3	Analyze the role of audio technology in multimedia design.
1857.29.4	Understand how sound elements contribute to the overall user experience and message delivery in various media formats.
1857.30	Demonstrate understanding of the preparation of multimedia presentations (e.g., HEIF files)
1857.30.1	Analyze the role of multimedia presentations in visual communication and marketing, understanding how effective design and presentation techniques contribute to audience engagement and message delivery.

Digital Image Manipulation

1857.31	Identify image terminology (e.g., raster, vector, continuous tone, half tone, line art).

1857.31.1	Identify various image types such as continuous tone, half tone, and line art, learning their specific applications in graphic design and the printing process.
1857.31.2	Explore the importance of image resolution and quality in graphic design.
1857.31.3	Demonstrate how raster images can be impacted by scaling and the significance of maintaining appropriate resolution for different media outputs.
1857.32	Identify and explain various file formats (e.g., .pdf, .jpg, .png, .eps).
1857.32.1	Describe the characteristics, advantages, and common uses of various file formats including .pdf, .jpg, .png, and .eps.
1857.32.2	Demonstrate an understanding of the differences between raster and vector file formats by explaining how .jpg, .png, and .eps formats function and are utilized in different design contexts.
1857.32.3	Convert a design project into different file formats (.pdf, .jpg, .png, .eps) and evaluate the quality and compatibility of each format in both print and digital environments.
1857.33	Identify appropriate resolution for projects.
1857.33.1	Explain the concept of resolution, including the differences between DPI (dots per inch) and PPI (pixels per inch).
1857.33.2	Explore common resolution issues, such as pixelation and blurriness.
1857.33.3	Develop strategies to prevent these problems by correctly setting and maintaining resolution standards throughout the design process.
1857.34	Manipulate images (e.g., restore, color correct, masking).
1857.34.1	Identify elements of the image manipulation software user interface and demonstrate knowledge of their functions.
1857.34.2	Transform images using a variety of basic tools.
1857.34.3	Apply basic layer management and masks.

This course introduces the student to basic advertising concepts and advanced layout procedures. Areas of study include demographics, mechanical preparation, vector and raster graphics, and student organizations. Students will demonstrate knowledge and technical expertise in the mechanical preparation of design projects. Emphasis will be placed on personal and professional ethics, and students will explore a variety of career opportunities. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to graphic design occupations. Safety instruction is integrated into all activities. Students are encouraged to become active members of Skills USA for additional co-curricular opportunities that enhance student achievement, develop student leadership, and support experiential learning. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Digital Literacy and Application

1859.1	Exhibit knowledge of design elements and principles.
1859.1.1	Create an original graphic design project that effectively incorporates the elements and principles of design.
1859.2	Describe characteristics of design for different media (e.g., logos, magazines).
1859.2.1	Demonstrating an understanding of how design principles are applied differently depending on the medium.
1859.3	Choose appropriate visual stages of layout (e.g., thumbnail, comprehensive).
1859.3.1	Create a multi-stage project from initial concept to final design.
1859.4	Demonstrate understanding of related math (e.g., proportion, percentage).
1859.4.1	Apply mathematical concepts such as proportion, ratio, and percentage to printing materials needed for printing processes.

Color Theory and Application

1859.5	Create visually impactful designs, utilizing color theory principles such as hue, saturation, and contrast.
1859.5.1	Create visually impactful designs, utilizing color theory principles such as hue, saturation, and contrast to evoke emotions.
1859.6	Identify colors to obtain shades, tints, or neutrals.
1859.6.1	Demonstrate proficiency in using color mixing techniques to create variations of a base color.
1859.6.2	Enhance the visual impact of their design projects, selecting and using appropriate color variations to create depth, contrast, and visual interest.
1859.7	Choose and apply appropriate color scheme.
1859.7.1	Demonstrate proficiency in applying chosen color schemes to design projects, using color theory principles to create visually cohesive and harmonious compositions.
1859.7.2	Create design projects optimized for both digital and print mediums, ensuring color consistency and accuracy across various outputs.
1859.8	Identify and utilize Pantone Matching System.

1859.8.1	Demonstrate ability to accurately select, utilize, and match Pantone colors.
1859.8.2	Integrate Pantone colors into their design projects effectively
1859.8.3	Apply standardized color systems to ensure color consistency in print and digital media.

Digital Illustration and Drawing

1859.9	Create designs experimenting with different media.
1859.9.1	Identify various brush types (e.g., round, textured, scatter).
1859.9.2	Customize brush settings (size, opacity, flow) for specific tasks.
1859.9.3	Create designs, concepts, and sample layouts based on knowledge of layout principles and aesthetic design concepts.
1859.9.4	Modify illustrations (e.g., size, color, stroke).
1859.9.5	Determine size, color and arrangement of illustrative material and copy, and select color, style, and size of type.
1859.10	Modify illustrations (e.g., thickness).
1859.10.1	Incorporate principles of design (i.e., balance, contrast, alignment, rhythm, repetition, proximity, movement, harmony, emphasis, unity, etc.) in student-generated graphic works.
1859.10.2	Modify illustrations by resizing elements while maintaining proportions.
1859.10.3	Demonstrate the principles of design through various design techniques.
1859.11	Identify ways to import, export, and save images (e.g., scanning, digitizing).
1859.11.1	Confer with clients to discuss and determine layout design.

Production and Printing

1859.12	Identify production and printing terminology.
1859.1	Create a print-ready digital production that adheres to professional standards, including proper resolution, color mode, and bleed settings.
1859.13	Demonstrate proofing, preflighting, and final production.
1859.13.1	Perform a preflight check on their digital illustrations to ensure all elements meet professional print standards, including resolution, color profiles, and file formats.
1859.13.2	Finalize a digital illustration for print production.
1859.13.3	Provide job specifications for printer.
1859.14	Determine what media/medium works best for a project and what to designate when specifying for output.
1859.14.1	Create projects using the appropriate media/medium.

Communication and Career Skills

1859.15	Apply communication skills for marketing.
1859.15.1	Develop compelling graphic design solutions that resonate with target audiences and achieve desired marketing objectives.

Multimedia and Photography

1859.16	Demonstrate use of cameras and accessories.
1859.16.1	Utilize appropriate camera equipment and accessories for specific photography tasks or projects, considering factors such as subject matter, lighting conditions, and desired artistic expression.
1859.16.2	Execute a photography project justifying specific camera equipment usage and accessories based on project requirements.
1859.17	Demonstrate knowledge of post-production with cameras.
1859.17.1	Demonstrate proficiency in using post-production software to edit and enhance digital photographs.
1859.17.2	Demonstrate use of adjustment layers, masks, and smart objects to maintain flexibility and preserve image quality throughout the editing process.
1859.17.3	Export and prepare digital photographs for various outputs and mediums.
1859.18	Define aspects of audio technology.
1859.18.1	Create a multimedia project that incorporates audio elements, such as background music, voiceovers, or sound effects
1859.18.2	Create audio files by recording and manipulating sound samples. (sampling rate and bit depth).
1859.19	Demonstrate understanding of the preparation of multimedia presentations (e.g., HEIF files)
1859.19.1	Create a multimedia presentation using HEIF files to showcase their understanding of the format.
1859.19.2	Optimize multimedia content for efficient delivery and playback, understanding techniques such as file compression, resolution adjustment, and multimedia integration to enhance presentation performance.

Digital Image Manipulation

1859.20	Produce digital files for product development, using various file outputs and techniques.
1859.20.1	Identify appropriate resolution for projects.
1859.20.2	Apply the appropriate resolution settings for different types of graphic design projects, ensuring optimal quality for print and digital outputs.
1859.21	Manipulate images (e.g., restore, color correct, masking).
1859.21.1	Apply techniques for restoring damaged or old photographs or images, including removing scratches, repairing torn edges, and enhancing faded colors.
1859.21.2	Demonstrate proficiency in color correction techniques, such as adjusting brightness, contrast, hue, saturation, and levels to improve the overall appearance of an image.
1859.21.3	Create a composite image project that involves using layer masks and selection tools to combine multiple images into a cohesive design.

Work Environment

1859.22	Maintain a safe and productive work environment.
1859.22.1	Identify basic tools and equipment.
1859.22.2	Maintain a safe and clean work environment.
1859.22.3	Evaluate and simulate workplace soft skills, and safety protocols.

Digital Image Manipulation

1859.23	Develop illustration and manipulation techniques.
1859.23.1	Identify image terminology (e.g., raster, vector, continuous tone, half tone, line art).
1859.23.1	Identify and explain various file formats (e.g., .pdf, .jpg, .png, .eps).
1859.23.1	Identify appropriate resolution for projects.
1859.23.1	Manipulate images (e.g., restore, color correct, masking).
1859.23.1	Produce digital files for product development, using various file outputs and techniques.
1859.23.1	Identify elements of the image manipulation software user interface and demonstrate knowledge of their functions.
1859.23.1	Transform images using a variety of basic tools.
1859.23.1	Apply basic layer management and masks.

This course introduces the student to advanced topics in illustration. Areas of study include color theory, proportion, visual storytelling, and portfolios. Students will demonstrate knowledge and technical expertise in advanced illustration techniques. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to graphic design occupations.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Computer Literacy

1861.1	Demonstrate proficiency in computer skills and legal compliance.
1861.1.1	Understanding file formats and resolution settings to ensure optimal output for various mediums, such as print or web.

Typography

1861.2	Demonstrate understanding and calculation of type measurements.
1861.2.1	Demonstrate the ability to calculate type measurements accurately for various design applications, such as converting between points and pixels, determining appropriate leading (line spacing) based on font size, and setting margins using ems and ens.
1861.2.2	Design projects that require the practical application of type measurements, such as posters, book covers, and digital graphics, and critique their work to ensure consistency, readability, and aesthetic quality based on accurate type measurement calculations.
1861.3	Identify and use proofreader's marks.
1861.3.1	Integrate proofreading skills into illustration and design projects.
1861.4	Demonstrate understanding of typography adjustments (e.g., tracking, kerning, readability).
1861.4.1	Demonstrate proficiency in adjusting typography elements such as tracking, kerning, leading, and font size to enhance readability, visual balance, and overall typographic aesthetics in their illustration projects.
1861.4.2	Analyze typography adjustments in real-world design contexts, examining how adjustments influence readability, hierarchy, and visual flow in various media
1861.4.3	Apply understanding of typography adjustments by implementing precise tracking, kerning, and leading adjustments to typography elements in illustration projects.
1861.5	Set type through character and paragraph formatting.
1861.5.1	Create designs that demonstrate typographical consistency and coherence by effectively using both character and paragraph formatting.
1861.6	Apply practical application of typography.
1861.6.1	Apply principles of design to typographic layouts, including balance, contrast, alignment, repetition, proximity, and hierarchy.
1861.6.2	Understand the difference between legibility and readability and apply techniques to enhance both in typographic compositions.
1861.6.3	Understand web typography basics, including responsive design, web fonts, and the use of CSS for typographic styling.
1861.6.4	Adapt typography for various formats and contexts, such as print, digital, environmental graphics, and packaging.

1861.6.5	Experiment with typography as a form of visual expression, exploring creative ways to convey messages and emotions through type.

Digital Literacy and Application

1861.7	Exhibit knowledge of design elements and principles.
1861.7.1	Apply design principles, including balance, contrast, emphasis, movement, pattern, rhythm, unity, proportion, and variety, to develop cohesive and dynamic compositions.
1861.7.2	Develop the ability to brainstorm and conceptualize ideas for illustrations using design elements and principles.
1861.7.3	Apply design elements and principles in various practical projects, such as posters, book covers, character designs, and digital illustrations.
1861.7.4	Demonstrate proficiency in utilizing design elements such as line, shape, color, texture, form, space, and value to create visually compelling and technically proficient illustrations.
1861.7.5	Practice refining illustrations based on constructive feedback and conceptual development techniques.
1861.8	Exhibit knowledge of database management and variable data printing.
1861.8.1	Execute a design project that utilizes database information for personalization.
1861.9	Demonstrate techniques of 2-D design.
1861.9.1	Explore a variety of traditional and digital 2-D design techniques.
1861.9.2	Experiment with advanced composition and layout strategies.
1861.9.3	Integrate knowledge of 2-D design techniques in manipulating design elements.
1861.10	Demonstrate techniques of 3-D design.
1861.10.1	Experiment with advanced 3-D modeling techniques using software.
1861.10.2	Explore concepts such as extrusion, sculpting, texturing, and lighting to create realistic and expressive 3-D illustrations.
1861.10.3	Demonstrate proficiency in incorporating 3-D elements, environments, and characters to enhance visual storytelling and create immersive illustrations.
1861.11	Produce project to client specifications.
1861.11.1	Analyze and interpret client briefs, identifying key requirements, objectives, and constraints for illustration projects.
1861.11.2	Engage in client consultations ensuring a thorough understanding of client expectations and preferences.
1861.11.3	Translate client specifications into visual concepts.
1861.11.4	Apply illustration skills and creativity to produce high-quality artwork that meets or exceeds client expectations while adhering to project deadlines and budget constraints.
1861.12	Describe characteristics of design for different media (e.g., logos, magazines).
1861.12.1	Evaluate design strategies tailored to specific media outlets, understanding how design choices differ based on audience, purpose, and context, and apply this knowledge to develop effective illustrations for diverse platforms.
1861.12.2	Apply understanding of media-specific design characteristics by creating illustrations tailored to different media formats.
1861.13	Choose appropriate visual stages of layout (e.g., thumbnail, comprehensive).
1861.13.1	Create and develop multiple thumbnail sketches to explore different ideas and compositions quickly.
1861.13.2	Produce comprehensive layouts based on their refined rough layouts, ensuring that all design elements, colors, typography, and images are accurately represented and polished.
1861.14	Demonstrate understanding of related math (e.g., proportion, percentage).
1861.14.1	Analyze and critique the layout designs of professional illustrators and designers, identifying mathematical patterns and principles that contribute to the effectiveness of their compositions.

Color Theory and Application

1861.15	Identify color theory terminology (e.g., colors, RGB).
1861.15.1	Apply their knowledge of color theory terminology in their illustration projects, selecting and combining colors purposefully to achieve specific visual effects and convey intended messages.
1861.16	Identify colors to obtain shades, tints, or neutrals.
1861.16.1	Apply their understanding of shades, tints, and neutrals in their illustration projects to create depth, dimension, and visual interest.
1861.16.2	Utilize shades to add shadows and depth, tints to create highlights and brightness, and neutrals to balance and harmonize color schemes, enhancing the overall visual impact and realism of their artwork.
1861.17	Identify correct use of RGB and CMYK colors.
1861.17.1	Apply understanding of RGB and CMYK colors in their illustration projects.
1861.17.2	Convert artwork between RGB and CMYK color modes as needed, understanding how to maintain color consistency and accuracy across different mediums.
1861.18	Identify and utilize Pantone Matching System (PMS).
1861.18.1	Identify and select specific Pantone colors using the Pantone Matching System (PMS) guide.
1861.18.2	Demonstrate ability to match colors for consistency in professional print and digital media.
1861.18.3	Create an original illustration project that incorporates a specified set of Pantone colors.
1861.18.4	Compare and contrast RGB, CMYK, and PMS.

Digital Illustration and Drawing

1861.19	Identify drawing tools and materials.
1861.19.1	Experiment with advanced digital drawing concepts such as layering, masking, blending modes, and digital texturing.
1861.20	Render drawing to reflect various perspectives (e.g., three-point).
1861.20.1	Practice drawing simple objects.
1861.20.2	Produce accurate renderings of posed subjects or from photographs, using any combination of freehand drawing, or computer software.
1861.20.3	Apply three-point perspective to depict towering buildings, trees, or expansive cityscapes.
1861.20.4	Enhance the illusion of depth and scale by choosing low or high angles.
1861.21	Utilize different drawing techniques (e.g., stippling).
1861.21.1	Apply drawing techniques to digital projects, considering composition and style.
1861.21.2	Create illustrations that demonstrate creative expression expanding on technical skills in digital illustration.
1861.22	Modify illustrations (e.g., thickness).
1861.22.1	Experiment with varying line thickness to create depth and contrast.
1861.22.2	Apply layer effects to enhance illustrations.
1861.22.3	Create illustrations that showcase intentional variations in stroke thickness.
1861.22.4	Refine proficiency in using digital illustration software demonstrating advanced techniques in digital drawing, painting, and manipulation of digital brushes and effects.
1861.23	Identify ways to import, export, and save images with peripheral devices.
1861.23.1	Demonstrate industry standards when importing, exporting, and saving images.

Production and Printing

1861.24	Identify production and printing terminology.

1861.24.1	Create a print-ready digital illustration that adheres to professional standards, including proper resolution, color mode, and bleed settings.
1861.25	Demonstrate proofing, preflighting, and final production.
1861.25.1	Demonstrate the ability to proof their illustrations by creating and evaluating test prints, making necessary adjustments to ensure color accuracy, alignment, and overall quality.
1861.25.2	Finalize a digital illustration for print production.
1861.26	Determine what media/medium works best for a project and what to designate when specifying for output.
1861.26.1	Select the most effective media or medium for a complex illustration project, considering factors such as project scope, intended audience, and final application.

Communication and Career Skills Within the Work Environment

1861.27	Apply communication skills for marketing.
1861.27.1	Apply their illustration skills to create effective visual marketing materials such as posters, flyers, social media graphics, and advertisements.
1861.27.2	Create persuasive marketing messages that complement their visual designs, including taglines, headlines, and body copy.
1861.27.3	Demonstrate proficiency in using digital tools and software (e.g., Adobe Creative Suite, Canva) to produce and refine marketing assets.
1861.27.4	Integrate illustrations into broader marketing campaigns, understanding the role of digital platforms and social media in reaching and engaging with target audiences.
1861.27.5	Apply typographic principles to branding projects, including the selection of typefaces that convey a brand's identity and message.
1861.28	Demonstrate knowledge of ethical use (e.g., copyright infringement).
1861.28.1	Practice proper citation and attribution techniques when using reference materials or incorporating elements created by others, ensuring they respect intellectual property rights.
1861.28.2	Create original illustrations and use licensed resources appropriately, understanding the importance of originality and ethical use in their work.

Multimedia and Photography

1861.29	Demonstrate use of cameras and accessories.
1861.29.1	Experiment with creative photography techniques.
1851.30	Demonstrate knowledge of post-production with cameras.
1861.30.1	Understand post-production techniques used in photography, including image editing, retouching, color correction, and enhancement.
1861.30.2	Apply knowledge of post-production techniques to enhance the quality and visual impact of projects.
1861.30.3	Demonstrate the ability to edit and refine images to meet creative objectives and convey intended messages effectively.
1861.31	Define aspects of audio technology.
1861.31.1	Analyze advanced audio equipment and systems used in professional multimedia production.
1861.31.2	Integrate knowledge of audio technology into illustration projects, exploring techniques such as sound design, audio storytelling, voice-over narration, and music composition to enhance visual narratives and create immersive multimedia experiences.
1861.32	Demonstrate understanding of the preparation of multimedia presentations (e.g., HEIF files).

1861.32.1	Prepare multimedia presentations, including selecting appropriate file formats, optimizing media content for compatibility and quality, and organizing presentation elements effectively to convey information and engage audiences successfully.

Digital Image Manipulation

1861.33	Identify appropriate resolution for projects.
1861.33.2	Understand resolution concepts, including pixel dimensions, DPI (dots per inch), PPI (pixels per inch), and their significance in determining image quality and print/web output.
1861.33.3	Determine the appropriate resolution needed to achieve desired visual quality and clarity.
1861.33.4	Apply industry standards and best practices for resolution.
1861.34	Manipulate images (e.g., masking, saturation) .
1861.34.1	Develop mastery in various image manipulation techniques, including masking, saturation adjustment, color correction, retouching, blending modes, and layer effects.
1861.34.2	Enhance and transform images, experimenting with artistic effects, compositing, surreal imagery, and photo manipulation to convey mood, narrative, and visual impact.
1861.34.3	Demonstrate proficiency in editing workflows, non-destructive editing techniques, and efficient use of editing tools.

Welding I serves as an initiation into the extensive knowledge and technical skills integral to the welding industry. The course commences with a comprehensive curriculum covering Basic Safety, Construction Math, Hand and Power Tools, Construction Drawings, Rigging, Communication Skills, Employability Skills, and Materials Handling. This foundational phase prepares students for in-depth exploration of welding fundamentals, encompassing Welding Safety, Oxyfuel Cutting, and Plasma Arc Cutting. As the course progresses, students develop the essential skills needed for advanced proficiency in welding.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1862.1	Identify various welding hazards and safe practices.
1862.1.1	Identify hazards associated with environmental extremes.
1862.1.2	Identify hazards associated with hot work.
1862.1.3	Identify fire hazards and describe basic firefighting procedures.
1862.1.4	Identify confined spaces and describe the related safety considerations.
1862.1.5	Identify potential respiratory hazards and the basic respirators used to protect workers against those hazards.
1862.1.6	Identify various exposure hazards commonly found on job sites.
1862.1.7	Identify and describe the basic use of PPE used to protect workers from bodily injury.
1862.2	Display familiarity with industrial and OSHA safety standards.
1862.2.1	Follow safety and security procedures.
1862.2.2	Define incidents and the significant costs associated with them.
1862.2.3	Identify the common causes of incidents and their related consequences.
1862.2.4	Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).
1862.2.5	Explain the importance of lockout/tagout and describe basic procedures.
1862.2.6	Describe basic job-site electrical safety guidelines.
1862.2.7	Identify and describe various fall hazards
1862.2.8	Identify and describe equipment and methods used in fall prevention and fall arrest
1862.2.9	Identify and describe the safe use of ladders and stairs
1862.2.10	Identify and describe the safe use of scaffolds
1862.2.11	Identify and explain how to avoid struck-by and caught-in-between hazards
1862.2.12	Identify and explain how to avoid caught-in and caught-between hazards
1862.3	Demonstrate knowledge of oxyfuel safety procedures.
1862.3.1	Describe basic oxyfuel cutting.
1862.3.2	Identify safe work practices related to oxyfuel cutting.
1862.3.3	Identify and describe various gases and cylinders used for oxyfuel cutting.
1862.3.4	Identify cylinders used for oxyfuel cutting.
1862.3.5	Identify and describe hoses and various types of regulators.
1862.3.6	Identify and describe cutting torches and tips.
1862.3.7	Identify and describe other miscellaneous oxyfuel cutting accessories.

1862.3.8	Identify and describe specialized cutting equipment.
1862.3.9	Explain how to properly prepare a torch set for operation.
1862.3.10	Explain how to leak test oxyfuel equipment.
1862.3.11	Explain how to light the torch and adjust for the proper flame.
1862.3.12	Explain how to properly shut down oxyfuel cutting equipment. identify the appearance of both good and inferior cuts and their causes.
1862.3.13	Explain how to cut both thick and thin steel.
1862.3.14	Explain how to bevel, wash, and gouge.
1862.3.15	Explain how to make straight and bevel cuts with portable oxyfuel cutting machines.
1862.4	Demonstrate knowledge of arc welding and cutting safety procedures.
1862.4.1	Recognize the main causes of accidents.
1862.4.2	Research agencies that are responsible for emergencies in the workplace.
1862.4.3	Develop a plan which outlines the procedures for handling an accident.
1862.4.4	Demonstrate operating instructions before using any equipment.
1862.5	Demonstrate proper and safe use of PPE, hand tools, and power equipment.
1862.5.1	Wear PPE as require for specified task.

Oxyfuel Cutting (OFC)

1862.6	Identify oxyfuel cutting principles.
1862.6.1	Describe basic oxyfuel cutting.
1862.6.2	Identify safe work practices related to oxyfuel cutting.
1862.7	Identify and maintain oxyfuel equipment.
1862.7.1	Identify and describe various gases and cylinders used for oxyfuel cutting.
1862.7.2	Identify and describe hoses and various types of regulators.
1862.7.3	Identify and describe cutting torches and tips.
1862.7.4	Identify and describe other miscellaneous oxyfuel cutting accessories.
1862.7.5	Identify and describe specialized cutting equipment.
1862.8	Assemble and disassemble oxyfuel equipment.
1862.8.1	Explain how to properly prepare a torch set for operation.
1862.8.2	Explain how to leak test oxyfuel equipment.
1862.8.3	Explain how to light the torch and adjust for the proper flame.
1862.8.4	Explain how to properly shut down oxyfuel cutting equipment.
1862.9	Handle and store compressed gas cylinders.
1862.9.1	Explain the properties and characteristics of gases commonly used in OFC.
1862.9.2	Demonstrate proper handling techniques for compressed gas cylinders.
1862.9.3	Inspect cylinders for damage, corrosion, or leaks.
1862.9.4	Follow safety protocols when handling and storing compressed gas cylinders to prevent accident and injuries.
1862.10	Cut and form metal with oxyfuel equipment.
1862.10.1	Identify the appearance of both good and inferior cuts and their causes.
1862.10.2	Explain how to cut both thick and thin steel.
1862.10.3	Explain how to bevel, wash, and gouge.
1862.10.4	Explain how to make straight and bevel cuts with portable oxyfuel cutting machines.

Arc Cutting Process (Carbon Arc and Plasma Arc)

1862.11	Identify arc cutting process principles.

1862.11.1	Describe the plasma arc cutting processes.
1862.11.2	Define air-carbon arc cutting.
1862.12	Assemble and disassemble arc cutting equipment.
1862.12.1	Identify and describe plasma arc power units.
1862.12.2	Identify and describe plasma arc torches and accessories.
1862.12.3	Identify and describe plasma arc cutting gases and gas control devices.
1862.12.4	Identify and describe air-carbon arc cutting equipment.
1862.12.5	Identify and describe various types of electrodes.
1862.13	Identify and maintain arc cutting equipment.
1862.13.1	Describe how to set up plasma arc cutting equipment and the adjacent work area.
1862.13.2	Describe how to care for plasma arc cutting equipment.
1862.13.3	Describe how to prepare the equipment and work area for air-carbon arc cutting.
1862.13.4	Describe how to care for air-carbon arc cutting equipment.
1862.14	Exhibit an understanding of arc cutting consumables.
1862.14.1	Identify common arc cutting consumables used in carbon arc and plasma arc processes.
1862.14.2	Describe the function and purpose of arc cutting consumables in the cutting process.
1862.14.3	Demonstrate proper handling and storage techniques of arc cutting consumables.
1862.15	Demonstrate appropriate use of arc cutting equipment.
1862.15.1	Identify safety practices related to plasma arc cutting.
1862.15.2	Describe how to safely operate plasma arc cutting equipment.
1862.15.3	Identify safety practices related to air-carbon arc cutting.
1862.15.4	Describe how to wash and gouge metals.

Welding II advances student skill sets in critical areas, including Air Carbon Arc Cutting and Gouging, Base Metal Preparation, Weld Quality, SMAW-Equipment and Setup, Shielded Metal Arc Electrodes, SMAW-Beads and Fillet Welds, Joint Fit Up and Alignments, SMAW-Groove Welds with Backing, SMAW-Open V-Groove Welds. This course is designed to deepen proficiency and mastery in welding techniques, providing students with hands-on experience and a comprehensive understanding of advanced welding processes.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Welding Fit-up and Quality

1863.1	Identify various joint designs (joint geometry) and welding positions.
1863.1.1	Identify and describe acceptable and unacceptable weld profiles.
1863.1.2	Identify and describe discontinuities related to joint penetration, fusion, and undercutting.
1863.2	Clean and prepare materials for groove and fillet welds.
1863.2.1	Inspect Base Metal and Joint Fit-Up.
1863.3	Identify welding defects and/or discontinuities.
1863.3.1	Identify and describe discontinuities related to porosity and inclusions.
1863.3.2	Identify and describe discontinuities that result in cracking.
1863.3.3	Identify and describe discontinuities
1863.4	Test welds using various techniques.
1863.4.1	Describe basic visual inspection methods including measuring devices and liquid penetrants.
1863.4.2	Describe magnetic particle and electromagnetic inspection processes.
1863.4.3	Describe the radiographic and ultrasonic inspection processes.
1863.4.4	Describe destructive testing processes.
1863.4.5	Describe welder qualification testing to meet American Welding Society (AWS) and American Society of Mechanical Engineers (ASME) requirements.
1863.4.6	Describe the process for completing a weld test.
1863.5	Use standard measuring and layout tools.
1863.5.1	Identify and describe various fit-up gauges and measuring devices.
1863.5.2	Identify and describe common weldment positioning equipment.
1863.5.3	Identify and describe various plate alignment tools.
1863.5.4	Describe the role of codes and specifications in welding procedures and techniques.
1863.6	Describe welding industry codes, standards, and procedures.
1863.6.1	Identify the various welding code organizations and their sponsoring organizations.
1863.6.2	Identify and describe the basic provisions of welding codes.

Shielded Metal Arc Welding (SMAW)

1863.7	Explain principles of SMAW.
1863.7.1	Define SMAW and identify related safety practices.
1863.7.2	Explain how various current characteristics apply to SMAW.
1863.7.3	Identify safety practices related to SMAW.
1863.8	Set up and maintain SMAW equipment.

1863.8.1	Identify and describe various types of SMAW machines.
1863.8.2	Identify and describe SMAW welding cable and connectors.
1863.8.3	Explain how to set up SMAW equipment.
1863.8.4	Explain how to start, stop, and maintain SMAW equipment.
1863.8.5	Explain how to prepare the area and equipment for welding.
1863.9	Demonstrate selection and application of SMAW consumables.
1863.9.1	Describe the AWS filler metal specification system and various electrode characteristics.
1863.9.2	Describe the characteristics of the four main electrode groups.
1863.9.3	Identify various considerations in the selection of the proper electrode.
1863.9.4	Describe the proper handling and storage of electrodes.
1863.10	Perform fillet and groove welds on plate in all positions.
1863.10.1	Explain how to strike an arc and respond to arc blow.
1863.10.2	Explain how to properly restart and terminate a weld pass.
1863.10.3	Describe the technique required to produce stringer beads.
1863.10.4	Describe the technique required to produce weave and overlapping beads.
1863.10.5	Describe the techniques required to produce fillet welds in various positions.

Welding III elevates student skills sets in critical areas, including Welding Symbols, Reading Welding Detail Drawings, Physical Characteristics, and Mechanical Properties of Metals, Preheating and Post-heating of Metals, GMAW and FCAW-Equipment and Filler Metals, and GMAW and FCAW-Plate. This advanced course is tailored to deepen understanding and proficiency in welding, with a focus on interpreting welding symbols, analyzing detailed drawings, exploring the characteristics of metals, and mastering Gas Metal Arc Welding (GMAW) and Flux-Cored Arc Welding (FCAW) techniques on various plate applications.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Welding Symbols and Blueprint Reading

1864.1	Interpret weld and welding symbols.
1864.1.1	Describe the structure and placement of welding symbols and identify basic symbols.
1864.1.2	Identify and interpret size and dimension markings for common types of welds.
1864.1.3	Identify and interpret various supplemental symbols.
1864.1.4	Identify and interpret less common welding symbols.
1864.1.5	Describe the object views used to depict welding details.
1864.1.6	Identify basic drawing elements related to welding detail drawings.
1864.2	Read and interpret blueprints and sketches.
1864.2.1	Identify various types of construction drawings.
1864.2.2	Identify and describe the purpose of the five basic construction drawing components.
1864.2.3	Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.
1864.2.4	Identify and explain the use of dimensions and various drawing scales.
1864.2.5	Identify and describe how to use engineer's and architect's scales.
1864.2.6	Identify and explain how to interpret dimensional information.
1864.2.7	Identify and explain how to interpret notes and a bill of materials.

Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW)

1864.3	Explain principles of GMAW and FCAW.
1864.3.1	Describe basic GMAW/FCAW processes.
1864.3.2	Describe the various GMAW metal transfer modes.
1864.3.3	Describe the FCAW metal transfer process.
1864.3.4	Describe basic GMAW processes.
1864.3.5	Identify GMAW/FCAW-related safety practices.
1864.4	Set up and maintain GMAW and FCAW equipment.
1864.4.1	Identify common GMAW/FCAW welding equipment.
1864.4.2	Describe power source control considerations.
1864.4.3	Identify and describe welding cables and terminations.
1864.4.4	Identify and describe external wire feeders and their controls.
1864.4.5	Identify and describe GMAW and FCAW guns, contact tips, and nozzles.

Welding 3**Course #: 1864****Allowable Teacher Endorsement: 7052**

1864.4.6	Identify various shielding gases and their related equipment.
1864.4.7	Explain how to set up welding equipment for GMAW and FCAW welding.
1864.4.8	Identify GMAW-related safety practices.
1864.5	Demonstrate selection and application of GMAW and FCAW consumables.
18654.5.1	Identify various GMAW filler metals.
18654.5.2	Identify various FCAW filler metals.
1864.6	Perform fillet and groove welds on plate in all positions.
1864.6.1	Describe equipment control and welding techniques related to GMAW.
1864.6.2	Explain how to produce basic GMAW weld beads.
1864.6.3	Describe the welding procedures needed to produce proper fillet welds using GMAW welding techniques.
1864.6.4	Describe the welding procedures needed to produce proper V-groove welds using GMAW welding techniques.
1864.6.5	Explain how to safely set up the equipment and work area for welding.

Welding IV advances student skills in Gas Tungsten Arc Welding (GTAW), focusing on GTAW-Equipment, Filler Metals, and GTAW-Plate applications. This course refines expertise built through Welding I, II, and III preparing students for intricate tasks in the welding industry.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Physical Characteristics and Mechanical Properties of Metals

1865.1	Identify metals by physical characteristics.
1865.1.1	Describe the composition and classification system for ferrous metals.
1865.1.2	Describe the composition and classification system for low-alloy steel.
1865.1.3	Describe the composition and classification system for common-grade stainless steel.
1865.1.4	Describe the composition and classification system for specialty-grade stainless steel.
1865.1.5	Describe the composition and classification system for nonferrous metals.
1865.1.6	Describe the physical characteristics of different metals.
1865.1.7	Identify base metals in field conditions.
1865.1.8	Identify the most common structural steel shapes.
1865.1.9	Identify different structural beam shapes.
1865.1.10	Identify pipe and tubing types.
1865.1.11	Identify other common metal forms, including rebar.
1865.2	Explain the pre-heating and post-heating processes.
1865.2.1	Explain how to identify base metals in field conditions.
1865.2.2	Describe metallurgy-related considerations for welding.
1865.2.3	Describe the relationship between heat and metal.
1865.2.4	Identify and describe methods used to preheat metal prior to welding.
1865.2.5	Describe interpass temperature control.
1865.2.6	Describe various postheating processes.
1865.3	Exhibit understanding of distortion control methods.
1865.3.1	Describe the causes of weldment distortion.
1865.3.2	Describe the techniques and tools used to control weldment distortion.
1865.4	Identify basic mechanical properties of metals.
1865.4.1	Describe the mechanical properties of different metals.
1865.4.2	Identify and describe devices and products used to measure temperature.

Gas Tungsten Arc Welding (GTAW)

1865.5	Explain principles of GTAW.
1865.5.1	Safe (GTAW) welding practices.
1865.5.2	Tool and equipment safety.
1865.5.3	Review and practice general welding shop safety guidelines.
1865.5.4	Describe the precautions to be taken when welding in confined areas.

1865.5.5	Describe and discuss electrical safety precautions when using gas arc welding equipment.
1865.6	Set up and maintain GTAW equipment.
1865.6.1	How to setup a machine for welding.
1865.6.2	Select the appropriate tools, machines, and materials to be used in preparation for welding.
1865.6.3	Explain joint design considerations based on a welding procedure specification.
1865.6.4	Set up, adjust, and demonstrate the use of all of the basic welding tools and machines.
1865.6.5	Position and adjust work pieces.
1865.6.6	Perform safety inspections of equipment and accessories.
1865.6.7	Operate GTAW equipment.
1865.7	Demonstrate selection and application of GTAW consumables.
1865.7.1	Identify and explain weld imperfections and their causes.
1865.7.2	Determine required equipment and welding methods, applying knowledge of metallurgy, geometry, and welding techniques.
1865.8	Perform fillet and groove welds on ferrous and nonferrous metals in all positions.
1865.8.1	Welding on carbon steel.
1865.8.2	Welding aluminum.
1865.8.3	Perform 1f, 2f and 3f welds on aluminum.
1865.8.4	Perform fillet welds in all positions.
1865.8.5	Perform groove welds in all positions.
1865.8.6	Check for joint misalignment or poor fit-up before and after welding.
1865.8.7	Monitor the fitting, burning, and welding processes to avoid over heating of parts or warping, shrinking, distortion, or expansion of material.

Robotics 1**Course #: 1866****Allowable Teacher Endorsement:** 0608, 1800, 1801, 1802, 1803, 1810, 1900, 7011, 7037, 7112, 7131, 7164, 7181, 7212, 7221, 7225, 7550

Robotics I offers an introductory exploration into the field of robotics, focusing on VEX programming. Students engage in hands-on activities and problem-solving tasks to build a solid foundation in robotics concepts. Emphasizing real-world learning, this course encourages active participation.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Introduction to Robotics

1866.1	Understanding Basic Concepts
1866.1.1	Define robotics and its applications.
1866.1.2	Explain the importance of robotics in various industries.
1866.1.3	Identify and describe different types of robots.
1866.1.4	Understand safety procedures when working with robots.
1866.1.5	Demonstrate proper use of basic robotic components such as motors, sensors, and controllers.
1866.1.6	Introduce basic programming concepts for robotics.

Robot Design and Construction

1867.2	Building and Prototyping
1867.2.1	Understand principles of robot design and mechanics.
1867.2.2	Use the engineering design process to design, build, and iterate on a robot prototype.
1867.2.3	Understand different types of drive systems and their applications.
1867.2.4	Explore mechanisms for manipulation and mobility.
1867.2.5	Practice effective use of tools and materials in robot construction.
1867.2.6	Document design process and iterations in a robotics notebook.

Robotics 2

Course #: 1867

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 1803, 1810, 1900, 7011, 7037, 7112, 7131, 7164, 7181, 7212, 7221, 7225, 7550

Robotics II advances students to build and program the BaseBot, expanding on REC 1. The course includes experiments demonstrating physics and mechanical properties, integrating sensors and mechanisms. Through hands-on activities and problem-solving, students deepen their understanding of robotics concepts, concluding with a capstone project using competitive instructional strategies.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advanced Robot Programming

1867.1	Programming Skills
1867.1.1	Develop proficiency in programming languages commonly used in robotics (e.g., C++, Python)
1867.1.2	Understand control structures, loops, and functions in programming.
1867.1.3	Understand sensors and their integration for feedback control.
1867.1.4	Implement algorithms for autonomous navigation and obstacle avoidance.
1867.1.5	Integrate sensor data with actuators for real-time control.
1867.1.6	Debug and troubleshoot robot programs.

Sensor Integration and Feedback Control

1867.2	Sensor Utilization.
1867.2.1	Explore various sensors used in robotics (e.g., proximity, ultrasonic, infrared, etc.).
1867.2.2	Understand principles of sensor operation and data acquisition.
1867.2.3	Learn techniques for sensor calibration and noise reduction.
1867.2.4	Implement feedback control systems for tasks such as line following and object detection.
1867.2.5	Design and implement sensor-based applications in robotics projects.

Robotics 3**Course #: 1868****Allowable Teacher Endorsement:** 0608, 1800, 1801, 1802, 1803, 1810, 1900, 7011, 7037, 7112, 7131, 7164, 7181, 7212, 7221, 7225, 7550

Robotics III explores advanced engineering topics, challenging students to construct more sophisticated robots. The course emphasizes hands-on activities and problem-solving to enhance students understanding of robotics concepts. Real-world learning opportunities are integrated to align with learning skills, technology tools, and essential skillsets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Advanced Robotic Systems

1868.1	System Integration
1868.1.1	Study advanced topics in robotics.
1868.1.2	Design and implement cooperative behaviors among multiple robots.
1868.1.3	Investigate emerging technologies in robotics, such as AI and machine learning.

Robotics Project Management

1868.2	Project Planning and Execution.
1868.2.1	Develop project management skills, including planning, scheduling, and resource allocation.
1868.2.2	Define project goals, requirements, and constraints.
1868.2.3	Break down projects into manageable tasks and set milestones.
1868.2.4	Manage project risks and adapt to changing circumstances.
1868.2.5	Collaborate effectively in teams to achieve project objectives.
1868.2.6	Present and communicate project outcomes to stakeholders.

Robotics 4**Course #: 1869****Allowable Teacher Endorsement:** 0608, 1800, 1801, 1802, 1803, 1810, 1900, 7011, 7037, 7112, 7131, 7164, 7181, 7212, 7221, 7225, 7550

Robotics IV focuses on a capstone project, providing students with an immersive hands-on experience. Throughout the course, students apply problem-solving techniques and engage in practical activities to deepen their understanding of robotics concepts.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Advanced Robotics Applications

1869.1	Practical Applications
1869.1.1	Explore real-world applications of robotics in fields such as healthcare, manufacturing, agriculture, and space exploration.
1869.1.2	Investigate ethical and societal implications of robotics technology.
1869.1.3	Participate in robotics competitions or industry-sponsored challenges.

Robotics Capstone Project

1869.2	Integration and Synthesis
1869.2.1	Apply knowledge and skills acquired throughout the robotics curriculum to a comprehensive capstone project.
1869.2.2	Identify a real-world problem or opportunity that can be addressed through robotics.
1869.2.3	Plan, design, implement, and evaluate a solution using robotics technologies.
1869.2.4	Demonstrate creative, innovation, and technical proficiency in project execution.
1869.2.5	Document the entire project process, including design rationale, implementation details, and outcomes.
1869.2.6	Present the capstone project to peers, educators, and industry professionals.

Electrical Maintenance explores fundamental knowledge and technical skills essential for entry-level proficiency. This course encompasses key areas, including basic electrical theory and calculations, utilization of electrical tools, instruments, and safety measures, understanding electrical symbols and diagrams, industrial power and control circuits, electrical equipment and devices, and an introduction to programmable logic controllers (PLCs) within industrial settings. Students gain comprehensive insights and practical skills necessary for success in industrial electrical maintenance.

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Electronics and Electrical Principles

1871.1	Apply basic electrical principles.
1871.1.2	Differentiate between alternating current and direct current and identify common applications for each.
1871.1.3	Explain the difference between conductors and insulators.
1871.1.4	Explain how voltage, current, and resistance are related to each other.
1871.1.5	Calculate electrical values in series, parallel, and series-parallel circuits.
1871.1.6	Find the total amount of resistance in a series, parallel, and series-parallel circuit.
1871.1.7	Calculate, using Kirchoff's voltage law, the voltage-drop in series, parallel, and series-parallel circuits.
1871.1.8	Describe voltage ratings of conductors and cables.
1871.1.9	Use the tables in the NEC to determine the ampacity of a conductor.
1871.1.10	Differentiate between power and control circuits on electrical diagrams.
1871.1.11	Study blueprints, schematics, manuals, or other specifications to determine installation procedures.
1871.2	Demonstrate knowledge of basic CNC operations.
1871.2.1	Test faulty equipment to diagnose malfunctions using test equipment or software.
1871.2.2	Calibrate testing instruments and installed or repaired equipment to prescribed specifications.
1871.2.3	Explain the purpose and history of the National Electric Code (NEC).
1871.2.4	Explain the difference between equipment grounding and system grounding as required by the NEC.
1871.3	Demonstrate knowledge and basic programmable logic controllers (PLCs).
1871.3.1	Explain the difference between digital and analog meters.
1871.3.2	Exhibit the ability to safely and correctly use electrical instruments to measure voltage and resistance.
1871.3.3	Select proper settings and ranges, interpret values indicated on digital multimeters (DMM).
1871.3.4	Test faulty equipment to diagnose malfunctions using test equipment or software.
1871.3.5	Describe the layout and how to navigate the NEC.
1871.3.6	Discuss the purpose and operation of a Ground Fault Circuit Interrupter (GFCI).
1871.4	Exhibit basic knowledge of electrical symbols.
1871.4.1	Interpret values indicated on digital multimeters (DMM).
1871.4.2	Select proper settings and ranges.

Motors and Motor Controls

1871.5	Apply basic electrical principles of motors.
1871.5.1	Explain the following terms that are associated with electrical motors: duty, full-load amps, thermal cutout, overcurrent, overload, power factor, rated full-load speed, rated horsepower, and thermal protector.

1871.5.2	Describe how rated voltage of a motor differs from the system voltage.
1871.5.3	Describe how torque is developed in an inductive motor.
1871.5.4	Describe the methods for determining various motor connections.
1871.5.5	Repair, rewire, and troubleshoot electrical systems.
1871.5.6	Explain how the direction and rotation of a DC motor is changed.
1871.5.7	Explain how direction in a three-phase motor is reversed.
1871.5.8	Describe how to connect a dual-voltage motor for operation and the methods used to reverse rotation.
1871.6	Interpret appropriate applications for types of motors (linear, servo, AC induction, DC motors, and transformers).
1871.6.1	Select appropriate applications for frequency drives.
1871.7	Select appropriate applications for frequency drives.
1871.7.1	Order parts, supplies, and equipment from catalogs and suppliers, or obtain them from storeroom.
1871.8	Identify motor components.
1871.8.1	Repair or adjust equipment, or defective components.
1871.8.2	Assemble, install, or repair wiring, electrical or electronic components.

Mechanism Drives

1871.9	Apply principles of mechanisms.
1871.9.1	Apply fundamental principles of mechanisms, including types of motion (rotational, linear, reciprocating), types of mechanisms (gears, belts, chains), and principles of power transmission.
1871.9.2	Utilize gear terminology (pitch diameter, tooth profile, pitch circle) and identify various gear types (spur, helical, bevel, worm gears).
1871.9.3	Implement various types of drives such as belt drives, chain drives, and gear drives.
1871.10	Identify appropriate applications of various gears and drives.
1871.10.1	Identify appropriate applications of various gears and drives based on factors such as load, speed, torque, and space constraints.
1871.10.2	Recognize the advantages and limitations of different types of gears and the drives for specific applications.
1871.10.3	Determine gear ratios and their impact on speed and torque in mechanical systems.
1871.11	Demonstrate knowledge of appropriate set-up procedures.
1871.11.1	Demonstrate proficiency in setting up mechanical drives and mechanisms according to manufacturer specifications and industry standards.
1871.11.2	Perform alignment and tensioning of belts, chains, and gears for optimal performance.
1871.11.3	Apply safety procedures and precautions during the set-up and adjustment of mechanical drives.
1871.12	Apply principles of mechanics.
1871.12.1	Apply basic principles of mechanics, including force, motion, friction, and energy transfer, to the design and operation of mechanical drives and mechanisms.
1871.12.2	Calculate forces, velocities, and torques in mechanical systems using principles of mechanics.
1871.12.3	Employ troubleshooting techniques to solve issues related to misalignment, wear, or malfunction in mechanical drive systems.

Industrial Robotic Systems

1871.13	Interpret appropriate industrial robotics functions and applications.
1871.13.1	Evaluate the functions and applications of industrial robotics in various industries.
1871.13.2	Assess the advantages and limitations of industrial robots for specific tasks and processes.

1871.13.3	Interpret the role of industrial robots in enhancing productivity, efficiency, and safety in manufacturing environments.
1871.14	Interpret basic robotic programming, including CADD.
1871.14.1	Interpret robotic programming languages, including the use of Computer-Aided Design and Drafting (CADD) and Computer-Aided Manufacturing (CAM) software, for controlling industrial robots.
1871.14.2	Demonstrate proficiency in reading and understanding robotic programming code.
1871.14.3	Apply programming concepts to develop and modify robotic programs for different applications.
1871.15	Identify various industrial robotic design features.
1871.15.1	Identify key design features of industrial robotics, including kinematics, end effectors, sensors, and actuators.
1871.15.2	Evaluate the significance of design considerations such as payload capacity, reach, accuracy, and repeatability.
1871.15.3	Recognize different configurations of industrial robots, such as articulated, Cartesian, SCARA, and delta robots.

Industrial Power

1871.16	Ensure compliance with electrical codes and standards when installing, maintaining, or repairing wiring devices and electrical systems.
1871.16.1	Explain the National Electric Code (NEC) requirements concerning wiring devices.
1871.16.2	Calculate and select service-entrance equipment.
1871.16.3	Explain the NEC requirements for grounding separately derived systems, including transformers and generators.
1871.17	Identify and troubleshoot control systems and components used in industrial power applications.
1871.17.1	State the functions of limit switches and relays.
1871.17.2	Compare and contrast manual and automatic control circuits and describe the applications for each.
1871.17.3	Assess the operation and application of solenoids.
1871.17.4	Identify the component parts of a Programmable Logic Controllers (PLC) system.
1871.18	Analyze and maintain power circuits and transformers to ensure reliable and efficient operation in industrial settings.
1871.18.1	List voltage levels commonly used in industrial locations.
1871.18.2	Explain basic transformer action.
1871.18.3	Discuss the differences between single-phase, three-phase, and direct current power circuits.
1871.18.4	Explain the purpose and application of an electric coil.
1871.19	Program and diagnose Programmable Logic Controllers (PLCs) to control industrial processes and equipment effectively.
1871.19.1	Explain the purpose of Programmable Logic Controllers (PLC) and their applications in industrial locations.
1871.19.2	Explain how to program and troubleshoot PLCs.
1871.20	Implement installation procedures and interpret blueprints.
1871.20.1	Study blueprints, schematics, manuals, or other specifications to determine installation procedures.

Fundamentals of Industrial Equipment Maintenance provides students with essential knowledge and technical skills for entry-level proficiency in Industrial Maintenance. The course covers a range of areas including workplace safety, measurement and calculation, tools, fasteners, lubrication and bearings, mechanical and belt drives, and mechanical alignment and vibration. Emphasis is not only on technical competence but also on career exploration, job-seeking skills, and the development of personal and professional ethics. Safety instruction is seamlessly integrated into all activities, ensuring a comprehensive and safe learning experience.

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Machinery and Equipment

1873.1	Disassemble, repair, and reassemble machinery/equipment.
1873.1.1	Examine parts of defects, such as breakage or excessive wear, using micrometer and gauges.
1873.1.2	Dismantle devices to access and remove defective parts, using hoists, cranes, hand tools, and power tools.
1873.1.3	Repair or replace defective equipment parts, using hand tools and power tools, and reassemble equipment.
1873.1.4	Explain the use of threaded and non-threaded fasteners used in metal, wood, and masonry applications.
1873.1.5	Explain the use of anchors in metal, wood, and masonry applications.
1873.1.6	Study sample parts to determine methods and sequences of operations needed to fabricate products.
1873.1.7	Install fasteners and anchors in an industrial setting.
1873.1.8	Identify and explain fastener standards, grades, and capacities.
1873.2	Maintain operating condition and perform preventing maintenance of the machinery/equipment.
1873.2.1	Order parts, supplies, and equipment from catalogs and suppliers, or obtain them from storerooms.
1873.2.2	Record parts or materials used and order or requisition new parts or materials, as necessary.
1873.2.3	Clean or lubricate shafts, bearings, gears, or other parts of machinery.
1873.2.4	Fit bearings to adjust, repair, or overhaul mobile mechanical equipment.
1873.2.5	Explain lubricant classification, types of additives and greases.
1873.2.6	Explain symptoms and problems associated with improper lubrication.
1873.3	Identify and troubleshoot component defects and malfunctions.
1873.3.1	Identify and explain fastener standards, grades, and capacities.
1873.3.2	Identify the various types of gaskets and their applications.
1873.3.3	Describe the importance of selecting the correct O-ring for an application.
1873.3.4	Explain the common types of bearings and causes for bearing failure.
1873.3.5	Explain friction and wear.
1873.3.6	Examine parts for defects, such as breakage or excessive wear, using micrometers and gauges.
1873.3.7	Calculate dimensions and tolerances using knowledge of mathematics and instruments such as micrometers and vernier calipers.
1873.4	Test operation of newly repaired machinery/equipment.
1873.4.1	Set up and operate machine tools to repair or fabricate machine parts, jigs, fixtures, or tools.
1873.5	Analyze test results, machine error messages, and information from operators in order to diagnose machinery/equipment problems.

1873.5.1	Study sample parts, blueprints, drawings, and engineering information to determine methods and sequences of operations needed to fabricate products and determine product dimensions and tolerances.

Tools and Safety

1873.6	Select and differentiate appropriate use of various hand tools.
1873.6.1	Use common hand and power tools, such as hammers, hoists, saws, drills, and wrenches.
1873.6.2	Use formulas to solve basic problems, area, volume, and circumference.
1873.6.3	Differentiate between different types of hand tools and their uses, including wrenches, screwdrivers, pliers, and hammers.
1873.6.4	Demonstrate proficiency in using hand tools safely and effectively to perform maintenance and repair tasks on industrial equipment.
1873.7	Demonstrate appropriate care of hand tools.
1873.7.1	Clean and inspect hand tools regularly to ensure they are in good working condition and free from damage or defects.
1873.7.2	Properly store hand tools in designated locations to prevent damage and ensure accessibility.
1873.7.3	Perform routine maintenance tasks, such as lubrication or sharpening, to prolong the lifespan of hand tools and maintain their effectiveness.
1873.8	Identify and safely use large machine tools, including lathes, mills, hoists, rigging equipment, and presses.
1873.8.1	Set up and operate large machine tools, including lathes, mills, hoists, rigging equipment, and presses.
1873.9	Identify safe use of ladders and scaffolding.
1873.9.1	Follow safety procedures when working at elevated heights using ladders and scaffolding.
1873.9.2	Identify different types of ladders and scaffolding commonly used in industrial environments and demonstrate awareness of their respective uses and limitations.
1873.9.3	Demonstrate proper techniques for setting up and securing ladders and scaffolding to ensure stability and safety.
1873.10	Demonstrate understanding of lock-out/tag-out procedures.
1873.10.1	Follow lock-out/tag-out procedures when working on machinery/equipment.
1873.11	Exhibit understanding of shop safety.
1873.11.1	Adhere to shop safety protocols when working with hand and power tools, machinery, and equipment.
1873.11.2	Demonstrate knowledge of emergency procedures, including evacuation routes, fire safety protocols, and first aid measures.
1873.11.3	Follow established safety policies and procedures, including wearing appropriate personal protective equipment (PPE), adhering to equipment operating guidelines, and maintaining a clean and organized workspace.

Blueprints and Schematics

1873.12	Interpret various lines.
1873.12.1	Identify and differentiate between different types of lines used in blueprints and schematics, such as solid lines, dashed lines, and hidden lines.
1873.12.2	Interpret the meaning of different line weights and styles in blueprints and schematics, including their significance for representing different components or materials.
1873.12.3	Recognize and interpret lines indicating dimensions, boundaries, and connections in blueprints and schematics.
1873.13	Exhibit knowledge of legends.

1873.13.1	Interpret and understand the symbols and abbreviations used in legends or keynotes on blueprints and schematics.
1873.13.2	Identify and explain the meaning of symbols commonly found in legends, such as electrical symbols, mechanical symbols, and material symbols.
1873.13.3	Utilize legends to locate and interpret relevant information about components, materials, and features depicted in blueprints and schematics.
1873.14	Interpret blueprint and schematic components.
1873.14.1	Analyze and interpret the components and features depicted in blueprints and schematics, including mechanical components, electrical components, and structural elements.
1873.14.2	Identify and interpret the relationships between different components and systems depicted in blueprints and schematics.
1873.14.3	Determine the function and purpose of individual components based on their representation in blueprints and schematics.
1873.15	Interpret title block information.
1873.15.1	Interpret information presented in the title block of blueprints and schematics, including project titles, drawing numbers, dates, and revision information.
1873.15.2	Utilize title block information to identify the origin, authorship, and version history of blueprints and schematics.
1873.15.3	Interpret scale information provided in the title block to understand the relationship between the drawing and the actual dimensions of the objects depicted.
1873.16	Demonstrate knowledge of views, angles, and tolerances.
1873.16.1	Interpret different views and perspectives presented in blueprints and schematics, including plan views, elevation views, and sectional views.
1873.16.2	Interpret angles and perspectives represented in blueprints and schematics, such as isometric views and orthographic projections.
1873.16.3	Interpret dimensional tolerances and geometric tolerances specified in blueprints and schematics, and their implications for manufacturing and assembly.

Hydraulic and Pneumatic Systems students explore hydraulic principles and their practical application, along with pneumatic principles and their real-world usage. This comprehensive course emphasizes not only technical proficiency but also encourages career exploration, cultivating job-seeking skills, and instills principles of personal and professional ethics. Integrated safety instruction ensures a secure learning environment throughout all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Hydraulics and Pneumatics

1875.1	Interpret basic hydraulic and pneumatic symbols.
1875.1.1	Interpret graphic hydraulic and pneumatic diagrams.
1875.2	Apply knowledge of hydraulic and pneumatic components.
1875.2.1	Measure the volume, capacity, velocity, flow, and speed in hydraulic systems.
1875.2.2	Describe quantitatively the relationship between force area, and pressure.
1875.2.3	Identify the six essential elements of a hydraulic circuit.
1875.2.4	Describe the function and types of hydraulic pumps.
1875.2.5	Assemble a basic hydraulic system.
1875.2.6	Apply Charles’ Law in a pneumatic system.
1875.2.7	Apply the combined gas law in a pneumatic system.
1875.2.8	Identify the seven basic components of a pneumatic system.
1875.2.9	Describe the function and types of pneumatic seals.
1875.2.10	Assemble a basic pneumatic circuit.
1875.3	Interpret hydraulic and pneumatic principles.
1875.3.1	Explain the mechanical advantages of using hydraulic power.
1875.3.2	Explain the basic principles of hydraulics.
1875.3.3	Explain the mechanical advantages of using pneumatic systems.
1875.3.4	Explain the basic principles and applications of air compression.
1875.3.5	Explain the production of pneumatic pressure in a pneumatic system.
1875.3.6	Test mechanical products and equipment after repair or assembly to ensure proper performance and compliance with manufacturers’ specifications (this standard applies to both hydraulic and pneumatic systems).

Drone Ground Operations is a foundational course for Unmanned Aerial Systems (UAS) or Drones. This course builds essential knowledge for safe UAS deployment and operations. Topics covered encompass regulations, airspace, weather, loading and performance, and operational procedures, establishing a solid foundation for responsible and proficient drone piloting.

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Fundamentals of Drone Operations

1887.1	Understanding Regulations and Airspace.
1887.1.1	Understand FAA Part 107 regulations and requirements for commercial drone operations.
1887.1.2	Identify different classes of airspace and their restrictions for drone flights.
1887.1.3	Interpret sectional charts and airspace maps for route planning and airspace awareness.
1887.1.4	Understand the importance of obtaining airspace authorizations and waivers.
1887.1.5	Learn about NOTAMs (Notices to Airmen) and their significance for planning flights.

Weather and Environmental Factors

1887.2	Weather Awareness
1887.2.1	Recognize the impact of weather conditions on drone performance and safety.
1887.2.2	Interpret weather forecast and observations relevant to drone operations.
1887.2.3	Understand the effect of temperature, wind, humidity, and precipitation on drone flight.
1887.2.4	Learn about microclimates and local weather phenomena that may affect drone operations.
1887.2.5	Develop skills in assessing weather risks and making informed flight decisions.

Drone Loading and Performance

1887.3	Payload and Performance Management.
1887.3.1	Understand the concept of maximum takeoff weight (MTOW) and payload capacity.
1887.3.2	Calculate drone performance parameters such as endurance, range, and payload capability.
1887.3.3	Learn about weight distribution and balance considerations for safe flight operations.
1887.3.4	Identify different types of payloads and their applications in various industries.
1887.3.5	Develop procedures for conducting pre-flight inspections and payload checks.

Operational Procedures

1887.4	Safe and Efficient Operations
1887.4.1	Develop pre-flight and post-flight checklists for drone operations.
1887.4.2	Understand emergency procedures and protocols for handling in-flight issues.
1887.4.3	Learn about airspace communication protocols and radio frequency management.
1887.4.4	Develop flight planning strategies to mitigate risks and ensure mission success.
1887.4.5	Practice situational awareness and decision-making in dynamic operational environments.

FAA 107 Drone Flight Operations covers a comprehensive array of topics crucial for drone pilots. The curriculum includes detailed explorations of checklists, general characteristics, dimensions & weight, motors, propellers, electronic speed controls, wireless links, fuel/flight, battery, flight parameters, limitations, emergency procedures, normal procedures, performance flight times & wireless transmission, weight & balance, and air vehicle systems description. This course equips students with the knowledge and skills necessary for FAA Part 107 compliance, ensuring proficiency in drone flight operations, maintenance, and safety procedures.

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Small UAV Ground School

1888.1	Technical Knowledge
1888.1.1	Understand the components and systems of small UAVs (Unmanned Aerial Vehicles).
1888.1.2	Learn about drone design considerations, including aerodynamics and structural integrity.
1888.1.3	Identify different types of propulsion systems, motors, and propellers used in UAVs.
1888.1.4	Understand the function and operation of electronic speed controllers (ESCs) and wireless links.
1888.1.5	Learn about power sources for UAVs, including batteries and fuel systems.

Flight Procedures and Performance

1888.2	Understanding of Flight Operations Management.
1888.2.1	Develop pre-flight and post-flight checklists specific to Part 107 regulations.
1888.2.2	Understand operational limitations and performance parameters defined by FAA regulations.
1888.2.3	Learn about emergency procedures and protocols for safe recovery of the drone.
1888.2.4	Practice flight maneuvers and operational techniques in accordance with Part 107 requirements.
1888.2.5	Analyze flight data and performance metrics to optimize flight parameters and efficiency.

UAV Maintenance and Service

1888.3	Understand Air Vehicle Systems Description, Handling, Service, and Maintenance.
1888.3.1	Understand the importance of regular maintenance and service for UAVs.
1888.3.2	Learn about pre-flight inspection procedures and system checks.
1888.3.3	Identify common issues and troubleshooting techniques for UAV systems.
1888.3.4	Develop skills in handling and storing UAV safely and securely.
1888.3.5	Understand the role of manufacturers’ guidelines and best practices in UAV maintenance.

Autonomous Flight

1888.4	Develop proficiency in autonomous flight operations.
1888.4.1	Develop comprehensive plans for autonomous flight missions considering mission objectives and safety considerations.
1888.4.2	Code flight missions using a programming language (i.e., Block-based, Python) to enable autonomous flight operations.
1888.4.3	Utilize different plot types to visualize and analyze data collected during autonomous flight missions.

1888.4.4	Demonstrate knowledge of GPS and GNSS location services devices, including their functionalities and accuracies.
1888.4.5	Understand and implement protocols for ensuring data privacy and network security during data collection and storage in autonomous flight missions.
1888.4.6	Understand privacy and network security concepts relevant to flying drones on missions, ensuring compliance with regulations and best practices.

FANUC Operator I serves as an introduction to essential robotic skills, encompassing operation, programming, root cause system troubleshooting, recover, and efficient teach pendant navigation. Core concepts cover coordinate systems, tool center point verification, program creation, macro selection, and program flow. Hands-on experience with FANUC's RJ-3, RJ3iB, R30iA, and R30iB controllers enhances practical proficiency. Upon completion, students gain a solid understanding of key techniques to improve and validate cycle time, establishing a strong foundation for operating FANUC robotic systems.

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Robot Safety and Safety Devices

1889.1	Demonstrate knowledge of internal robot safety devices and functions.
1889.1.1	Identify and explain the function of internal safety devices such as emergency stop buttons, safety interlocks, and collision detection systems.
1889.1.2	Demonstrate the procedure for activating and deactivating internal safety features on a FANUC robot.
1889.2	Demonstrate knowledge of external safety devices.
1889.2.1	Identify and describe the purpose of external safety devices such as safety fences, light curtains, and safety mats.
1889.2.2	Explain the setup and operation of external safety devices in conjunction with FANUC robots.

Robot Systems and Components

1889.3	Identify teach pendant features and functions.
1889.3.1	Identify and describe the various buttons, switches, and menus on the FANUC teach pendant.
1889.3.2	Demonstrate navigation through teach pendant menus and settings.
1889.4	Demonstrate knowledge of function of robot controller
1889.4.1	Explain the role and function of the robot controller in executing programmed tasks.
1889.4.2	Describe the communication protocols and interfaces used by the FANUC robot controller.
1889.5	Demonstrate knowledge of function of end-of-arm tool (EOAT).
1889.5.1	Identify different types of end-of-arm tools (EOAT) and their applications in robotics tasks.
1889.5.2	Explain the setup and calibration procedures for attaching and configuring EOATs on FANUC robots.
1889.6	Demonstrate knowledge of axis configuration and functions.
1889.6.1	Explain the concept of robot axis and their configuration (e.g., 6-axis robot).
1889.6.2	Describe the range of motion and capabilities of each robot axis.
1889.6.3	Demonstrate an understanding of axis movement coordination in robot programming.

Initial Installation and Start Up

1889.7	Prepare robot for installation and start up
1889.7.1	Perform visual inspection of the robot and associated equipment to ensure readiness for installation.
1889.7.2	Verify proper electrical and mechanical connections before powering on the robot.
1889.8	Determine and perform various start-up methods
1889.8.1	Follow manufacturer guidelines to power on the robot using different start-up methods (e.g., cold start, warm start)

1889.8.2	Verify successful start-up by checking system indicators and diagnostic screens.
1889.9	Perform software setup
1889.9.1	Install and configure necessary software components for robot operation and programming.
1889.9.2	Verify software compatibility and update firmware as required by FANUC recommendations.

Basic Robot Operations Using Teach Pendant

1889.10	Log the robot using teach pendant.
1889.10.1	Use the teach pendant to manually move the robot through its workspace in various modes (e.g., joint, Cartesian).
1889.10.2	Demonstrate safe jogging techniques to avoid collisions and potential hazards.
1889.11	Master and re-master robot.
1889.11.1	Perform robot mastering procedures to establish reference positions for accurate motion control.
1889.11.2	Demonstrate re-mastering techniques in response to changes in robot setup or calibration.
1889.12	Identify common keys in teach pendant.
1889.12.1	Identify and explain the function of common keys on the teach pendant keypad (e.g., shift, enter, arrow keys).
1889.12.2	Use common keys to navigate menus, input commands, and execute operations.
1889.13	Set up robot coordinate frames.
1889.13.1	Define and configure robot coordinate frames for defining workspaces, tool orientations, and reference points.
1889.13.2	Verify coordinate frame accuracy through teach pendant interface and diagnostic tools.
1889.14	Identify basic error and fault recovery.
1889.14.1	Recognize common error messages and fault codes displayed on the teach pendant or controller interface.
1889.14.2	Perform troubleshooting steps to diagnose and resolve basic robot errors and faults.

Operations and Programming (ROBOGuide)

1889.15	Basic program functions and options.
1889.15.1	Understand the basic functions and options available in programming.
1889.15.2	Learn to execute simple commands and operations within the programming environment.
1889.16	Introduction to Programming Features.
1889.16.1	Recognize foundational features of programming.
1889.16.2	Understand basic programming concepts such as variables, loops, and conditional statements.
1889.17	Introduction to Motion Controls.
1889.17.1	Execute basic motion controls.
1889.17.2	Understand how to control the movement of a robot through simple commands.
1889.18	Basic Motion Planning and Optimization.
1889.18.1	Understand basic path planning techniques.
1889.18.2	Understand strategies for optimizing simple programs for efficiency.
1889.18.3	Learn how to program simple motion statements.
1889.18.4	Understand how to command the robot to move in basic patterns.
1889.18.5	Understand fundamentals of controlling robot motion.
1889.19	Introduction to Axes.

1889.19.1	Understand the concept of axes in robotics.
1889.19.2	Learn about the basic axes of a robot and their functions.

FANUC Operator II builds upon foundational knowledge with a focus on sophisticated topics such as robot communication methods, input and output types, and crucial program instructions for seamless operation and effective troubleshooting. The course explores robot mastering verification, mastering and calibration methods, along with file utilities and backup & restore functions. This course empowers students with advanced skills for intricate tasks in robot operation and maintenance.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Basic Robot Programming

1890.1	Create various robot programs.
1890.1.1	Use the teach pendant programming interface to create and edit robot programs for different tasks and applications.
1890.1.2	Write and modify motion commands, logical statements, and function calls within robot programs.
1890.2	Identify variables to include in motion program.
1890.2.1	Define and declare variables within robot programs to store and manipulate data relevant to motion control and task execution.
1890.2.2	Explain the role of variables in programming complex robot motions and sequences.
1890.3	Plan a motion path.
1890.3.1	Design motion paths and trajectories for the robot to follow using teach pendant programming tools.
1890.3.2	Consider factors such as reachability, collision avoidance, and task requirements when planning motion paths.
1890.4	Program inputs/outputs.
1890.4.1	Configure digital and analog inputs and outputs (I/O) on the robot controller to interface with external devices and sensors.
1890.4.2	Write program logic to control I/O signals based on input conditions and program execution flow.
1890.5	Program non-motion logic structures.
1890.5.1	Implement conditional statements, loops, and branching structures in robot programs to control program flow and logic.
1890.5.2	Use programming constructs such as If-Else statements, For loops, and While loops to implement non-motion tasks.
1890.6	Program macros.
1890.6.1	Define and create reusable macro programs to condense common sequences of robot actions or routines.
1890.6.2	Incorporate macros into larger robot programs to streamline programming and enhance code modularity.

Program File Manipulations

1890.7	Backup individual and system files.
1890.7.1	Perform regular backups of individual robot programs, system configurations, and controller settings to prevent data loss.
1890.7.2	Store backup files in secure location and follow established procedures for file management and archival.
1890.8	Restore individual and system files.

1890.8.1	Retrieve and restore backed-up robot programs and system files as needed to recover from data loss or system failures.
1890.8.2	Verify file integrity and completeness after restoration to ensure proper functionality.
1890.9	Perform image backup and restore.
1890.9.1	Create image backups of the robot controller's operating system and firmware for comprehensive system recovery.
1890.9.2	Restore controller images to factory defaults or previous states to troubleshoot software issues or recover from system corruption.

Robot Integration

1890.10	Establish communication to peripheral devices.
1890.10.1	Configure communication protocols and interfaces to enable data exchange between the robot controller and peripheral devices.
1890.10.2	Test and verify communication links with external devices such as sensors, actuators, and PLCs.
1890.11	Configure input/output.
1890.11.1	Map and assign digital and analog I/O signals on the robot controller to corresponding input and output devices in the system.
1890.11.2	Calibrate and adjust I/O settings to ensure proper signal levels and compatibility with external devices.
1890.12	Set end-of-arm tool parameters.
1890.12.1	Configure end-of-arm tool (EOAT) parameters such as gripping force, tool speed, and sensor thresholds to optimize performance for specific tasks.
1890.12.2	Fine-tune EOAT setting based on task requirements and environmental conditions.

Gateway units are nationally recognized and available through Project Lead The Way (PLTW).

For more information, visit [PLTW Gateway Middle School STEM Curriculum Grades 6-8 | PLTW](#)

Automation and Robotics (AR) allows students to trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms.

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Design and Modeling provides students opportunities to apply the design process to creatively solve problems. Students are introduced to the unit problem in the first activity and are asked to make connections to the problem throughout the lessons in the unit. Students learn and utilize methods for communicating design ideas through sketches, solid models, and mathematical models. Students will understand how models can be simulated to represent an authentic situation and generate data for further analysis and observations. Students work in teams to identify design requirements, research the topic, and engage stakeholders. Teams design a toy or game for a child with cerebral palsy, fabricate and test it, and make necessary modifications to optimize the design solution.

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Energy and the Environment challenges students to think big and look toward the future as they explore sustainable solutions to our energy needs and investigate the impact of energy on our lives and the world. They design and model alternative energy sources and evaluate options for reducing energy consumption.

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Flight and Space allows students to become engineers as they design, prototype, and test models to learn about the science of flight and what it takes to travel and live in space. They solve real-world aviation and space challenges and plan a mission to Mars.

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In Green Architecture students learn how to apply concepts of “green” choices to the fields of architecture and construction by exploring dimensioning, measuring, and architectural sustainability as they design affordable housing units using Autodesk® Design Software.

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This course is designed to develop students' knowledge and skills in basic circuitry design and examine the impact of electricity on the world around them. Through hands-on projects, students explore electricity, the behavior and parts of atoms, and sensing devices.

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In Science of Technology students explore how science impacts the technology of yesterday, today, and the future. Students apply the concepts of physics, chemistry, and nanotechnology to STEM activities and projects, including making ice cream, cleaning up an oil spill, and discovering the properties of nanomaterials.

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In Medical Detectives students play the role of real-life medical detectives as they collect and analyze medical data to diagnose disease. They solve medical mysteries through hands-on projects and labs, measure and interpret vital signs, dissect a sheep brain, investigate disease outbreaks, and explore how a breakdown within the human body can lead to dysfunction.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Machine Tool Technology Program of Study. Incorporated into this course are fundamentals related to high performance engine machining skills necessary for a career in a machine shop. This course is recommended as an Elective in Machine Tool Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

High Performance Engines

1901.1	High Performance Engines
1901.1.1	How to identify and evaluate different types of high-performance engines.
1901.1.2	Evaluate engine components for wear.
1901.1.3	Analyze hardness of valve.
1901.1.4	Calculate the new face angles to which the valve should be machined.
1901.1.5	Assess the bore size to which the cylinder should be honed.
1901.1.6	Hone the cylinder depending on usage.
1901.1.7	Recondition and resize rods.
1901.1.8	Bore out valve guides, install new guides and ream to the appropriate size for valve.
1901.1.9	Resurface cylinder head to appropriate finish per application.
1901.1.10	Inspect crankshaft for cracks, pits, abrasions and the polish or grind depending on condition of crankshaft.
1901.1.11	Determine and install camshaft according to application.
1901.1.12	Evaluate passages and restrictions in oiling systems of motor.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Machine Tool Technology Program of Study. Incorporated into this course are elements of advanced measuring, drill press, metal lathe, and milling machine operations skills necessary for a career in machine tool technology. This course is recommended as an Elective in Machine Tool Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Measuring

1902.1	Measuring
1902.1.1	Advanced measuring skills and machining techniques.
1902.1.2	Properly use measuring equipment.
1902.1.3	Demonstrate usage of an inch based inside and outside vernier micrometer.
1902.1.4	Calculate dimensions and tolerances using knowledge of mathematics and instruments such as micrometers and vernier calipers.

Drill Press Operations

1902.2	Drill Press Operations
1902.2.1	Operating a drill press and its applications.
1902.2.2	Select, mount and secure jigs and fixtures for a drill press.
1902.2.3	Perform tapping and boring operations on a drill press.

Metal Lathe Operations

1902.3	Metal Lathe Operations
1902.3.1	Operating a metal lathe and its applications.
1902.3.2	Mount work in independent lathe chuck, face workpiece and center drill workpiece.
1902.3.3	Perform set-up using dial indicator to measure offsets on a lathe.
1902.3.4	Perform a variety of lathe operations.

Fundamentals of Machine Tool Technology introduces students to the foundational knowledge and technical skills essential for success in the machine tool industry. The course covers key areas, emphasizing organization and shop safety practices, measurement and inspection, metallurgical processes and heat treating, blueprint interpretation and process planning, and layout and benchwork. This course sets the stage for a full understanding of the principles and practices needed in Machine Tool Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Organization and Shop Safety Practices

1903.1	Demonstrate safe work habits and operating procedures.
1903.1.1	Adhere to safety protocols and procedures while operating machine tools and equipment.
1903.1.2	Utilize proper techniques for handling materials, tools, and machinery to minimize the risk of accidents and injuries.
1903.1.3	Position and fasten workpieces.
1903.1.4	Set up, adjust, and operate all of the basic machine tools and specialized or advanced variation tools to perform precision machining operations.
1903.1.5	Set up or operate metalworking, brazing, heat-treating, welding, or cutting equipment.
1903.1.6	Shrink-fit bushings, sleeves, rings, liners, gears, and wheels to specifications, using portable gas heating equipment.
1903.2	Clean and maintain personal work area and equipment.
1903.2.1	Regularly clean and organize workspaces to ensure optimal efficiency and safety.
1903.2.2	Perform routine maintenance tasks on machine tools and equipment to keep them in good working condition.
1903.3	Select and appropriately use cutting fluids.
1903.3.1	Identify different types of cutting fluids and their applications in machining operations.
1903.3.2	Properly select and apply cutting fluids to reduce friction, dissipate heat, and improve chip evacuation during cutting processes.
1903.4	Identify and appropriately use Personal Protective Equipment (PPE).
1903.4.1	Wear required PPE, including safety glasses, gloves, ear protection, and protective clothing, to mitigate potential hazards in the machine shop environment.
1903.4.2	Ensure PPE is properly fitted, maintained, and utilized according to safety guidelines and regulations.
1903.5	Identify environmental and safety considerations established by the EPA, OSHA, and listed in SDS publications.
1903.5.1	Understand and comply with environmental regulations and safety standards set forth by regulatory agencies such as the EPA and OSHA.
1903.5.2	Access and interpret Safety Data Sheets (SDS) to identify potential hazards associated with materials and substances used in machining processes.

Measurement and Inspection

1903.6	Identify, select, and calibrate precision and semi-precision measuring tools.
1903.6.1	Identify various measuring instruments, including micrometers, calipers, dial indicators, and gauge blocks, and understand their principles of operation.
1903.6.2	Select appropriate measuring tools based on the level of precision required for dimensional inspection tasks and ensure their accuracy through proper calibration procedures.
1903.7	Measure workpiece to verify compliance with print specifications.
1903.7.1	Use precision measuring tools to accurately measure dimensions, tolerances, and surface finishes of machined components.
1903.7.2	Compare measured values against blueprint specifications to verify conformance and identify deviations for corrective action.
1903.8	Display knowledge of quality control standards and process improvement, including SPC.
1903.8.1	Understand the principles of Statistical Process Control (SPC) and its application in monitoring and improving machining processes.
1903.8.2	Implement quality control measures to detect and address variations in product output, ensuring consistent quality and adherence to specifications.

Metallurgical Processes and Heat Treating

1903.9	Identify the properties and characteristics of common metals and their effect on machinability.
1903.9.1	Recognize the metallurgical properties of ferrous and non-ferrous metals, including hardness, toughness, and ductility, and their influence on machining behavior.
1903.9.2	Understand how material properties affect tool life, cutting forces, and surface finish in machining operations.
1903.10	Identify the AISI/SAE and UNS steel identification systems.
1903.10.1	Interpret steel identification codes according to the American Iron and Steel Institute (AISI) and Society of Automotive Engineers (SAE) standards.
1903.10.2	Identify and classify steel alloys based on their chemical composition, mechanical properties, and intended applications.
1903.11	Identify heat treating processes and objectives.
1903.11.1	Understand the principles of heat treatment processes, including annealing, quenching, tempering, and case hardening.
1903.11.2	Recognize the objectives of heat treating, such as improving mechanical properties, enhancing wear resistance, and relieving internal stresses in metal components.
1903.11.3	Solve problems involving heat flow and temperature.

Blueprint Interpretation and Process Planning

1903.12	Interpret blueprints including geometric dimensioning and tolerancing (GD&T) symbols.
1903.12.1	Read and interpret engineering drawings, including geometric dimensioning and tolerancing (GD&T) annotations, to understand part geometry and dimensional requirements.
1903.12.2	Identify and interpret GD&T symbols, such as position, concentricity, and perpendicularity, to ensure proper communication of design specifications.
1903.13	Develop an order of operations (process plan) based on blueprint specifications.
1903.13.1	Analyze blueprint specifications and geometric features to determine the sequence of machining operations required to produce a given part.
1903.13.2	Develop a systematic process plan outlining the steps, tools, and machining parameters needed to achieve desired part dimensions and tolerances.

Layout and Benchwork

1903.14	Identify and appropriately use hand tools.
1903.14.1	Identify common hand tools used in layout and benchwork, such as squares, rulers, scribes, and files, and understand their applications.
1903.14.2	Safely and effectively use hand tools to perform layout, marking, cutting, and shaping operations on workpieces.
1903.15	Identify and safely use power hand tools.
1903.15.1	Identify various power hand tools, including drills, grinders, sanders, and saws, and understand their proper operation and safety precautions.
1903.15.2	Use power hand tools to efficiently perform material removal, shaping, and finishing tasks while adhering to safety guidelines.
1903.15.3	Align and secure holding fixtures, cutting tools, attachments, accessories, or materials onto machines.
1903.16	Grind and shape tools using a pedestal/bench grinder.
1903.16.1	Operate a pedestal or bench grinder to sharpen and shape cutting tools, such as drills, lathe tools, and milling cutters, to maintain optimal cutting performance.
1903.16.2	Apply proper grinding techniques to achieve accurate tool geometry and edge sharpness while minimizing heat buildup and tool damage.
1903.17	Perform semi-precision and precision layout.
1903.17.1	Perform layout operations to mark dimensions, hole locations, and geometric features on workpieces using layout tools and instruments.
1903.17.2	Ensure accuracy and precision in layout work by employing proper measuring techniques, layout procedures, and attention to detail.

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Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advanced Lathe Operations

1904.1	Advanced Lathe Operations
1904.1.1	Measuring skills needed for the machine tool industry.
1904.1.2	Perform measuring skills using a vernier protractor.
1904.1.3	Layout a hole pattern using dividers.

Advanced Milling Machine Operations

1904.2	Advanced Milling Machine Operations
1904.2.1	Operate a metal lathe.
1904.2.2	Counter bore hole in a work piece using a boring tool.
1904.2.3	Cut a groove in a work piece.
1904.2.4	Machine an external taper using a taper attachment.
1904.2.5	Set-up a follower rest to support a long work piece.
1904.2.6	Machine internal and external snap-ring grooves.

Milling Machine

1904.3	Milling Machine
1904.3.1	Operate a milling machine.
1904.3.2	End mill opposing key seats in work piece.
1904.3.3	Drill equally spaced holes on a bolt circle using a rotary table.

Fundamentals of Machine Processes enhances student skills in key areas such as intermediate hand tools, power tools, measuring tools, vertical band saw, surface grinding, metal lathe operations, and milling machine operations. Through problem-solving techniques and hands-on activities, students develop an understanding of course concepts.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Machining Processes

1905.1	Identify appropriate machine processes and equipment to produce a product.
1905.1.1	Study blueprints, layouts, or charts, and job orders for information on specifications and tooling instructions, and to determine material requirements and operational sequences.
1905.1.2	Select cutting tools and tooling instructions, according to written specifications or knowledge of metal properties and shop mathematics.
1905.1.2	Position, adjust, and secure stock material or workpieces against stops, on arbors, or in chucks, fixtures, or automatic feeding mechanisms, manually or using hoists.
1905.2	Explain the use of machine tools in the manufacturing industry.
1905.2.1	Compute dimensions, tolerances, and angles of workpieces or machines, according to specifications and knowledge of metal properties and shop mathematics.
1905.2.2	Move controls to set cutting speeds and depths and feed rates, and to position tools in relation to workpieces.
1905.2.3	Monitor the feed and speed of machines during the machining process.
1905.2.4	Record operational data such as pressure readings, lengths of strokes, feed rates, and speeds.
1905.2.5	Measure, examine, or test completed units to check for defects and ensure conformance to specifications, using precision instruments, such as micrometers.

Lathe and Milling Machine Identification

1905.3	Identify parts of preventive maintenance of a lathe and a mill.
1905.3.1	Identify the basic parts of a lathe.
1905.3.2	Identify and use the controls that are used to start and stop the spindle.
1905.3.3	Identify and use the carriage hand wheel and the cross-slide hand wheel.
1905.3.4	Demonstrate how to change the speeds and feeds of a lathe.
1905.3.5	Identify the basic parts of a mill.
1905.3.6	Align the vise to be parallel with the table.
1905.3.7	Clean, machines, tools, or parts, using solvents or solutions and rags.
1905.3.8	Demonstrate how to change the speeds and feeds of a mill.

Surface Grinding

1905.4	Identify parts and preventive maintenance of a surface grinder.
1905.4.1	Inspect and identify all components of a surface grinder machine.
1905.4.2	Execute routine preventive maintenance tasks to ensure optimal functionality.
1905.5	Select appropriate grinding wheel.
1905.5.1	Analyze workpiece material and specifications to determine the correct type and grit of grinding wheel.
1905.5.2	Evaluate grinding wheel characteristics such as hardness and abrasiveness for compatibility with the workpiece.
1905.6	Explain safe principles of operation (e.g., wheel mounting and dressing, ring testing, workholding, grinding parallel and perpendicular surfaces).
1905.6.1	Demonstrate proper techniques for mounting and dressing grinding wheels.
1905.6.2	Conduct ring testing to assess the integrity of grinding wheels before operation.
1905.6.3	Implement safe workholding methods to secure the workpiece during grinding.
1905.6.4	Perform surface grinding operations while maintaining parallelism and perpendicularity according to specifications.

Drill Press

1905.7	Identify parts and preventive maintenance of a drill press.
1905.7.1	Identify and inspect all components of a drill press.
1905.7.2	Execute regular preventive maintenance procedures to ensure smooth operation and longevity of the equipment.
1905.8	Determine appropriate tooling and workholding devices.
1905.8.1	Evaluate workpiece material, size, and drilling requirements to select suitable cutting tools (e.g., drill bits, reamers, countersinks).
1905.8.2	Choose appropriate workholding devices (e.g., clamps, vises) to secure the workpiece safely and effectively.
1905.9	Explain safe principles of operation (e.g., drilling, reaming, countersinking, counterboring, tapping).
1905.9.1	Execute drilling, reaming, countersinking, counterboring, and tapping operations following established safety protocols.
1905.9.2	Demonstrate proper techniques for setting up and aligning workpieces on the drill press table.
1905.9.3	Operate the drill press machine safely, ensuring correct spindle speeds, feed rates, and cutting tool engagements.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Machine Tool Technology Program of Study. Incorporated into this course are elements of advanced lathe, milling machine, and CNC operations necessary for a career in machine tool technology. This course is recommended as an Elective in Machine Tool Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advanced Lathe Operations

1906.1	Advanced Lathe Operations
1906.1.1	Advanced lathe operations.
1906.1.2	Cut internal taper surface using the compound rest.
1906.1.3	Chase internal right hand and left-hand acme-threads.
1906.1.4	Chase internal pipe threads.

Advanced Milling Machine Operations

1906.2	Advanced Milling Machine Operations
1906.2.1	Advanced milling machine operations.
1906.2.2	Machine a t-nut.
1906.2.3	Boring holes in a work piece.
1906.2.4	Advanced machining operations using an indexing head.

Advanced CNC Machining

1906.3	Advanced CNC Machining
1906.3.1	Advanced CNC machining processes.
1906.3.2	Contrast and compare parts of CNC equipment and describe how it operates.
1906.3.3	Demonstrate set-up procedure for and properly operate CNC equipment.
1906.3.4	Calculate CNC programming geometry problems.
1906.3.5	Create CNC programs using g and m codes.
1906.3.6	Create incremental and absolute CNC programs.
1906.3.7	Formulate angles for CNC program.

Machine Tool Operations equips students with essential knowledge and technical skills in grinding techniques, lathe and milling operations, and CNC machining. The course emphasizes career exploration, job-seeking skills, and ethical practices while integrating safety into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Lathes

1907.1	Explain safe principles of operation.
1907.1.1	Confer with instructor before turning on machine.
1907.1.2	Monitor the feed and speed of machines during the machining process.
1907.1.3	Adjust machine controls and change tool settings in order to keep dimensions within specified tolerances.
1907.1.4	Inspect sample work pieces to verify conformance with specifications, using instruments such as gauges, micrometers, and dial indicators.
1907.2	Select and maintain appropriate tools.
1907.2.1	Remove and sharpen dull cutting tools.
1907.3	Calculate appropriate cutting speed, feed rate, and depth of cut.
1907.3.1	Calculate machine speed and feed ratios and the size and position of cuts.
1907.4	Grind and form lathe tools.
1907.4.1	Operate engine lathe to grind, file, and turn, taper, and thread machine parts to dimensional specifications.
1907.5	Demonstrate knowledge of various workholding methods (e.g., independent, and universal chucks, collets, faceplate, between centers, steady and follower rests).
1907.5.1	Demonstrate how to change the speed of the chuck.
1907.5.2	Set up and perform lathe machine operations (e.g., turning, threading, taper turning, knurling, grooving, and cut-off, drilling and tapping, filing, polishing).
1907.6	Set up and perform lathe machine operations (e.g., turning, boring, threading, taper turning, knurling, grooving and cut-off, drilling and tapping, filing, polishing).
1907.6.1	Start lathe or turning machine and observe operations to ensure that specifications are met.
1907.6.2	Set machine stops or guides to specified lengths as indicated by scales, rules, or templates.
1907.6.3	Read blueprints or job orders to determine product specifications and tooling instructions and to plan operational sequences
1907.7	Identify appropriate uses for carbide inserts.
1907.7.1	Program computers or electronic instruments, such as numerically controlled machine tools.

Milling Machines

1907.8	Explain safe principles of operation.
1907.8.1	Stop machines to remove finished work pieces or to change tooling, setup, or work piece placement, according to required machining sequences.

1907.9	Select and maintain appropriate tools.
1907.9.1	Select cutting tools and tooling instructions, according to written specifications or knowledge of metal properties and shop mathematics.
1907.9.2	Select and use appropriate inspection devices.
1907.10	Calculate appropriate cutting speed, feed rate, and depth of cut.
1907.10.1	Set controls to regulate machining: keyway, boring head, angular indexing, simple indexing, and direct indexing.
1907.11	Explain various workholding methods (e.g., mill vise, table set-ups, angle plates, indexing heads, v-blocks).
1907.11.1	Position and fasten work pieces.
1907.11.2	Lay out, measure, and mark metal stock to display placement of cuts.
1907.12	Set up milling machines (e.g., head alignment, vise alignment, tool holder selection, establishing a part zero, set DRO use).
1907.12.1	Align the vise to be parallel with the table.
1907.12.2	Select the proper coolants and lubricants and start their flow.
1907.13	Perform milling operations (e.g., pocketing, slotting, hole-making, peripheral and face milling).
1907.13.1	Interpret scaled machine tool and materials forming prints to produce parts or finished products.
1907.13.2	Stop machines to remove finished work pieces or to change tooling, setup, or work piece placement, according to required machining sequences.

Machining Processes

1907.14	Demonstrate milling machine processes and basic lathe operations.
1907.14.1	Set up and operate machines, such as milling machines, to make metallic and plastic workpieces.
1907.14.2	Move cutters or material manually or by turning handwheels or engage automatic feeding mechanisms to mill workpieces to specifications.
1907.14.3	Move controls to set cutting speeds and depths and feed rates, and to position tools in relation to workpieces.
1907.14.4	Start machines and turn handwheels or valves to engage feeding, cooling, and lubricating mechanisms.
1907.14.5	Perform minor machine maintenance, such as oiling or cleaning machines, or adding coolant to machine reservoirs.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Machine Tool Technology Program of Study. Incorporated into this course are elements of advanced machining operations and program creation skills necessary for a career in machine tool technology. This course is recommended as an Elective in Machine Tool Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Machining Operations

1908.1	Machining Operations
1908.1.1	Advanced machining operations.
1908.1.2	Demonstrate advanced programming to create parts.
1908.1.3	Create programs using row hole pattern canned cycles.
1908.1.4	Create programs using pocket canned cycles.
1908.1.5	Create incremental and absolute programs.
1908.1.6	Create engraving programs.
1908.1.7	Create programs using bolt hole pattern canned cycles.
1908.1.8	Set up and operate computer-controlled machines or robots to perform one or more machine functions on plastic or metal workpieces.
1908.1.9	Monitor machine operation and control panel displays and compare readings to specifications to detect malfunctions.
1908.1.10	Implement changes to machine programs and enter new specifications using computers.
1908.1.11	Modify cutting programs to account for problems encountered during operation and save modified programs.

Metal Trades Processes and Applications advances students skills in power saw operations, metal lathe operations, milling machine operations, and CNC machining operations. Students gain a solid understanding of course concepts, preparing them for success in the realm of metal trades.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Computer Numerical Control (CNC) Programming, Preparation, Operations

1909.1	Demonstrate knowledge of the axis and coordinate systems.
1909.1.1	Apply taper terminology and trigonometry to set a compound rest to cut a taper on a lathe.
1909.1.2	Identify purpose and application of layout die.
1909.1.3	Identify the types of tools that produce holes.
1909.1.4	Calculate machine speed and feed ratios and the size and position of cuts.
1909.1.5	Set controls to regulate machining, or enter commands to retrieve, input, or edit computerized machine control media.
1909.1.6	Transfer commands from a computer to a computer numerical control (cnc) modules.
1909.1.7	Identify the types of steel and their differing characteristics and attributes.
1909.2	Read and write basic G and M codes.
1909.2.1	Create CNC programs using G and M codes.
1909.2.2	Create incremental and absolute CNC programs.
1909.2.3	Be able to use a machinery handbook to find a tap drill size, keyway and keyset calculations, and thread parameters.
1909.3	Perform basic setup and operation for CNC Lathe (e.g., work offset, tool offset, workholding devices, toolholding devices).
1909.3.1	Identify weldable and non-weldable materials.
1909.3.2	Demonstrate filing to a layout line.
1909.3.3	Cut external and internal V threads, worms, grooves, and profiles.
1909.3.4	Turn an eccentric on lathe.
1909.3.5	File and polish using a lathe.
1909.3.6	Use gnarling and grooving tools.
1909.4	Perform basic setup and operation for CNC mill (e.g., work offset, tool offset, workholding devices, toolholding devices).
1909.4.1	Calculate cutting time, feed rate for a milling operation and rpms for a drilling operation.
1909.4.2	Demonstrate proper hacksawing procedures.
1909.4.3	Calculate rpms for reaming and drilling.
1909.4.4	Perform horizontal boring.
1909.4.5	Machine slots in workpiece.
1909.4.6	Flycut workpiece on vertical mill.
1909.4.7	Demonstrate care and maintenance of milling cutters.
1909.4.8	Perform drilling operations such as counterboring, countersinking, reaming.
1909.4.9	Inspect sample workpieces to verify conformance with specifications, using instruments such as gauges, micrometers, and dial indicators.

1909.4.10	Set up and operate computer-controlled machines to perform one or more machine functions on metal or plastic workpieces.
1909.4.11	Create square stock from round stock.

Band Saw Machines

1909.5	Identify parts and preventive maintenance of a band saw.
1909.5.1	Identify common parts of a band saw machine, such as the blade, guides, wheels, and motor.
1909.5.2	Perform routine preventive maintenance tasks, including blade tension adjustment, lubrication of moving parts, and inspection of safety features.
1909.6	Explain safe principles of operation.
1909.6.1	Explain proper techniques for feeding material into the band saw and maintaining a safe distance from the blade.
1909.6.2	Describe the importance of wearing appropriate personal protective equipment (PPE) and following safety guidelines while operating the band saw machine.
1909.7	Set up and perform band saw machine operations.
1909.7.1	Set up the band saw machine by adjusting blade tension, setting blade guides, and aligning the cutting table.
1909.7.2	Perform basic band saw operations, including straight cuts, angle cuts, and contour cutting, while ensuring accurate measurements and proper material support.

This course introduces the student to the knowledge base and technical skills for concepts in Block Laying. Areas of study include block foundation, concrete block, and block leads. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Block Foundations

1911.1	Block Foundations
1911.1.1	Constructing a block foundation.
1911.1.2	Show how to pin corners for a block foundation.
1911.1.3	Estimate materials for a foundation project.
1911.1.4	Layout, bond, build and waterproof a foundation.
1911.1.5	Install wire reinforcement and lintels in a block wall.
1911.1.6	Explain terms associated with laying block.
1911.1.7	Demonstrate methods of putting up a line.
1911.1.8	Write a description of laying block leads accurately.
1911.1.9	Build an outside and inside corner lead several courses high.

Special Applications

1911.2	Special Applications
1911.2.1	Control joints, using masonry saw, metal door frames, and windows and bond beam installation.
1911.2.2	Build a block partition wall with control joints.
1911.2.3	Cut block with a masonry saw.
1911.2.4	Lay block against a metal door frame.
1911.2.5	Incorporate bond beam within a block wall.

This course introduces the student to the knowledge base and technical skills for concepts in Masonry Procedures. Areas of study include laying split face block, constructing quoin corners, and laying cultured stone. Emphasis will be placed on career exploration, job seeking skills, personal and professional ethics. Safety instruction is integrated into all activities. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to Advanced Masonry Procedures.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Construction Foundations

1912.1	Construction foundations.
1912.1.1	Lay split face block leads.
1912.1.2	Utilize terms associated with laying split face block.
1912.1.3	Compare and contrast the difference in split face block and regular block.
1912.1.4	Construct an eight-inch split face block straight lead.
1912.1.5	Construct an eight-inch split face block corner lead.

Laying Split Face Block

1912.2	Laying split face block.
1912.2.1	Lay split face block.
1912.2.2	Assess methods of establishing a string line.
1912.2.3	Lay out and build a wall using established leads.
1912.2.4	Analyze the importance of having uniform head and bed joints.

Quoin Corners

1912.3	Quoin corners.
1912.3.1	Construct brick quoin corners.
1912.3.2	Utilize terms associated with laying a quoin corner.
1912.3.3	Analyze the purpose of a quoin corner.
1912.3.4	Lay out a quoin corner using established height.
1912.3.5	Build a quoin corner as a lead.
1912.3.6	Tie a quoin corner to a previously built wall.

Cultured Stone

1912.4	Cultured Stone.
1912.4.1	Lay a cultured stone panel.
1912.4.2	Break down terms associated with cultured stone.
1912.4.3	Outline the various procedures for laying cultured stone.
1912.4.4	Compile a list of factors to consider when laying cultured stone.
1912.4.5	Validate the purpose of wire lath for laying cultured stone.

1912.4.6	Compare and contrast the difference between finishing joints with grout bag/brush and dry stacked cultured stone.
1912.4.7	Construct a cultured stone panel.

This course introduces the student to the knowledge base and technical skills for concepts in Bricklaying. Areas of study include joint finishing, laying brick to the line, constructing brick leads, laying brick positions and brick paving. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Building Plans and Specifications for Electrical Installations

1913.1	Building Plans and Specifications for Electrical Installations
1913.1.1	Laying brick leads.
1913.1.2	Explain terms associated with laying leads.
1913.1.3	Write a short paragraph describing the purpose of leads.
1913.1.4	Lay brick leads.

Laying Brick to the Line

1913.2	Laying Brick to the Line
1913.2.1	Laying brick to the line.
1913.2.2	Explain terms associated with laying brick to the line.
1913.2.3	Demonstrate methods of putting up a line and setting a trig brick.
1913.2.4	Dry bond a wall.
1913.2.5	Lay brick to the line using established leads and corner poles.
1913.2.6	Reinforce the importance of having a plumb bond.
1913.2.7	Explain how to install wall ties.

Brick Positions

1913.3	Brick Positions
1913.3.1	Laying brick using different brick positions.
1913.3.2	Distinguish between the different meanings of bonding and types of bonds.
1913.3.3	Explain terms associated with wall layout.
1913.3.4	Construct a double wall that contains stretchers, headers, soldiers, shiners, row locks, and sailors.

Tooling Mortar Joints

1913.4	Tooling Mortar Joints
1913.4.1	Mortar joints.
1913.4.2	Contrast the different types of jointers and their uses.
1913.4.3	Strike, brush, and polish mortar joints.

Brick Paving

1913.5	Brick Paving
1913.5.1	Laying brick pavers.
1913.5.2	Compare the various types of bricks and pattern bonds in paving.
1913.5.3	Show how brick pavers are laid with and without mortar.
1913.5.4	Lay various brick patterns within a 2' x 4' frame.

This course introduces the student to the knowledge base and technical skills for concepts in Bricklaying Applications. Areas of study include installing brick paving, building chimneys and fireplaces, constructing brick steps, and building brick archways. Emphasis will be placed on career exploration, job seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Brick Paving

1914.1	Brick Paving
1914.1.1	Installing brick paving.
1914.1.2	Analyze various types of brick pattern bonds used for paving.
1914.1.3	Compare and contrast the differences of brick paving with and without mortar.
1914.1.4	Lay various patterns within a 2'x 4' frame.

Chimneys and Fireplaces

1914.2	Chimneys and Fireplaces
1914.2.1	Building chimneys and fireplaces.
1914.2.2	Utilize terms associated with chimneys and fireplaces.
1914.2.3	Compare and contrast the types of fireplaces.
1914.2.4	Analyze the factors to consider in constructing fireplaces and chimneys.
1914.2.5	Butter a firebrick.
1914.2.6	Assess the characteristics of a firebox.
1914.2.7	Construct a fireplace with chimney.

Steps

1914.3	Steps
1914.3.1	Constructing steps.
1914.3.2	Classify parts of a step.
1914.3.3	Compare and contrast the relationship between riser and tread.
1914.3.4	Map out the procedures for the layout of brick steps.
1914.3.5	Build a set of brick steps.

Arches

1914.4	Arches
1914.4.1	Constructing arches.
1914.4.2	Utilize terms associated with arch construction.
1914.4.3	Compare and contrast the major types of arches used today.
1914.4.4	Assess the function of archways.
1914.4.5	Build an arch template.
1914.4.6	Construct a semi-circular arch.

This course introduces the student to the knowledge base and technical skills for concepts in Decorative Masonry Work. Areas of study include building with the six different brick positions, building with landscape block, integrating arches into openings, and setting ceramic tile. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Brick Positions

1916.1	Brick Positions
1916.1.1	The six different brick positions and how to use them.
1916.1.2	Analyze the six different brick positions.
1916.1.3	Build a brick wall for each of the six brick positions.
1916.1.4	Layout a herringbone pattern.
1916.1.5	Lay a radius step using brick position.

Landscape Block

1916.2	Landscape Block
1916.2.1	Laying landscape block.
1916.2.2	Identify the tools associated with laying landscape block.
1916.2.3	Compare and contrast the different dimensions of landscape block.
1916.2.4	Define and discuss the use and purpose of landscape block.
1916.2.5	Utilize terms associated with laying landscape block.
1916.2.6	Formulate methods for estimating landscape block.
1916.2.7	Layout and build a landscape block project.

Arch Construction

1916.3	Arch Construction
1916.3.1	Designing and constructing an archway.
1916.3.2	Utilize terms associated with arch construction.
1916.3.3	Compare and contrast the types of arches used in the construction industry.
1916.3.4	Analyze the use of keystone in arch construction.
1916.3.5	Construct an archway.

Ceramic Tile

1916.4	Ceramic Tile
1916.4.1	Laying ceramic tile.
1916.4.2	Identify tools associated with setting ceramic tile.
1916.4.3	Assess methods for estimating ceramic tile.
1916.4.4	Layout and construct a ceramic tile project.

This course introduces the student to the knowledge base and technical skills for all courses in the masonry Program of Study, specifically foundations and footings. Areas of study include blueprint reading, site layout and footer and foundation installation. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Blueprint Reading

1917.1	Blueprint Reading
1917.1.1	Blueprint reading.
1917.1.2	Interpret working drawings.
1917.1.3	Apply terms, abbreviations, and symbols associated with basic blueprint reading.

Foundation Layout

1917.2	Foundation Layout
1917.2.1	Foundation layout.
1917.2.2	Reinforce the importance of accuracy in foundation layout.
1917.2.3	Measure the diagonal to square a foundation.
1917.2.4	Explain the important features of a foundation.
1917.2.5	Set up level devices and transits.
1917.2.6	Construct batter boards.
1917.2.7	Determine the size of footings for different widths of walls.
1917.2.8	Compare and contrast the two major types of footings.
1917.2.9	Demonstrate the use of steel reinforcement in concrete footers.
1917.2.10	Explain how a footer is placed and cured.
1917.2.11	Determine the size of footings for different widths of walls.

Gateway units are nationally recognized and available through Project Lead The Way (PLTW).

For more information, visit [PLTW Gateway Middle School STEM Curriculum Grades 6-8 | PLTW](#)

App Creators introduces students to the field of computer science and the concepts of computational thinking, through the creation of mobile apps. Students are challenged to be creative and innovative, as they collaboratively design and develop mobile solutions to engaging, authentic problems. Students experience the positive impact of the application of computer science to society as well as other disciplines, particularly biomedical science. The unit provides students opportunities for self-expression. Teams identify a personal or community problem of interest to them that can be solved with a mobile app solution. The problem can address issues such as health and wellness, the environment, school culture, emergency preparedness, education, community service.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Career Opportunities

1919.1	Career Opportunities.
1919.1.1	Career opportunities related to masonry.
1919.1.2	Research masonry careers.
1919.1.3	Develop work ethic.
1919.1.4	Compile sources of information about careers in masonry.

Safety

1919.2	Safety.
1919.2.1	Safe work habits.
1919.2.2	Practice safety rules in the masonry lab.
1919.2.3	Complete a safety checklist.
1919.2.4	Demonstrate the safe use of hand and power masonry tools.
1919.2.5	Compare and contrast different types of scaffolding.
1919.2.6	Erect scaffolding and/or ladders.
1919.2.7	Write a report on safety in the masonry lab.
1919.2.8	Investigate hazardous materials and the use of the Safety Data Sheets (SDS).
1919.2.9	Complete a safety examination.

Hand Tools

1919.3	Hand Tools.
1919.3.1	Various hand tools related to the masonry field.
1919.3.2	Explain why proper tool identification is necessary on the job site.
1919.3.3	Demonstrate proper care and use of various hand tools.

Masonry Materials

1919.4	Masonry Materials.
1919.4.1	The manufacturing of masonry materials and their application.
1919.4.2	Research the development of brick and block from early times to the present.
1919.4.3	Match the description of various actual dimensions of brick and block to nominal sizes.
1919.4.4	Assess the characteristics of brick and block.
1919.4.5	Rank the various types of mortar.
1919.4.6	Determine what admixtures are to be used in masonry.
1919.4.7	Analyze the causes and prevention of efflorescence.
1919.4.8	Proportion mortar ingredients and mix to the proper consistency using a mortar hoe and a mortar mixer.
1919.4.9	Demonstrate the different methods of picking up mortar from a pan and board.
1919.4.10	Demonstrate the correct and incorrect ways of holding a trowel and how to properly spread mortar.
1919.4.11	When given an illustration, label the head and bed joints.
1919.4.12	Demonstrate the ability to spread mortar on a 2x4.

Gateway units are nationally recognized and available through Project Lead The Way (PLTW).

For more information, visit [PLTW Gateway Middle School STEM Curriculum Grades 6-8 | PLTW](#)

Computer Science for Innovators and Makers teaches students that programming goes beyond the virtual world into the physical world. Students are challenged to creatively use sensors and actuators to develop systems that interact with their environment. Designing algorithms and using computational thinking practices, they code and upload programs to microcontrollers that perform a variety of authentic tasks. The unit broadens students' understanding of computer science concepts through meaningful applications. Teams select and solve a personally relevant problem related to wearable technology, interactive art, or mechanical devices.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

FANUC Operator III advances student's expertise in robot operation and programming. Covering advanced programming techniques, preventive maintenance, and in-depth troubleshooting, this course prepares students for complex scenarios, emphasizing mastery in optimizing efficiency and ensuring seamless operations.

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Advanced Operations and Programming (ROBOGuide)

1929.1	Apply advanced program functions and options.
1929.1.1	Explore advanced programming features and functions available in the robot programming environment.
1929.1.2	Utilize advanced motion control options, path planning algorithms, and optimization techniques to enhance program efficiency and performance.
1929.2	Program auxiliary axis.
1929.2.1	Configure and program auxiliary axis (e.g., external axes, additional robot axes) to extend the capabilities of the robot system.
1929.2.2	Integrate auxiliary axis into robot programs to synchronize motion and coordinate complex multi-axis movements.
1929.3	Program advanced motion and non-motion statements.
1929.3.1	Implement advanced motion commands and non-motion statements to achieve precise and sophisticated robot behaviors.
1929.3.2	Utilize advanced motion instructions such as coordinated motion, spline interpolation, and tool center point (TCP) control from intricate motion control tasks.

Troubleshoot System Errors

1929.4	Troubleshoot Configuration errors.
1929.4.1	Diagnose and resolve configuration errors related to robot setup, system integration, and peripheral device communication.
1929.4.2	Use diagnostic tools and error logs to identify and correct configuration issues affecting system performance.
1929.5	Troubleshoot Dual Check Safety (DCS) errors.
1929.5.1	Identify and troubleshoot errors and faults related to Dual Check Safety (DCS) systems implemented in FANUC robots.
1929.5.2	Interpret DCS error codes and messages to diagnose safety-related issues and ensure compliance with safety standards.

FANUC Operator IV represents the pinnacle of proficiency in operating and maintaining FANUC robotics systems. This advanced course focuses on specialized knowledge in advanced motion control, vision systems integration, and real-time production optimization. Students are equipped to tackle complex programming challenges, refine troubleshooting, and master system diagnostics, becoming invaluable assets in industrial automation.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Simulation

1930.1	Determine the function and use of simulations.
1930.1.1	Understand the purpose and benefits of simulation software in virtual robot programming and offline programming (OLP).
1930.1.2	Explain the role of simulations in validating robot programs, optimizing cycle times, and minimizing downtime during production.
1930.2	Demonstrate knowledge of simulation screen layout.
1930.2.1	Navigate and interpret the user interface of simulation software, including layout, menus, toolbars, and panels.
1930.2.2	Familiarize with simulation controls and options for viewing, editing, and analyzing robot programs and simulations.
1930.3	Prepare simulation model robot.
1930.3.1	Set up and configure virtual robot models within simulation software to accurately represent physical robot systems.
1930.3.2	Define kinematic properties, joint limits, and payload characteristics for simulation model robots.
1930.4	Jog the robot.
1930.4.1	Use simulation software to manually jog the virtual robot through its workspace and verify motion paths.
1930.4.2	Validate robot movements and interactions with virtual environments to ensure proper simulation behavior.
1930.5	Define parts and fixtures in simulation.
1930.5.1	Import CAD models or define geometric primitives to represent parts, fixtures, and workpieces within simulation environments.
1930.5.2	Position and orient parts and fixtures relative to the robot's workspace for simulation and programming tasks.
1930.6	Create robot TP program for simulation.
1930.6.1	Develop robot programs within simulation environments using teach pendant programming tools and syntax.
1930.6.2	Write and debug robot programs to perform simulated tasks and operations accurately.
1930.7	Create a simulation.
1930.7.1	Configure simulation parameters and settings to define simulation scenarios, including robot programs, environmental conditions, and task objectives.
1930.7.2	Execute simulations and observe virtual robot behavior to validate program logic, optimize robot motions, and troubleshoot errors.
1930.8	Execute simulation program.

1930.8.1	Run simulated robot programs and observe virtual robot actions and interactions within the simulation environment.
1930.8.2	Monitor simulation outputs, such as robot path, sensor readings, and task completion status, for validation and analysis.
1930.9	Match real cell to ROBOGUIDE.
1930.9.1	Compare physical robot cell configurations and layouts with corresponding virtual representations in ROBOGUIDE simulation software.
1930.9.2	Ensure consistency and accuracy between real-world production environments and simulated models for seamless integration and operation.
1930.10	Transfer to and from robot.
1930.10.1	Export validated robot programs and configurations from simulation environments to physical robot controllers for execution in production.
1930.10.2	Import feedback and data collect from real-world robot operations back into simulation software for analysis, optimization, and iterative improvement.

iRVision

1930.11	Identify iRVision application requirements.
1930.11.1	Recognize scenarios and tasks where iRVision systems can be applied to enhance robotic vision capabilities.
1930.11.2	Identify the benefits and limitations of integrating iRVision technology into robotic automation systems.
1930.12	Demonstrate knowledge of iRVision components.
1930.12.1	Examine hardware components and subsystems comprising an iRVision system, including cameras, lighting, lenses, and processors.
1930.12.2	Describe the roles and functions of each component in capturing, processing, and interpreting visual information for robot guidance and inspection.
1930.13	Demonstrate knowledge of iRVision system hardware setup.
1930.13.1	Configure and calibrate iRVision hardware components to ensure optimal performance and accuracy in robotic vision applications.
1930.13.2	Align cameras, adjust lighting conditions, and optimize camera settings for specific inspection tasks and work environments.
1930.14	Identify iRVision processes.
1930.14.1	Investigate the various image processing and analysis techniques employed by iRVision systems to gather relevant information from visual inputs.
1930.14.2	Identify key processes such as pattern matching, blob analysis, edge detection, and feature extraction used for object recognition and localization.
1930.15	Determine and establish frame locations.
1930.15.1	Define reference frames and coordinate systems within iRVision software to facilitate accurate robot positioning and motion control.
1930.15.2	Set up coordinate transformations and alignment procedures to synchronize robot motion with visual feedback from iRVision cameras.
1930.16	Perform iRVision setup.
1930.16.1	Configure iRVision software settings and parameters to customize vision algorithms and processing techniques for specific applications.
1930.16.2	Adjust image filters, thresholding parameters, and region-of-interest (ROI) setting to optimize object detection and recognition performance.
1930.17	Perform 2D Calibration (automatic and manual)

1930.17.1	Calibrate iRVision cameras and vision systems to ensure accurate geometric mapping and distortion correction for 2D image processing.
1930.17.2	Execute both automatic and manual calibration procedures to fine-tune camera parameters and improve measurement accuracy.
1930.18	Perform Error Proofing process.
1930.18.1	Implement error-proofing strategies using iRVision systems to detect and prevent defects, errors, and deviations from desired product specifications.
1930.18.2	Configure inspection routines and quality checks to identify non-conforming parts and trigger corrective action in real-time production environments.
1930.19	Apply 2D Vision process.
1930.19.1	Utilize 2D vision algorithms and techniques to perform object detection, localization, measurement, and alignment tasks in industrial automation application.
1930.19.2	Develop vision-guided robot programs to accurately manipulate and interact with objects based on visual cues and feedback.

This course introduces the student to the knowledge base and technical skills for Fundamentals of Power Equipment I as a component of all courses in the Power Equipment Systems Program of Study. Areas of study include job seeking and keeping skills, safety, basic principles of engine operation, and air and fuel systems. Emphasis will be placed on career exploration, job seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1962.1	Identify and test equipment safety devices.
1962.1.1	Demonstrate understanding of all safety procedures.
1962.1.2	Identify OSHA and other accident reporting agencies.
1962.1.3	Identify and describe basic Personal Protective Equipment (PPE).
1962.1.4	Recognize the main causes of accidents.
1962.1.5	Research agencies that are responsible for emergencies in the workplace.
1962.1.6	Demonstrate operating instructions before using any equipment.
1962.1.7	Establish procedures for safe evacuation of the worksite in an emergency.
1962.1.8	Demonstrate the ability to follow safety and security procedures.
1962.1.9	Identify the location and use of eye wash stations.
1962.1.10	Identify and comply with personal and environmental safety practices associated with the handling, storage, and disposal of chemicals and hazardous materials.
1962.1.11	Identify and apply general and required shop safety rules and procedures.
1962.1.12	Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
1962.2	Demonstrate proper techniques for hand tools (e.g., screwdriver, torque wrenches).
1962.2.1	Identify tools and demonstrate their proper usage.
1962.2.2	Identify standard and metric designation.
1962.2.3	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
1962.3	Demonstrate proper techniques for power tools and machinery.
1962.3.1	Explain and demonstrate how to safely use various types of power tools.
1962.3.2	Demonstrate how to properly service, maintain, and store miscellaneous power tools and machinery.
1962.4	Demonstrate proper handling, containment, and clean-up of hazardous materials (e.g., SDS).
1962.4.1	Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).
1962.5	Demonstrate proper usage of personal protective equipment (PPE).
1962.5.1	Demonstrate proper use of Personal Protective Equipment (PPE).
1962.6	Demonstrate safe operation of small engines and equipment.
1962.6.1	Identify the components and principles of operation of combustion engines.
1962.6.2	Remove engines from equipment, and position and bolt engines to repair stands.
1962.6.3	Dismantle engines, use hand tools, and examine parts for defects.
1962.6.4	Test and inspect engines to determine malfunctions, to locate missing and broken parts, and to verify repairs, using diagnostic instruments.

1962.6.5	Read and interpret service manuals.

General Shop Practices

1962.7	Locate parts and equipment information using printed and electronic media.
1962.7.1	Analyze tables, charts, graphs and multiple data sources to complete career/technical assignments and projects.
1962.8	Write a parts and labor invoice.
1962.8.1	Demonstrate how to complete an invoice for services completed.
1962.9	Calculate materials mark-up, labor time, and state tax.
1962.9.1	Calculate charges for work performed, collect deposits or payments, or arrange for billing.
1962.10	Demonstrate timekeeping and parts usage on worksheet and job ticket.
1962.10.1	Demonstrate how to determine charges for services requested, collect deposits or payments, or arrange for billing.

Maintenance

1962.11	Identify and conduct manufacturer's recommended service procedures.
1962.11.1	Read and interpret service manuals to determine recommended service procedures and intervals.
1962.11.2	Show customers how to maintain their personal power equipment.
1962.12	Inspect, test, and adjust safety-stop devices.
1962.12.1	Demonstrate how to test, adjust, and service engine safety-stop devices.

Fuel Systems Fundamentals

1962.13	Inspect fuel tank, lines, and filters.
1962.13.1	Identify the fundamental fuel system components and their function.
1962.14	Identify and service fuel delivery system components, including carburetors and injectors.
1962.14.1	Explain how different air/fuel ratios are delivered to the engine.
1962.14.2	Analyze fuel properties and the effects it has on combustion.
1962.14.3	Identify and describe the functions of the carburetor and fuel injection systems.
1962.14.4	Compare two-stroke and four-stroke induction systems.
1962.15	Adjust and service fuel system controls and linkages.
1962.15.1	Demonstrate how to adjust and service a fuel injections system and all related linkages.
1962.16	Explain fuel injection theory.
1962.16.1	Explain fuel injection theory and describe how fuel injection systems operate.
1962.17	Explain carburetor theory.
1962.17.1	Demonstrate understanding of carburetor theory and identify each part of a carburetor and its function.
1962.18	Inspect and service air filtration system.
1962.18.1	Describe and demonstrate how to service an engine air filtration system.
1962.18.2	Demonstrate how to remove and clean or replace an engine air filter.
1962.19	Disassemble, clean, inspect, and reassemble carburetor (diaphragm and float bowl).
1962.19.1	Identify all parts of a carburetor and inspect each part for wear and functionality.

1962.19.2	Demonstrate the ability to remove, inspect, clean, repair, and reassemble a Constant Velocity (CV) carburetor.
1962.19.3	Demonstrate the ability to remove, inspect, clean, repair, and reassemble a diaphragm carburetor.
1962.19.4	Demonstrate how to remove and properly clean a carburetor float bowl.
1962.19.5	Demonstrate the ability to troubleshoot, adjust, and tune carburetors to manufacturer specifications.

Governor

1962.20	Identify governor parts, functions, and types.
1962.20.1	Identify the parts of an engine governor and explain the function of each part.
1962.21	Inspect, service, and adjust governor.
1962.21.1	Demonstrate how to inspect, adjust and service an engine governor.
1962.22	Identify governor-related problems.
1962.22.1	Troubleshoot and repair problems with engine governors.

Cylinder Head and Valve, Service and Maintenance

1962.23	Explain theory of compression.
1962.23.1	Demonstrate understanding of compression and engine operation.

This course introduces the student to the knowledge base and technical skills for Fundamentals of Power Equipment II as a component of concepts in the Power Equipment Systems Program of Study. Areas of study include lubrication, cooling, electrical, and exhaust systems. Emphasis will be placed on career exploration, job seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Advanced Engine Operation

1964.1	Inspect and service engine lubrication system including breathers, filters, and strainers.
1964.1.1	Identify and inspect the components and principles of operation of the lubrication system.
1964.1.2	Demonstrate how to safely inspect and service the engine lubrication system.
1964.1.3	Diagnose, service and repair problems with oil-delivery systems.
1964.1.4	Service lubrication systems.
1964.1.5	Change engine oil and clean or replace filters and strainers per manufacturer’s instructions.
1964.1.6	Check fluid levels and change fluids and the tightness of the oil filters.
1964.1.7	Inspect and service oil injection systems on two-cycle engines.
1964.1.8	Calculate fuel premix ratios for two-cycle engines.
1964.2	Identify types of lubricating mechanisms.
1964.2.1	Describe the different types of lubricating mechanisms.
1964.3	Identify proper types of oil and lubricants.
1964.3.1	Identify and classify lubricants by function and application.
1964.3.2	Compare and contrast typical motorcycle lubricants and lubricant properties.
1964.3.3	Explain how to select lubricants.
1964.3.4	Calculate fuel premix ratios for two-cycle engines.
1964.3.5	Demonstrate how to read and interpret a lubricant chart.

Ignition

1964.4	Explain ignition theory and coil output.
1964.4.1	Explain how electrical and electronic devices are used to create and control electricity in power equipment.
1964.4.2	Assemble, install, or repair wiring, electrical or electronic components, on machinery or equipment.
1964.4.3	Inspect electrical systems, equipment, or components to identify hazards, defects, or the need for adjustment or repair, and to ensure compliance with codes.
1964.5	Identify, inspect, test, and adjust ignition components.
1964.5.1	Inspect and adjust ignition components.
1964.5.2	Check electrical circuits with a test light; determine needed repairs.

1964.5.3	Troubleshoot and repair battery-operated electronic ignition systems.
1964.5.4	Troubleshoot and repair magneto-ignition systems.
1964.5.5	Troubleshoot and repair capacitive-discharge-ignition (CDI) systems.
1964.6	Disassemble, service, and reassemble ignition system and/or components.
1964.6.1	Disassemble, service and reassemble an electronic ignition system.
1964.6.2	Troubleshoot and repair battery-operated electronic ignition systems.

Starters and Charging Systems

1964.7	Identify, inspect, and test charging and starting systems.
1964.7.1	Assess and use basic electrical system test equipment.
1964.7.2	Identify and inspect the components of electrical starting systems.
1964.7.3	Identify and inspect the components of an electrical charging system.
1964.8	Service and repair charging and starting systems.
1964.8.1	Inspect, troubleshoot and repair three-phase charging systems.
1964.8.2	Troubleshoot and repair electrical starter systems.
1964.8.3	Troubleshoot and repair Direct-Current (DC) Generators.
1964.8.4	Troubleshoot and repair half-wave and full-wave charging systems.
1964.8.5	Troubleshoot and repair three-phase charging systems.
1964.9	Inspect and perform battery service.
1964.9.1	Service and check batteries, if not charging then replace.

This course introduces the student to the knowledge base and technical skills for Power Equipment Service I as a component of concepts in the Power Equipment Systems Program of Study. Areas of study include: basic shop skills, safety, measurement, and complete engine system service. Emphasis will be placed on career exploration, job seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

General Shop Practices

1966.1	Identify how to perform basic Shop operations.
1966.1.1	Identify and apply general and required shop safety rules and procedures.
1966.1.2	Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
1966.1.3	Identify the location and use of eye wash stations.
1966.1.4	Utilize proper ventilation procedures for working within the lab/shop area.
1966.1.5	Utilize safe procedures for handling of tools and equipment.
1966.1.6	Identify and use proper procedures for safe lift operation.
1966.1.7	Identify and use proper placement of floor jacks and jack stands.
1966.1.8	Identify and comply with the required use of PPE during lab/shop activities.
1966.1.9	Secure hair and jewelry for lab/shop activities.
1966.1.10	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
1966.1.11	Locate and demonstrate knowledge of Safety Data Sheets (SDS).
1966.1.12	Identify and comply with personal and environmental safety practices associated with the handling, storage, and disposal of chemicals and hazardous materials.
1966.1.13	Assist in activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
1966.1.14	Identify specialized measurement instruments used in the mechanical trades.
1966.1.15	Read and interpret service and parts manuals.
1966.1.16	Demonstrate how to calculate linear, area, and volume measurements.
1966.1.17	Demonstrate how to calibrate equipment.
1966.1.18	Convert from English to metric units.
1966.1.19	Demonstrate how to measure using precision instruments.
1966.1.20	Describe how to test engine operating parameters.
1966.1.21	Perform thread forming and repair operations.
1966.1.22	Lay out and drill, ream, tap, or cut parts for assembly.
1966.1.23	Consult with customers to obtain problem descriptions and prepare cost estimates for repairs.
1966.1.24	Show customers how to maintain equipment.

1966.2	Demonstrate proper techniques for hand tools (e.g., screwdriver, torque wrenches).
1966.2.1	Demonstrate how to safely use hand and power tools, such as hammers, drills, and wrenches, including electrical and electronic testing devices.
1966.2.2	Identify standard and metric designation.
1966.2.3	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
1966.3	Demonstrate proper techniques for power tools and machinery.
1966.3.1	Explain and demonstrate how to safely use various types of power tools.
1966.3.2	Demonstrate how to properly service, maintain, and store miscellaneous power tools and machinery.
1966.4	Demonstrate proper handling, containment, and clean-up of hazardous materials (e.g., SDS).
1966.4.1	Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).
1966.5	Demonstrate proper usage of personal protective equipment (PPE).
1966.5.1	Identify and describe basic Personal Protective Equipment (PPE).
1966.6	Demonstrate safe operation of small engines and equipment.
1966.6.1	Demonstrate how to operate and maintain gasoline engines used to power equipment such as portable saws, lawn mowers, generators, and compressors.

Basic Engine Services

1966.7	Perform Basic engine service and repairs.
1966.7.1	Perform diagnostic and service on two and four stroke-cycle engines and accessories
1966.7.2	Disassemble machinery or equipment to remove parts and make repairs.
1966.7.3	Examine parts for defects, such as breakage or excessive wear.
1966.7.4	Repair and maintain gasoline engines used to power equipment such as portable saws, lawn mowers, generators, and compressors.
1966.7.5	Perform routine maintenance such as cleaning and oiling parts, honing cylinders, and tuning ignition systems.
1966.7.6	Adjust points, valves, carburetors, distributors, and spark plug gaps, using feeler gauges.
1966.7.7	Repair or replace defective parts such as magnetos, water pumps, gears, pistons, and carburetors, using hand tools.
1966.7.8	Test engine operating parameters.
1966.7.9	Obtain problem descriptions from customers and prepare cost estimates for repairs.
1966.8	Write a parts and labor invoice.
1966.8.1	Demonstrate how to complete an invoice for services completed.
1966.9	Calculate materials mark-up, labor time, and state tax.
1966.9.1	Demonstrate how to calculate the charges for materials, parts, labor time and taxes.
1966.10	Demonstrate timekeeping and parts usage on worksheet and job ticket.
1966.10.1	Demonstrate how to record time, determine charges for parts and labor and complete a work invoice or job ticket.

Maintenance

1966.11	Identify and conduct manufacturer's recommended service procedures.
1966.11.1	Read and interpret service manuals to determine recommended service procedures and intervals.
1966.12	Inspect, test, and adjust safety-stop devices.
1966.12.1	Explain how electrical and mechanical Safety-stop devices are used to protect users of motorized equipment.
1966.12.2	Describe how a safety stop works to protect an engine and the operator.

Lubrication Systems

1966.13	Inspect and service engine lubrication system including breathers, filters, and strainers.
1966.13.1	Identify parts and condition of an engine lubrication system.
1966.13.1	Perform engine oil and filter change.
1966.14	Identify types of lubricating mechanisms.
1966.14.1	Identify and describe the basic function of the auto lube injection system on a 2-cycle engine.
1966.15	Identify proper types of oil and lubricants.
1966.15.1	Identify the various types of oils and lubricants and their applications.
1966.15.2	Explain the difference between mineral and synthetic oils, and the benefits of each.

Governor

1966.16	Identify governor parts, functions, and types.
1966.16.1	Describe how a governor works to protect an engine.
1966.16.2	Explain how electrical and mechanical governing devices are used to control RPM and power output on motorized equipment.
1966.17	Inspect, service, and adjust governor.
1966.17.1	Describe how to service, adjust, and maintain an engine governor.
1966.18	Identify governor-related problems.
1966.18.1	Describe common problems that occur with governors.

This course introduces the student to the knowledge base and technical skills for Power Equipment Service II as a component of concepts in the Power Equipment Systems Program of Study. Areas of study include drive systems, chainsaws, and miscellaneous outdoor power equipment applications. Emphasis will be placed on career exploration, job seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

1968.1	Identify and test equipment safety devices.
1968.1.1	Demonstrate complete understanding of all safety protocols and procedures.
1968.1.2	Demonstrate the ability to follow safety rules and work safely in the shop.
1968.2	Demonstrate proper techniques for hand tools (e.g., screwdriver, torque wrenches).
1968.2.1	Demonstrate proficiency in using various hand tools, screwdrivers, wrenches, and torques wrenches.
1968.3	Demonstrate proper techniques for power tools and machinery.
1968.3.1	Demonstrate proficiency in using power tools and shop machinery.
1968.4	Demonstrate proper handling, containment, and clean-up of hazardous materials (e.g., SDS).
1968.4.1	Demonstrate complete understanding of proper handling procedures.
1968.4.2	Demonstrate the ability to work safely with all hazardous chemicals while utilizing proper PPE.
1968.5	Demonstrate proper usage of personal protective equipment (PPE).
1968.5.1	Demonstrate complete understanding of all PPE requirements.
1968.5.2	Demonstrate appropriate use of necessary PPE.
1968.6	Demonstrate safe operation of small engines and equipment.
1968.6.1	Demonstrate the ability to safely operate small engines and equipment.

General Shop Practices

1968.7	Locate parts and equipment information using printed and electronic media.
1968.7.1	Demonstrate the ability to locate tools and materials necessary to complete an assigned task.
1968.7.2	Demonstrate the ability to read and interpret information in parts and service manuals and other technical media.
1968.8	Write a parts and labor invoice.
1968.8.1	Demonstrate the ability to write and process work orders and invoices.
1968.9	Calculate materials mark-up, labor time, and state tax.
1968.9.1	Demonstrate the ability to prepare cost estimates for jobs using service and flat-rate standards.
1968.10	Demonstrate timekeeping and parts usage on worksheet and job ticket.
1968.10.1	Demonstrate the ability to track and document the cost of parts, labor and time spent on repairs.

Equipment Service and Repair

1968.11	Identify and conduct manufacturer's recommended service procedures.
1968.11.1	Explain the engine operating theory.

1968.11.2	Demonstrate the ability to read and interpret information in parts and service manuals and other technical media.
1968.11.3	Demonstrate the ability to read and understand graphs, charts, diagrams, and tables commonly used in the industry.
1968.11.4	Service engine powered equipment drive systems.
1968.11.5	Perform service operations on chainsaws and small engines.
1968.11.6	Perform service and repair on outdoor power equipment.
1968.11.7	Obtain problem descriptions from customers and prepare cost estimates for repairs.
1968.11.8	Test and inspect engines to determine malfunctions, to locate missing and broken parts, and to verify repairs, using diagnostic instruments.
1968.11.9	Read and interpret assembly blueprints or specifications manuals.
1968.11.10	Verify conformance of parts to stock lists or blueprints, using measuring instruments, such as calipers, gauges, or micrometers.
1968.11.11	Repair or replace damaged parts and position or align parts according to specifications.
1968.11.12	Demonstrate the ability to rebuild or replace engines as appropriate.
1968.11.13	Determine and test engine operating parameters.
1968.11.14	Service, maintain and repair specialized equipment and machinery.
1968.11.15	Service tire and wheel assemblies.
1968.11.16	Inspect, test and service brake and suspension systems.
1968.11.17	Record repairs made, time spent, and parts used.
1968.11.18	Check fluid levels and change fluids and the tightness of the oil filters.
1968.11.19	Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
1968.11.20	Inspect and test head and tail lamp circuits; aim headlights and replace bulbs.
1968.11.21	Troubleshoot and repair problems with wiring harnesses.
1968.11.22	Inspect cables, connectors, clamps, and hold-downs; adjust, as necessary.
1968.11.23	Inspect and fill battery.
1968.11.24	Utilize electrical test equipment to isolate defective components and check lamp circuits.
1968.11.25	Install cables, hoses, and electrical assemblies.
1968.11.26	Clean engine.
1968.11.27	Inspect tires; check and adjust air pressure.
1968.11.28	Check for proper fluid levels.
1968.11.29	Inspect and interpret vehicle identification number information.
1968.11.30	Describe the sequence of tightening and torquing fasteners to specs.
1968.11.31	Compare and contrast the different stress fractures of fasteners
1968.11.32	Remove, remount and balance tires.
1968.11.33	Diagnose and service wheel bearings and seals.
1968.11.34	Demonstrate knowledge of the different front- and rear-suspension systems and explain their operation.
1968.11.35	Troubleshoot and repair battery-operated electronic ignition systems.
1968.11.36	Troubleshoot and repair magneto-ignition systems.
1968.11.37	Troubleshoot and repair capacitive-discharge-ignition (CDI) systems.
1968.11.38	Troubleshoot and repair half-wave and full-wave charging systems.
1968.11.39	Troubleshoot and repair three-phase charging systems.
1968.11.40	Troubleshoot and repair electrical starter systems.
1968.11.41	Troubleshoot and repair Direct-Current (DC) Generators.
1968.11.42	Troubleshoot and repair Warning systems.

1968.11.43	Recondition a two-stroke engine top-end.
1968.11.44	Recondition a single-cylinder four-stroke engine top-end.
1968.11.45	Recondition a multi-cylinder four-stroke engine top-end.
1968.11.46	Rebuild a four-stroke head.
1968.11.47	Recondition a single-cylinder four-stroke engine bottom-end.
1968.11.48	Recondition a multi-cylinder four-stroke engine bottom-end.
1968.11.49	Recondition a two-stroke engine bottom-end.
1968.11.50	Service a plain-bearing crankshaft.
1968.11.51	Service and repair front suspension.
1968.11.52	Service and repair rear suspension.
1968.11.53	Inspect, remove, and replace frames.
1968.11.54	Diagnose and repair mechanical disc and drum brake systems and components.
1968.11.55	Diagnose and repair hydraulic disc and drum brake systems and components.
1968.11.56	Diagnose and repair ABS braking systems and other advanced stopping systems.
1968.11.57	Diagnose, service, and repair primary-drive systems.
1968.11.58	Diagnose, service, and repair clutch assemblies.
1968.11.59	Describe and distinguish the different types of measurement systems.
1968.11.60	Compare and contrast the different types of fasteners.
1968.11.61	Explain the steps of inspecting, cleaning, and replacement of broken fasteners.
1968.11.62	Describe the sequence of tightening and torquing fasteners to specs.
1968.11.63	Demonstrate the ability to measure tolerance(s) using millimeters and inches.
1968.11.64	Perform metric to SAE (and SAE to metric) conversions.
1968.11.65	Perform correct measurements using various precision measuring devices.
1968.11.66	Perform correct measures using Vernier Calipers.
1968.11.67	Perform correct measures using Micrometers.
1968.11.68	Inspect, grind, ream, rebores, and re-tap parts to obtain specified clearances, using grinders, lathes, taps, reamers, boring machines, and micrometers.
1968.12	Inspect, test, and adjust safety-stop devices.
1968.12.1	Inspect and test emergency stop devices on chain saws and other equipment.
1968.13	Inspect and service intake and exhaust systems.
1968.13.1	Diagnose service and repair intake systems replace necessary components as needed.
1968.13.2	Clean or replace after inspection of air filtration.
1968.13.3	Diagnose service and repair exhaust systems replace necessary components as needed.
1968.14	Identify and inspect PTO and drive train (e.g., belts, blades, pulleys, spindles).
1968.14.1	Inspect, measure, replace and adjust drive components.
1968.14.2	Diagnose, service, and repair shaft drives, belts, and pulleys.
1968.14.3	Diagnose, service, and repair transmissions.
1968.15	Inspect and service cooling system components (air and liquid cooled).
1968.15.1	Inspect, service, and repair water pump assemblies.
1968.15.2	Check radiator coolant level (if applicable), test and add coolant.

Troubleshooting

1968.17	Troubleshoot ignition system problems.
1968.17.1	Demonstrate the ability to troubleshoot and repair ignition system problems.

1968.18	Troubleshoot starting and charging system problems.
1968.18.1	Troubleshoot and repair three-phase charging systems.
1968.19	Troubleshoot cooling system problems.
1968.19.1	Categorize the components of air and liquid cooling systems by name and function.
1968.19.2	Diagnose service and repair air-cooling systems.
1968.19.3	Diagnose service and repair liquid cooling systems.
1968.20	Troubleshoot fuel system problems.
1968.20.1	Identify components and operation of carburetion and fuel-injection systems.
1968.20.2	Diagnose service and repair slide-type carburetors.
1968.20.3	Diagnose service and repair constant-velocity-type (CV-type) carburetors.
1968.20.4	Diagnose service and repair fixed Venturi carburetors.
1968.20.5	Diagnose service and repair fuel-injection systems.
1968.20.6	Diagnose service and repair other fuel-delivery-system components.
1968.21	Troubleshoot lubrication system problems.
1968.21.1	Demonstrate the ability to troubleshoot, diagnose and repair lubrication system problems.
1968.22	Troubleshoot compression problems related to cylinder head and valves.
1968.22.1	Demonstrate understanding of compression and engine operation.
1968.22.2	Demonstrate the ability to troubleshoot, diagnose and repair problems with cylinder heads and valves.
1968.22.3	Identify correct timing of crankshaft, camshaft, balance shaft, gears, and flywheel.
1968.22.4	Identify, inspect, and measure piston, rings, and cylinder.
1968.22.5	Identify, inspect, and measure bearing clearances and journal sizes of the crankshaft and connecting rod.
1968.22.6	Identify proper usage of gaskets and sealants.
1968.22.7	Remove, inspect, and reinstall cylinder head to manufacturer's specifications.
1968.23	Troubleshoot low power and rough running conditions.
1968.23.1	Demonstrate the ability to troubleshoot, diagnose and repair problems with insufficient power output and rough running conditions.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Power Equipment Systems Program of Study. Incorporated into this course are required forms for service department operation, motorcycle and ATV brake systems, transmissions, and suspension systems for a career in power equipment systems. This course is recommended as an Elective in Power Equipment Systems.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Franchise Records

1970.1	Franchise Records
1970.1.1	Record keeping forms for franchised and non-franchised businesses.
1970.1.2	Complete pre-delivery, repair order, parts order, inventory, and warranty claims forms.
1970.1.3	Perform pre-delivery service.

Brakes

1970.2	Brakes
1970.2.1	Servicing brake systems on motorcycles.
1970.2.2	Perform service on single and double leading shoe drum brakes.
1970.2.3	Service disc brake systems.
1970.2.4	Inspect, repair, or replace brake rotors and drums.
1970.2.5	Inspect, repair, or replace a master cylinder.
1970.2.6	Bleed and adjust hydraulic brake systems.

Transmissions and Drives

1970.3	Transmissions and Drives
1970.3.1	Adjusting the clutch on motorcycles.
1970.3.2	Disassemble, inspect, and reassemble motorcycle and ATV transmissions.
1970.3.3	Service final drives.
1970.3.4	Service various types of motorcycle and ATV clutches.
1970.3.5	Disassemble, inspect, and reassemble manual gear transmissions.
1970.3.6	Disassemble, inspect, and reassemble a centrifugal clutch with a variable ratio belt drive.
1970.3.7	Inspect, lubricate, and adjust a chain drive.
1970.3.8	Calculate final drive ratio.
1970.3.9	Inspect, service shaft drive assemblies.

Suspension and Wheels

1970.4	Suspension and Wheels
1970.4.1	Adjust, repair and service motorcycle suspension and wheel service.

1970.4.2	Adjust wheel tracking and alignment.
1970.4.3	Inspect, and reassemble manual gear transmissions.
1970.4.4	Lace and true a spoke type wheel.
1970.4.5	Measure a wheel for run-out.
1970.4.6	Change tube and tubeless tires.
1970.4.7	Balance a wheel assembly.
1970.4.8	Service rear suspension components.
1970.4.9	Service steering head assembly.
1970.4.10	Rebuild telescoping fork assembly.

The skill sets in this course are representative of the basic knowledge included in a Career and Technical Power Equipment Program of Study. Incorporated into this course are elements of introductory knowledge and skills necessary for a career in power equipment sales and service. This course is recommended as an Elective in Power Equipment Systems.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Fuel Systems

1972.1	Fuel systems.
1972.1.1	Servicing multiple carburetor and fuel injection engines.
1972.1.2	Service and adjust twist grip throttle assemblies.
1972.1.3	Perform service on slide, vacuum controlled and butterfly-controlled carburetors.
1972.1.4	Synchronize and adjust multiple carburetor systems.
1972.1.5	Calculate changes due to geographic regions.
1972.1.6	Test throttle body and port fuel injection system components.

Outboard Motor Repair

1972.2	Outboard motor repair.
1972.2.1	Service and maintenance to outboard motors and their controls.
1972.2.2	Properly determine propeller selection for optimum operation.
1972.2.3	Preparing motor for the off-season.
1972.2.4	Perform routine service to the engine and rigging.
1972.2.5	Select propellers to maximize planning speed and thrust.
1972.2.6	Explain the effect of blade numbers on propeller performance.
1972.2.7	Distinguish between propeller, slippage, cavitation, and ventilation.
1972.2.8	Winterize an outboard for storage.

Personal Watercraft

1972.3	Personal watercraft.
1972.3.1	Service and maintenance to personal watercraft.
1972.3.2	Service the steering nozzle pivot and cables.
1972.3.3	Service jet pump.
1972.3.4	Adjust throttle cable linkage.
1972.3.5	Test engine shut-off lanyard.
1972.3.6	Maintain engine cooling and bilge systems.

Snowmobile Service and Maintenance

1972.4	Snowmobiles
1972.4.1	Service and maintenance to snowmobiles.
1972.4.2	Service the clutch and drive chain assembly.
1972.4.3	Service on bogie wheel and slide rail track suspension systems.
1972.4.4	Evaluate track condition.
1972.4.5	Replace skis and align steering.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Power Equipment Program of Study. Incorporated into this course are elements of introductory knowledge and skills necessary for a career in power equipment sales and service. This course is recommended as an Elective in Power Equipment Systems.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Diesel Engine Fundamentals

1973.1	Diesel Engine Fundamentals
1973.1.1	Characteristics of compact diesel engines.
1973.1.2	Components unique to diesel engines.
1973.1.3	Cold weather operation.
1973.1.4	Describe the difference between a diesel and a gasoline engine.
1973.1.5	Describe fuel characteristics that are unique to diesel engines.
1973.1.6	Identify components of a compact diesel engine.
1973.1.7	Describe the diesel fuel injection system.
1973.1.8	Describe how to start up a diesel engine in cold weather.
1973.1.9	Startup a diesel engine in cold weather.

Diesel Engine Maintenance, Diagnosis and Service

1973.2	Diesel Engine Maintenance, Diagnosis and Service
1973.2.1	Servicing and maintaining a compact diesel engine.
1973.2.2	Maintain diesel engine fuel system.
1973.2.3	Test fuel injectors and check injector timing according to manufacturer specifications.
1973.2.4	Inspect, test, and replace engine starting aids.
1973.2.5	Troubleshoot the engine based on engine exhaust output.
1973.2.6	Analyze engine compression.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Power Equipment Program of Study. Incorporated into this course are elements of introductory knowledge and skills necessary for a career in power equipment sales and service. This course is recommended as an Elective in Power Equipment Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Principals of Operation

1974.1	Principals of Operation
1974.1.1	The principals of operation of generators.
1974.1.2	Estimating generator size for customer requirements.
1974.1.3	Review units of electrical measurement.
1974.1.4	Describe the components of a generator.
1974.1.5	Differentiate between brushless and brush type generators.
1974.1.6	Identify factors that affect starting and running loads.
1974.1.7	Select the appropriate tools, machines, and materials to be used in preparation for welding.
1974.1.8	Explain starting and running load demands for the selection of a generator and the specification.
1974.1.9	Explain the difference between a transfer and a disconnect switch.

Generator Service

1974.2	Generator Service
1974.2.1	Operating a portable generator.
1974.2.2	Servicing a portable generator to manufacturer's specifications.
1974.2.3	Set-up a portable generator for service.
1974.2.4	Test generator components and circuits.
1974.2.5	Analyze generator output for correct voltage and hertz.
1974.2.6	Test and adjust automatic idler.

This course provides comprehensive training in Safety and Sanitation, Business and Math Skills, Purchasing, Receiving, Inventory, and Storage, Nutrition, and Human Relations and Career Skills relevant to the food service industry. Students will learn to identify and prevent kitchen accidents, maintain safe and sanitary food handling processes, understand regulatory standards such as OSHA regulations, and develop proficiency in mathematical operations essential for food cost calculation and recipe management. Additionally, the course covers purchasing ethics, inventory management techniques, nutritional considerations, and effective communication and interpersonal skills crucial for success in the baking industry.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Safety and Sanitation

1980.1	Identify causes and prevention of kitchen accidents.
1980.1.1	Identify a range of protective attire, footwear, and gear utilized within a foodservice environment.
1980.1.2	Identify methods for avoiding burns.
1980.1.3	Outline protocols for avoiding slips, trips, and falls within a foodservice establishment.
1980.1.4	Outline procedures for cleaning up spills.
1980.1.5	Demonstrate safe and proper use of ladders.
1980.1.6	Demonstrate correct techniques for lifting and carrying to prevent injuries.
1980.1.7	Outline basic first aid methods and procedures.
1980.1.8	Identify external risks to an operation and enumerate measures to safeguard against them.
1980.2	Demonstrate safe and sanitary procedures for operating and maintaining large equipment, hand tools, and small wares.
1980.2.1	Identify types of food-preparation equipment and examples of their uses.
1980.2.2	Demonstrate proper and safe use of equipment.
1980.2.3	Outline procedures for cleaning and sanitization of tools and equipment.
1980.2.4	Identify hand tools and small equipment.
1980.3	Exhibit familiarity with laws and rules, pertaining to the food service industry, of regulatory agencies such as OSHA.
1980.3.1	Identify government agencies overseeing the regulation of the restaurant and foodservice sector.
1980.3.2	Define the role and functions of Occupational Safety and Health Administration (OSHA) regulations.
1980.3.3	Outline the employer requirements of the Hazard Communication Standard.
1980.3.4	Outline the steps of an accident investigation.
1980.3.5	Explain the purpose of an emergency and evacuation plan.
1980.4	Identify safe food handling processes.
1980.4.1	Identify individual actions that have the potential to introduce contaminants into food.
1980.4.2	Demonstrate proper handwashing and explain when hands should be washed.
1980.4.3	Identify proper personal hygiene practices and suitable attire for work.
1980.4.4	Identify methods for safely handling ready-to-eat food.
1980.4.5	Explain circumstances when it is necessary to restrict food handlers from engaging in food-related tasks or working within the operation.
1980.4.6	Explain how to maintain a clean and sanitary food service operation.

1980.5	Identify causes and signs of biological, physical, and chemical contamination.
1980.5.1	Explain the difference between biological, physical, and chemical contamination.
1980.5.2	Identify methods to prevent cross-contamination.
1980.5.3	List causes of biological contamination.
1980.6	Describe use, storage, and disposal of types of cleaners and sanitizers, and their proper use.
1980.6.1	Identify factors that affect the efficiency of sanitizers.
1980.6.2	Create a master cleaning schedule.
1980.6.3	List the requirements for storage of hazardous chemicals.
1980.7	Identify proper methods of waste disposal and recycling.
1980.7.1	Explain the strategies a restaurant or foodservice establishment can employ to minimize its overall waste.
1980.7.2	List items that a foodservice establishment can repurpose or recycle.
1980.7.3	Explain greenwashing and ways to avoid it.
1980.8	Identify and describe microorganisms related to food spoilage and food-borne illness, including growth environments.
1980.8.1	Explain foodborne illness outbreaks and associated expenses.
1980.8.2	List and explain the acronym FAT TOM.
1980.8.3	Outline methods to prevent and control pests.
1980.8.4	Describe the characteristics of TCS food and list examples.
1980.8.5	Explain the importance of food defense systems.
1980.8.6	Identify methods to avoid time-temperature abuse.

Business and Math Skills

1980.9	Perform basic mathematical operations pertaining to the food service industry (e.g., addition, subtraction, multiplication, division, conversions).
1980.9.1	Demonstrate basic math calculations using whole numbers and fractions.
1980.9.2	Calculate food cost and food cost percentage.
1980.9.3	Calculate as purchased (AP) and edible portion (EP) amounts of a recipe.
1980.9.4	Calculate the total cost and portion costs of a recipe.
1980.9.5	Calculate a recipe's yield and the portions.
1980.9.6	Calculate a new yield for a recipe using a conversion factor.
1980.9.7	Convert recipes to yield different quantities.
1980.10	Weigh and measure accurately.
1980.10.1	Calculate the weights of ingredients using baker's percentages.
1980.10.2	Convert units between customary and metric measurement units.
1980.10.3	Demonstrate the proper use of smallware and utensils for measuring and portioning.
1980.11	Calculate preparation temperatures based on known variables (e.g., friction factor).
1980.11.1	Explain the significance of considering variables like friction factor in determining preparation temperatures.
1980.11.2	Analyze different factors that could impact the accuracy of preparation temperature calculations.

Purchasing, Receiving, Inventory, and Storage

1980.12	Describe proper techniques of receiving and storing fresh, frozen, refrigerated, and staple goods.
1980.12.1	Explain procedures for procurement, receiving, and storage that contribute to maintaining quality and managing costs effectively.
1980.12.2	Identify criteria for approving or declining food items during the receiving process.
1980.12.3	Identify the necessary equipment for receiving and storage of food and supplies.

1980.13	Examine various inventory systems (e.g., FIFO).
1980.13.1	Outline the methods used to track and manage inventory.
1980.13.2	Explain the significance of inventory value concerning the control of costs.
1980.14	Discuss ethical issues as they relate to purchasing.
1980.14.1	Describe ethics and explain the significance within the restaurant and foodservice industry.
1980.14.2	Explain the elements that play a role in the purchasing process.
1980.14.3	Explain the process of determining what items to order and when to place those orders.
1980.14.4	Describe the subsequent steps and processes that occur after goods are purchased.
1980.15	Order food requisitions from appropriate/reliable sources.
1980.15.1	Identify characteristics of an authorized food source.
1980.15.2	Describe local sourcing.

Nutrition

1980.16	Discuss various alternatives to increase the wholesomeness of baked goods.
1980.16.1	Explain why nutrition is important to the foodservice industry.
1980.16.2	Outline the six basic types of nutrients found in food.
1980.16.3	Describe food additives and their functions.
1980.16.4	Describe recent developments in the production of food and how it may affect nutrition.
1980.17	Interpret food labels in terms of the portion size, ingredients, and nutritional value.
1980.17.1	Interpret information on a food label.
1980.17.2	Explain how portion control affects food cost.
1980.18	Discuss ways of preventing food allergies (e.g., gluten).
1980.18.1	List the most common allergens.
1980.18.2	Outline methods for preventing allergic reactions.

Human Relations and Career Skills

1980.19	Demonstrate effective communication and interpersonal skills.
1980.19.1	Demonstrate effective communication skills.
1980.19.2	Outline and explain interpersonal communication in the workplace.
1980.20	Identify career opportunities in the baking industry.
1980.20.1	List the major positions in a bakery.
1980.20.2	Explain the process for an effective job search.
1980.20.3	List the steps to a successful job interview.
1980.20.4	List the steps to choosing a college or trade school that aligns with individual objectives.
1980.20.5	Outline methods for discovering and applying for scholarships.
1980.20.6	List the essential skills required for professionals in the baking industry.
1980.21	Identify professional organizations and explain their purposes and benefits to the industry.
1980.21.1	Research and compile a list of professional organizations relevant to the baking industry.
1980.21.2	Explore the benefits offered by these organizations, such as networking opportunities, industry insights, and educational resources.
1980.21.3	Assess the eligibility criteria and membership requirements for each professional organization and compare costs associated with membership.

Ornamental Metal Work

Course #: 1982

Allowable Teacher Endorsement: 7052, 7070

This course introduces the student to the knowledge base and technical skills for concepts in Ornamental Metal Work. Areas of study include measurement, metal layout and bending, operation of the drill press, band saw, and the iron worker. Incorporated into this course are elements of introductory knowledge and skills necessary for a career in welding. This course is recommended as an Elective in Welding.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Welding Math

1982.1	Welding Math
1982.1.1	Adding, subtracting, multiplying, and dividing whole numbers and fractions.
1982.1.2	Use of measuring devices.
1982.1.3	Converting fractions to decimals.
1982.1.4	Converting fractions to angular measurements.
1982.1.5	Practice addition, subtraction, multiplication, and division of whole numbers and fractions.
1982.1.6	Describe and use measuring devices.
1982.1.7	Describe and discuss how to convert fractions to decimals.
1982.1.8	Understand and use the decimal equivalent table.
1982.1.9	Explain linear measurement, angular measurement, and circular measurement.

Layout and Bending Techniques

1982.2	Layout and Bending Techniques
1982.2.1	Layout tools.
1982.2.2	Lay out straight lines, angles, and circles.
1982.2.3	Calculating bend tolerances.
1982.2.4	Demonstrate the proper use and care of layout tools.
1982.2.5	Demonstrate straight line layout within tolerances.
1982.2.6	Demonstrate layout procedures using a square.
1982.2.7	Perform circle layout.
1982.2.8	Identify and use different tools used in ornamental metalworking.
1982.2.9	Demonstrate 90- and 45-degree bends.
1982.2.10	Check for joint misalignment or poor fit-up when bending different types of metals.
1982.2.11	Explain how a CNC metal cutting machine works and how it is used in ornamental welding fabrication.
1982.2.12	Draw a sketch in isometric and orthographic views.
1982.2.13	Determine materials needed and specific tools needed to complete the project within tolerances.

Drill Press Operations

1982.3	Drill Press Operations
1982.3.1	Personal protective equipment (PPE) needed when using a drill press.
1982.3.2	Set up and operate a drill press within tolerance specifications.
1982.3.3	Demonstrate the proper use of PPE methods and procedures when operating a drill press.
1982.3.4	Explain the safety precautions of all accessories.

1982.3.5	Demonstrate how to set up a drill press.
1982.3.6	Demonstrate how to operate and shut down a drill press.
1982.3.7	Examine and compare drill speed ratios of material thickness and specific drill sizes.
1982.3.8	Describe the role of lubricants when using a drill press.
1982.3.9	Demonstrate knowledge of drill sizes, letters, fractions, and decimal equivalents.

Band Saw Operations

1982.4	Band Saw Operations
1982.4.1	Personal protective equipment (PPE) perform safety inspections and minor repairs.
1982.4.2	Set up and operate a band saw within tolerances.
1982.4.3	Demonstrate the proper use of PPE methods and procedures when operating a band saw.
1982.4.4	Explain the safety precautions of all accessories.
1982.4.5	Demonstrate how to set up, adjust, operate, and cut metal using a band saw.
1982.4.6	Demonstrate how to change the blade on a band saw.
1982.4.7	Examine and compare different blade types and their applications.
1982.4.8	Describe the role of lubricants when using a band saw.
1982.4.9	Demonstrate knowledge of how to cut angles using a band saw.

Shielded Metal Arc Welding Equipment and Set-up

1982.5	Shielded Metal Arc Welding Equipment and Set-up
1982.5.1	Safe (SMAW) welding practices.
1982.5.2	Tool and equipment safety.
1982.5.3	How to set up a machine for welding.
1982.5.4	Review and practice general welding shop safety guidelines.
1982.5.5	Describe and discuss electrical safety precautions when using arc welding equipment.
1982.5.6	Identify factors that affect electrode selection.
1982.5.7	Set up, adjust, and demonstrate the use of all the basic welding tools and machines.
1982.5.8	Position and adjust work pieces.
1982.5.9	Identify and explain weld imperfections and their causes.

SMAW Weld Processes

1982.6	SMAW Weld Processes
1982.6.1	Operate SMAW equipment.
1982.6.2	Properly striking and extinguish an arc.
1982.6.3	Distortion and how it is controlled.
1982.6.4	Perform safety inspections of equipment and accessories.
1982.6.5	Determine required equipment and welding methods, applying knowledge of metallurgy, geometry, and welding techniques.
1982.6.6	Weld components in flat, vertical, and overhead positions.
1982.6.7	Check for joint misalignment or poor fit-up before and after welding.
1982.6.8	Monitor the fitting, burning, and welding processes to avoid over-heating of parts or warping, shrinking, distortion, or expansion of material.
1982.6.9	Chip or grind off excessive weld, slag, or spatter to finish metal surfaces.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Education Welding Program of Study. Areas of study include drawing fundamentals, sketching, and fabricating, basic welding symbols, and properties of metals and alloys. This course is recommended as an Elective in the Welding Program of Study.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Drawing Fundamentals

1983.1	Drawing Fundamentals
1983.1.1	Basic dimensioning skills.
1983.1.2	Distinguishing between notes and specs and being able to analyze the title block.
1983.1.3	Creating a title block and a bill of materials.
1983.1.4	Identify the accepted standards and methods of dimensioning a welding blueprint.
1983.1.5	Explain the procedures for dimensioning welding drawings.
1983.1.6	Differentiate between notes and specifications.
1983.1.7	Explain processing requirements from the title block.
1983.1.8	Explain why tolerances are used in blueprints.
1983.1.9	Develop a bill of materials from a drawing.
1983.1.10	Explain the concepts related to sketching.
1983.1.11	Construct an isometric sketch.
1983.1.12	Construct an orthographic sketch.

Sketching and Fabrication

1983.2	Sketching and Fabrication
1983.2.1	Basic sketching skills and techniques.
1983.2.2	Fabricating parts from drawings.
1983.2.3	Identify the concepts related to sketching.
1983.2.4	Explain the concepts related to sketching multi-views.
1983.2.5	Construct an isometric and orthographic views.
1983.2.6	Fabricate parts from a drawing or sketch or blueprint.

Basic Welding Symbols

1983.3	Basic Welding Symbols
1983.3.1	Basic welding symbols.
1983.3.2	Structural and non-structural steel.
1983.3.3	Draw welding symbols on a sketch or blueprint.
1983.3.4	Describe common types of welds and joints.
1983.3.5	Draw fillet and groove welding symbols.
1983.3.6	Interpret common abbreviations for blueprints and welding processes.
1983.3.7	Identify the different types of structural and non-structural steel and their uses.

Metal and Alloy Properties

1983.4	Metal and Alloy Properties
1983.4.1	Metallurgy properties and related terminology.
1983.4.2	Heat treating ferrous and non-ferrous metals.
1983.4.3	Define metallurgy terms.
1983.4.4	Distinguish between mechanical and physical properties.
1983.4.5	Describe various heat-treating processes.
1983.4.6	Explain welding characteristics of low, medium, and high-carbon steel.
1983.4.7	Explain welding techniques used on alloy steels and cast iron.

Fundamentals of Welding Technology serves as the gateway to essential knowledge and technical skills in welding. Students explore diverse areas, including career opportunities within welding, welding terms and processes, oxyfuel cutting, and lab and equipment safety. Emphasizing a comprehensive understanding, the course integrates safety instructions seamlessly into all activities, ensuring a secure and foundational learning experience for future courses in Welding Technology.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Welding Safety

1985.1	Adhere to general welding shop safety guidelines
1985.1.1	Review and practice general welding shop safety guidelines.
1985.1.2	Describe the precautions to be taken when welding in confined areas.
1985.1.3	Describe and discuss electrical safety precautions when using arc welding equipment.
1985.2	Implement and maintain safety procedures related to welding preparation and equipment.
1985.2.1	Review sample parts, blueprints, drawings, and engineering information to determine methods and sequences of operations needed to fabricate products.
1985.2.2	Select the appropriate tools, machines, and materials to be used in preparation for welding.
1985.2.3	Position and adjust workpieces.
1985.2.4	Set up, adjust, and demonstrate the use of all the basic welding tools and machines.

Thermal Welding and Cutting Processes

1985.3	Perform equipment setup for thermal welding and cutting processes.
1985.3.1	Perform safety inspections of equipment and accessories.
1985.3.2	Explain how to transport oxy-fuel cylinders, assemble, and set up oxy-fuel welding and cutting equipment.
1985.3.3	Connect and turn regulator valves to activate and adjust gas flow and pressure to obtain desired flames.
1985.4	Prepare base metals and configure torch setup for thermal welding and cutting processes.
1985.4.1	Explain and describe base metal preparation techniques for cutting and welding.
1985.4.2	Prepare base metal for cutting and welding.
1985.4.3	Select and install torches, torch tips, filler rods, and flux according to welding chart specifications or types and thickness of metals.
1985.5	Apply operational skills and techniques.
1985.5.1	Solve problems involving heat flow and temperature.
1985.5.2	Perform oxy-fuel gas cutting, beveling, and piercing operations.
1985.5.3	Perform shape cutting and bevel cutting on plain carbon steel.
1985.5.4	Position and weld mild steel using oxy-fuel equipment.
1985.5.5	Position and braze mild steel using oxy-fuel equipment.
1985.5.6	Operate a motorized, portable oxy-fuel gas cutting machine.

Air Carbon Arc Cutting and Gouging

1985.6	Demonstrate proficiency in the techniques and procedures for air carbon arc cutting and gouging.

1985.6.1	Perform set-up procedures for manual air carbon arc gouging and cutting on mild steel.
1985.6.2	Demonstrate using the air carbon arc the process of gouging.
1985.6.3	Demonstrate using air carbon arc the process of cutting.

Plasma Arc Cutting

1985.7	Execute plasma arc cutting processes.
1985.7.1	Perform set-up procedures for manual plasma arc cutting operations on plain carbon steel, aluminum, and stainless steel.
1985.7.2	Demonstrate using the plasma arc process for cutting.
1985.7.3	Demonstrate using the plasma arc the process of shape cutting on plain carbon steel, aluminum, and stainless steel.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Welding Program of Study. Incorporated into this course are elements of introductory knowledge and skills necessary for a career in welding. This course is recommended as an Elective in Metals Technology and Welding.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Gas Metal Arc Welding Equipment and Setup

1987.1	Gas Metal Arc Welding Equipment and Setup
1987.1.1	Safe (GMAW) welding practices.
1987.1.2	Tool and equipment safety.
1987.1.3	The processes in relation to welding.
1987.1.4	How to set up a machine for welding.
1987.1.5	Review and practice general welding shop safety guidelines.
1987.1.6	Describe the precautions to be taken when welding in confined areas.
1987.1.7	Describe and discuss electrical safety precautions when using gas arc welding equipment.
1987.1.8	Select the appropriate tools, machines, and materials to be used in preparation for welding.
1987.1.9	Explain joint design considerations based on a welding procedure specification.
1987.1.10	Set up, adjust, and demonstrate the use of all of the basic welding tools and machines.
1987.1.11	Position and adjust work pieces.
1987.1.12	Identify and explain weld imperfections and their causes.

GMAW-Bead and Fillet Welds

1987.2	GMAW-Bead and Fillet Welds
1987.2.1	Operate GMAW equipment.
1987.2.2	Distortion and how it is controlled.
1987.2.3	Welding carbon steel and aluminum.
1987.2.4	Perform safety inspections of equipment and accessories.
1987.2.5	Determine required equipment and welding methods, applying knowledge of metallurgy, geometry, and welding techniques.
1987.2.6	Weld components in flat and horizontal positions.
1987.2.7	Perform 1f and 2f welds on plain carbon steel.
1987.2.8	Perform 1g welds on plain carbon steel.
1987.2.9	Perform 1f, 2f, and 3f welds on aluminum.
1987.2.10	Perform fillet welds in all positions.
1987.2.11	Perform groove welds in all positions.
1987.2.12	Check for joint misalignment or poor fit-up before and after welding.
1987.2.13	Solve problems involving heat flow and temperature.
1987.2.14	Monitor the fitting, burning, and welding processes to avoid over-heating of parts or warping, shrinking, distortion, or expansion of metal.

Flux Cored Arc Welding

1987.3	Flux Cored Arc Welding
1987.3.1	Operate FCAW equipment.
1987.3.2	Welding carbon steel.
1987.3.3	Perform safety inspections of equipment and accessories.
1987.3.4	Determine required equipment and welding methods, applying knowledge of metallurgy, geometry, and welding techniques.
1987.3.5	Perform fillet welds.
1987.3.6	Perform groove welds.
1987.3.7	Check for joint misalignment or poor fit-up before and after welding.
1987.3.8	Solve problems involving heat flow and temperature.

The Skill Sets in this course are representative of the basic knowledge included in a Career and Technical Welding Program of Study. Incorporated into this course are elements of introductory knowledge and skills necessary for a career in welding. This course is recommended as an Elective in Metals Technology and Welding.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Gas Tungsten Arc Welding Equipment and Setup

1989.1	Gas Tungsten Arc Welding Equipment and Setup
1989.1.1	Safe (GTAW) welding practices.
1989.1.2	Tool and equipment safety.
1989.1.3	How to set up a machine for welding.
1989.1.4	Review and practice general welding shop safety guidelines.
1989.1.5	Describe the precautions to be taken when welding in confined areas.
1989.1.6	Describe and discuss electrical safety precautions when using gas arc welding equipment.
1989.1.7	Select the appropriate tools, machines, and materials to be used in preparation for welding.
1989.1.8	Explain joint design considerations based on a welding procedure specification.
1989.1.9	Set up, adjust, and demonstrate the use of all the basic welding tools and machines.
1989.1.10	Position and adjust work pieces.
1989.1.11	Identify and explain weld imperfections and their causes.

GTAW Welding

1989.2	GTAW Welding
1989.2.1	Operate GTAW equipment.
1989.2.2	Welding on carbon steel.
1989.2.3	Welding aluminum.
1989.2.4	Perform safety inspections of equipment and accessories.
1989.2.5	Determine required equipment and welding methods, applying knowledge of metallurgy, geometry, and welding techniques.
1989.2.6	Perform 1f, 2f, and 3f welds on aluminum.
1989.2.7	Perform fillet welds in all positions.
1989.2.8	Perform groove welds in all positions.
1989.2.9	Check for joint misalignment on poor fit-up before and after welding.
1989.2.10	Monitor the fitting, burning, and welding processes to avoid over heating of parts and warping, shrinking, distortion, or expansion of material.

This course is an elective course in the Agriculture, Food and Natural Resources cluster. The skill sets focused in this course to develop a students' knowledge and abilities in the theory of operation, maintenance, troubleshooting and repair of small gasoline engines. Safety instruction is integrated into relevant activities. Teachers should provide each student with real world learning opportunities and instruction related to selection, development, and maintenance of individual Supervised Agricultural Experience (SAE) programs. Students are encouraged to become active members of FFA, the national youth organization for those enrolled in agricultural education. FFA is an integral component of the program and provides curricular opportunities that enhance student achievement. Teachers should utilize relevant FFA activities to support experiential learning.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundations of Agriculture, Food, and Natural Resources

2002.1	Demonstrate understanding of power, structural, and technical systems (e.g., measurement).
2002.1.1	Discuss cycles of a small engine—4 stroke and 2 stroke.
2002.1.2	Utilize part manuals.
2002.1.3	Demonstrate small engine tool use.
2002.1.4	Discuss potential hazards of small engine work and explain preventative actions.
2002.1.5	Discuss small engine maintenance.
2002.1.6	Explain the workings of ignition systems.
2002.1.7	Discuss carburetion systems.
2002.1.8	Discuss lubrication systems.
2002.1.9	Tear down small engines and identify parts.
2002.1.10	Repair and maintain gasoline engines used to power equipment such as portable saws, lawn mowers, generators, and compressors.
2002.1.11	Adjust points, valves, carburetors, distributors, and spark plug gaps, using feeler gauges.
2002.1.12	Reassemble engines after repair or maintenance work is complete and test operation.
2002.1.13	Record repairs made, time spent, and parts used.
2002.1.14	Perform routine maintenance such as cleaning and oiling parts, honing cylinders, and tuning ignition systems.
2002.1.15	Obtain problem descriptions from customers and prepare cost estimates for repairs.
2002.1.16	Test and inspect engines to determine malfunctions, to locate missing and broken parts, and to verify repairs, using diagnostic instruments.
2002.1.17	Repair or replace defective parts such as magnetos, water pumps, gears, pistons, and carburetors, using hand tools.
2002.1.18	Dismantle engines, using hand tools, and examine parts for defects.
2002.1.19	Remove engines from equipment, and position and bolt engines to repair stands.
2002.1.20	Mix oil/gas to correct ratios for 2 cycle engines.

Foundations of Agriculture, Food, and Natural Resources

2002.2	Demonstrate knowledge of leadership development through FFA.
2002.2.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
2002.2.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
2002.2.3	Participate in community service and career awareness activities at the local, state, and national level.

This course is an elective course in the Agriculture, Food and Natural Resources cluster. The skill sets focused in this course to develop a students' knowledge and abilities to read and interpret blueprints and make mechanical drawings. Safety instruction is integrated into relevant activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Fundamentals of Drafting

2004.1	Fundamentals of Drafting
2004.1.1	Basic drafting equipment and use.
2004.1.2	Read and interpret technical drawings.
2004.1.3	Read and transfer measurements.
2004.1.4	Identify standard media for drawing.
2004.1.5	Use proper layout techniques on drawings.
2004.1.6	Read and interpret the following drawings-welding, construction, electrical and mechanical.

Basic Sketches

2004.2	Basic Sketches
2004.2.1	Sketching geometric shapes.
2004.2.2	Develop orthographic sketches of geometric shapes.
2004.2.3	Develop isometric sketches of geometric shapes.
2004.2.4	Develop skills in size and proportion of shapes.

Line Types and Symbols

2004.3	Line Types and Symbols
2004.3.1	Interpretation and application of common line types and symbols to geographical representatives.
2004.3.2	Use alphabet of lines when drawing.
2004.3.3	Draw geometric line constructions.
2004.3.4	Draw geometric circle and arc constructions.
2004.3.5	Draw geometric polygon constructions.
2004.3.6	Draw geometric ellipse constructions.

Basic CAD System Operations

2004.4	Basic CAD System Operations
2004.4.1	CAD operation.
2004.4.2	Peripheral equipment operation.
2004.4.3	Operate plotters and printers.
2004.4.4	Create plotter files.
2004.4.5	Create disk files.
2004.4.6	Copy plotter files.
2004.4.7	Develop back-up files.

Orthographic Projections

2004.5	Orthographic Projections
2004.5.1	Principles of orthographic projections to select proper views and projections techniques.
2004.5.2	Orthographic terminology.
2004.5.3	Apply orthographic projection techniques to complete multi-view drawings.
2004.5.4	Select proper views to define given objects (1-view, 2-view, and 3 view drawings).
2004.5.5	Draw revision blocks.
2004.5.6	Draw title blocks.
2004.5.7	Specify shop notes.
2004.5.8	Create detailed working assembly drawings.
2004.5.9	Create sectional drawings.

Drawing Threads and Fastener

2004.6	Drawing Threads and Fastener
2004.6.1	Thread forms, series, and classification of fits.
2004.6.2	Specify keys, keyways, taper pins, and common threaded fasteners.
2004.6.3	Draw threaded fasteners using detailed representation.
2004.6.4	Draw threaded fasteners using schematic representations.

Advanced CAD Systems

2004.7	Advanced CAD Systems
2004.7.1	Operating CAD systems.
2004.7.2	Use advanced drawing and editing features within a CAD system.
2004.7.3	Obtain numerical and database information from CAD system.
2004.7.4	Use operating system functions within the CAD program.
2004.7.5	Demonstrate ability to efficiently print and plot specified drawings.
2004.7.6	Develop 3-D objects on a CAD system.

Applications in Technical Drawings

2004.8	Applications in Technical Drawings
2004.8.1	Operating CAD systems.
2004.8.2	Create and use different prototype drawings.
2004.8.3	Develop new line types, hatch patterns, and text styles.
2004.8.4	Modify CAD menu to perform additional and/or new operations.
2004.8.5	Load and run lisp routine.
2004.8.6	Modify operating system files to facilitate CAD operations.

This course is an elective course in the Agriculture, Food and Natural Resources cluster. The skill sets focused in this course to develop a student's knowledge and abilities in SMAW and MIG Welding, Oxy Fuel Cutting, Welding and Brazing. Safety instruction is integrated into relevant activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Oxy Fuel Cutting, Welding and Brazing

2006.1	Oxy Fuel Cutting, Welding and Brazing
2006.1.1	Operating CAD systems.
2006.1.2	Create and use different prototype drawings.
2006.1.3	Develop new line types, hatch patterns, and text styles.
2006.1.4	Modify CAD menu to perform additional and/or new operations.
2006.1.5	Load and run lisp routine.
2006.1.6	Modify operating system files to facilitate CAD operations.

SMAW & MIG Welding

2006.2	SMAW & MIG Welding
2006.2.1	Identify common safety hazards of welding.
2006.2.2	Identify and explain specific PPE needs of welding.
2006.2.3	Know how to avoid welding fumes.
2006.2.4	Know how to prepare base metal for welding.
2006.2.5	Know and identify types of welding joints (butt, fillet, lap, etc.).
2006.2.6	Identify and explain characteristics of Shielded Metal Arc Welding (SMAW).
2006.2.7	Know how welding electrodes are coded.
2006.2.8	Identify factors for electrode selection.
2006.2.9	Know how to set up a welder before use.
2006.2.10	Know the difference between Gas Metal Arc Welding (GMAW) and Flux Core Arc Welding (FCAW).
2006.2.11	Know the uses of GMAW and FCAW.
2006.2.12	Know how to set up a MIG welding machine.
2006.2.13	Weld components in flat, vertical, or overhead positions.
2006.2.14	Ignite torches or start power supplies and strike arcs by touching electrodes to metals being welded, completing electrical circuits.
2006.2.15	Clamp, hold, tack-weld, heat-bend, grind, or bolt component parts to obtain required configurations and positions for welding.
2006.2.16	Operate manual or semi-automatic welding equipment to fuse metal segments, using processes such as gas tungsten arc, gas metal arc, flux-cored arc, plasma arc, shielded metal arc, resistance welding, and submerged arc welding.
2006.2.17	Monitor the fitting, burning, and welding processes to avoid overheating of parts or warping, shrinking, distortion, or expansion of material.
2006.2.18	Examine workpieces for defects and measure workpieces with straightedges or templates to ensure conformance with specifications.

2006.2.19	Recognize, set up, and operate hand and power tools common to the welding trade, such as shielded metal arc and gas metal arc welding equipment.
2006.2.20	Lay out, position, align, and secure parts and assemblies prior to assembly, using straightedges, combination squares, calipers, and rulers.
2006.2.21	Chip or grind off excess weld, slag, or spatter, using hand scrapers or power chippers, portable grinders, or arc-cutting equipment.
2006.2.22	Weld separately or in combination, using aluminum, stainless steel, cast iron, and other alloys.
2006.2.23	Prepare all material surfaces to be welded, ensuring that there is no loose or thick scale, slag, rust, moisture, grease, or other foreign matter.
2006.2.24	Select and install torches, torch tips, filler rods, and flux, according to welding chart specifications or types and thicknesses of metals.
2006.2.25	Remove rough spots from workpieces, using portable grinders, hand files, or scrapers.
2006.2.26	Position and secure workpieces, using hoists, cranes, wire, and banding machines or hand tools.
2006.2.27	Guide and direct flames or electrodes on or across workpieces to straighten, bend, melt, or build up metal.
2006.2.28	Clean or degrease parts, using wire brushes, portable grinders, or chemical baths.
2006.2.29	Cut, contour, and bevel metal plates and structural shapes to dimensions as specified by blueprints, layouts, work orders, and templates, using powered saws, hand shears, or chipping knives.
2006.2.30	Preheat workpieces prior to welding or bending, using torches or heating furnaces.

This specialization course focuses on the basic scientific principles and processes related to equine physiology, breeding, nutrition, and management practices involved in the equine industry. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Animal Health

2007.1	Demonstrate knowledge of equine nutrition.
2007.1.1	Discuss aspects of equine nutrition and nutrients.
2007.1.2	Identify components of equine feeds.
2007.1.3	Explain the functions of the equine digestive system.
2007.1.4	Demonstrate an understanding of balancing rations for equines.
2007.1.5	Provide feeding recommendations to meet nutritional needs of horses.
2007.1.6	Feed and water horses according to schedules and feeding instructions.
2007.1.7	Mix food, liquid formulas, medications, or food supplements according to instructions, prescriptions, and knowledge of horses.
2007.1.8	Collect and record animal information such as weight, size, physical condition, treatments received, medications given and food intake.
2007.2	Demonstrate knowledge of equine care and management.
2007.2.1	Discuss equine management needs.
2007.2.2	Demonstrate safety in equine management and handling.
2007.2.3	Train a horse.
2007.2.4	Conduct horse grooming practices.
2007.2.5	Accustom animals to human voice and contact.
2007.2.6	Perform animal grooming duties such as washing, brushing, clipping, and trimming coats, cutting nails, and cleaning ears.
2007.2.7	Exercise animals to maintain their physical and mental health.
2007.2.8	Train horses or other equines for riding, harness, show, racing, or other work, using knowledge of breed characteristics, training methods, performance, and the peculiarities of each animal.
2007.2.9	Use oral, spur, rein, or hand commands to condition horses to carry riders or to pull horse-drawn equipment.
2007.2.10	Place tack or harnesses on horses to accustom horses to the feel of equipment.
2007.2.11	Cue or signal animals during performances.
2007.2.12	Evaluate animals to determine their temperaments, abilities, or aptitude for training.
2007.2.13	Feed or exercise animals or provide other general care, such as cleaning or maintaining holding or performance areas.
2007.2.14	Talk to or interact with animals to familiarize them to human voices or contact.
2007.2.15	Conduct training programs to develop and maintain desired animal behaviors for competition, entertainment, obedience, security, riding, and related areas.

2007.2.16	Research diseases and injuries and appropriate medications for equines.
2007.2.17	Keep records on heats, birth intervals, pedigree, and health practices of equines.
2007.2.18	Examine animals to detect illness, injury, or disease, and to check physical characteristics, such as rate of weight gain.
2007.2.19	Provide medical treatment, such as administering medications and vaccinations; or arrange veterinarians to provide more extensive treatment.
2007.2.20	Mix feed, additives, and medications in prescribed portions.
2007.2.21	Keep records documenting animal health, diet, or behavior.
2007.2.22	Students will demonstrate knowledge of selection, breeding, and artificial insemination of equines.
2007.2.23	Select animals to be bred, and semen specimens to be used, according to knowledge of animals, genealogies, traits, and desired offspring characteristics.
2007.2.24	Observe animals in heat to detect the approach of estrus, and exercise animals to induce or hasten estrus, if necessary.

Animal Reproduction

2007.3	Demonstrate understanding of equine reproduction.
2007.3.1	Demonstrate a knowledge of livestock reproduction organs and systems.
2007.3.2	Explain the estrous cycle.
2007.3.3	Discuss phases of reproductive development.
2007.3.4	Identify and explain livestock artificial insemination procedures/equipment and other reproduction technology.
2007.3.5	Evaluate breeding animals.
2007.3.6	Prepare containers of semen for freezing and storage or shipment, placing them in dry ice or liquid nitrogen.
2007.3.7	Maintain logs of semen specimens used and animals bred.
2007.3.8	Measure specified amounts of semen into calibrated syringes and insert syringes into inseminating guns.
2007.3.9	Inject prepared animal semen into female animals for breeding purposes, by inserting nozzle of syringe into vagina and depressing syringe plunger.
2007.3.10	Examine semen microscopically to assess and record density and motility of gametes, and dilute semen with prescribed diluents according to formulas.
2007.3.11	Perform duties related to livestock reproduction, such as breeding animals within appropriate timeframes, performing artificial inseminations, and helping with animal births.

Foundations of Agriculture, Food, and Natural Resources

2007.4	Demonstrate knowledge of leadership development through FFA.
2007.4.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
2007.4.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
2007.4.3	Participate in community service and career awareness activities at the local, state, and national level.

Aviation Fundamentals I provides an introductory exploration of the Aviation Technology industry. Areas of study encompass hydraulic principles, the practical application of hydraulic systems, pneumatic principles, and hands-on experience with pneumatic systems. This foundational course lays the groundwork for a comprehensive understanding of key components in aviation technology, setting the stage for further specialization in subsequent courses.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety Practices in Aviation Maintenance

2012.1	Apply safety protocols and practices in maintenance tasks.
2012.1.1	Demonstrate proper use of personal protective equipment (PPE).
2012.1.2	Execute emergency response protocols effectively.
2012.1.3	Identify and mitigate hazards in the work environment.

Basic Electricity

2012.2	Evaluate basic electricity principles for maintenance applications.
2012.2.1	Apply Ohm's law to calculate voltage, current, and resistance.
2012.2.2	Analyze basic AC and DC electrical circuits.
2012.2.3	Troubleshoot electrical system malfunctions using circuit diagrams.

Aircraft Drawings

2012.3	Demonstrate interpretation of aircraft drawings and schematics
2012.3.1	Identify common symbols and abbreviations used in aircraft drawings.
2012.3.2	Interpret aircraft drawings to understand system layouts and configurations.
2012.3.3	Use drawings and schematics for troubleshooting and maintenance tasks.

Weight and Balance

2012.4	Calculate weight and balance for aircraft maintenance.
2012.4.1	Determine aircraft center of gravity (CG) and moment calculations.
2012.4.2	Perform weight and balance calculations for different loading configurations.
2012.4.3	Understand the effects of weight and balance on aircraft performance.

Fluid Lines and Fittings

2012.5	Identify and handle fluid lines and fittings appropriately.
2012.5.1	Recognize different types of tubing materials and sizes.
2012.5.2	Select appropriate fittings for fluid line connections.
2012.5.3	Perform maintenance tasks on fluid lines and fittings according to specifications.

Materials and Processes

2012.6	Assess aircraft materials and processes for maintenance tasks.
2012.6.1	Identify common metals and non-metallic materials used in aircraft construction.
2012.6.2	Understand heat treatment processes for metals.
2012.6.3	Apply appropriate materials and processes to aircraft maintenance and repairs.

Ground Operation and Servicing Protocols

2012.7	Perform ground operations and servicing according to regulations.
2012.7.1	Follow procedures for aircraft towing, starting, and taxiing.
2012.7.2	Adhere to air traffic control (ATC) requirements during ground operations.
2012.7.3	Understand safety precautions for starting and operating aircraft engines.

Cleaning and Corrosion Control

2012.8	Execute cleaning and corrosion control techniques effectively.
2012.8.1	Identify corrosion-prone areas in aircraft.
2012.8.2	Perform aircraft cleaning procedures using approved methods.
2012.8.3	Apply corrosion prevention techniques and treatments.

Mathematics for Aviation Maintenance

2012.9	Apply mathematics accurately in maintenance calculations.
2012.9.1	Calculate areas and volumes of geometric shapes.
2012.9.2	Solve ratio and proportion problems relevant to aircraft maintenance.
2012.9.3	Convert units and perform metric conversions as needed.

Maintenance Forms and Records

2012.10	Manage maintenance forms and records efficiently.
2012.10.1	Understand regulatory requirements for maintenance documentation.
2012.10.2	Complete maintenance forms accurately and legibly.
2012.10.3	Maintain organized records of maintenance activities and inspections.

Basic Physics

2012.11	Understand basic physics principles relevant to maintenance tasks.
2012.11.1	Understand the effects of pressure, temperature, and fluid density on aircraft systems.
2012.11.2	Apply principles of sound resonance and fluid dynamics to maintenance tasks.
2012.11.3	Analyze the behavior of simple machines and mechanical systems.

Maintenance Publications

2012.12	Utilize maintenance publications and regulations effectively.
2012.12.1	Interpret information from aircraft maintenance manuals and publications.
2012.12.2	Understand the requirements of relevant regulations, such as 14 CFR Part 43 and Airworthiness Directives (ADs).
2012.12.3	Stay informed about updates and changes in maintenance procedures and regulations.

Aviation Mechanic Privileges and Limitations

2012.13	Comprehend and adhere to aviation mechanic privileges and limitations.
2012.13.1	Understand eligibility requirements for aviation mechanic certification.
2012.13.2	Recognize the privileges and limitations of aviation mechanics under FAA regulations.
2012.13.3	Adhere to ethical and professional standards in aircraft maintenance practices.

Aviation Fundamentals II extends the exploration of Aviation Technology, expanding on the foundational knowledge from its precursor. Emphasizing advanced hydraulic and pneumatic systems, this course refines understanding of those principles and applications.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

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2013.4.1	Determine aircraft center of gravity (CG) and moment calculations.
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2013.6.1	Identify common metals and non-metallic materials used in aircraft construction.
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Aviation Mechanic Privileges and Limitations

2013.13	Comprehend and adhere to aviation mechanic privileges and limitations.
2013.13.1	Understand eligibility requirements for aviation mechanic certification.
2013.13.2	Recognize the privileges and limitations of aviation mechanics under FAA regulations.
2013.13.3	Adhere to ethical and professional standards in aircraft maintenance practices.

Airframe Systems I students learn about specific airframe systems, including structural components and mechanical elements. Through a blend of theoretical insights and hands-on experience, this course equips students with the specialized knowledge necessary for maintaining and certifying airframe systems, a key aspect of the AMT General Certification.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

2014.1	Apply safety protocols and practices in airframe maintenance.
2014.1.1	Demonstrate safe work habits and operating procedures.
2014.1.2	Identify and mitigate hazards associated with airframe maintenance tasks.
2014.1.3	User personal protective equipment (PPE) appropriately.
2014.1.4	Understand and adhere to environmental and safety regulations.

Metallic Structures

2014.2	Assess metallic structures for inspection and maintenance.
2014.2.1	Perform visual and non-destructive inspections of metallic structures.
2014.2.2	Identify common types of defects and damage in metal components.
2014.2.3	Select appropriate repair techniques and materials for metal structures.

Non-Metallic Structures

2014.3	Analyze non-metallic structures for inspection and maintenance.
2014.3.1	Conduct inspections to detect damage and deterioration in non-metallic components.
2014.3.2	Identify types and characteristics of non-metallic materials used in aircraft structures.
2014.3.3	Apply proper repair techniques for non-metallic structures.

Flight Controls

2014.4	Troubleshoot flight control systems effectively.
2014.4.1	Understand the principles of flight control systems and components.
2014.4.2	Use schematic diagrams and technical documentation to troubleshoot system malfunctions.
2014.4.3	Perform functional testing and adjustments on flight control systems.

Airframe Inspection

2014.5	Apply airframe inspection requirements according to regulations.
2014.5.1	Interpret regulatory requirements for airframe inspections.
2014.5.2	Develop and execute inspection procedures in compliance with regulations.
2014.5.3	Document inspection findings and ensure compliance with regulatory standards.

Landing Gear Systems

2014.6	Perform landing gear systems maintenance proficiently.
2014.6.1	Conduct routine maintenance tasks on landing gear components.
2014.6.2	Inspect landing gear for wear, damage, and proper operations.
2014.6.3	Perform troubleshooting and repair of landing gear systems.

Hydraulic and Pneumatic Systems

2014.7	Manage hydraulic and pneumatic systems efficiently.
2014.7.1	Identify key components of hydraulic and pneumatic systems.
2014.7.2	Perform routine maintenance tasks to ensure system integrity and performance.
2014.7.3	Troubleshoot hydraulic and pneumatic system malfunctions.

Aircraft Instrument Systems

2014.8	Troubleshoot aircraft instrument systems accurately.
2014.8.1	Identify various types of aircraft instruments and their functions.
2014.8.2	Interpret instrument readings and indications to diagnose system anomalies.
2014.8.3	Use schematic diagrams and technical documentation to troubleshoot instruments system failures.

Communication and Navigation Systems

2014.9	Maintain communication and navigation systems proficiently.
2014.9.1	Understand principles of communication and navigation systems.
2014.9.2	Perform routine maintenance tasks on communication and navigation equipment.
2014.9.3	Ensure proper calibration and alignment of communication and navigation systems.

Environmental Systems

2014.10	Execute environmental systems maintenance effectively.
2014.10.1	Understand the function and components of environmental control systems.
2014.10.2	Perform maintenance tasks to prevent corrosion and contamination in environmental systems.
2014.10.3	Ensure proper operation of environmental control systems to maintain cabin comfort.

Aircraft Fuel Systems

2014.11	Manage aircraft fuel systems efficiently.
2014.11.1	Identify components of aircraft fuel systems and their functions.
2014.11.2	Perform fuel system inspections, leak checks, and maintenance tasks.
2014.11.3	Troubleshoot fuel system malfunctions and perform repairs as needed.

Aircraft Electrical Systems

2014.12	Maintain electrical systems effectively.
2014.12.1	Understand electrical components and circuits in aircraft.
2014.12.2	Perform electrical system inspections, tests, and maintenance tasks.
2014.12.3	Troubleshoot electrical system faults and perform repairs to ensure system integrity.

Ice and Rain Control Systems

2014.13	Maintain ice and rain control systems proficiently.
2014.13.1	Identify components and subsystems of ice and rain control systems.

2014.13.2	Perform inspections and tests to ensure proper functioning of de-icing and anti-icing systems.
2014.13.3	Execute maintenance tasks to address issues such as ice buildup, malfunctioning heaters, or damaged de-icing boots.
2014.13.4	Implement preventive maintenance measures to enhance the reliability and effectiveness of ice and rain control systems.

Airframe Systems II focuses on advanced airframe systems, this course explores structures, materials, and technologies. By mastering complex maintenance and certification techniques, students emerge as candidates ready to excel in the AMT field and achieve the AMT General Certification.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

2015.1	Apply safety protocols and practices in airframe maintenance.
2015.1.1	Demonstrate safe work habits and operating procedures.
2015.1.2	Identify and mitigate hazards associated with airframe maintenance tasks.
2015.1.3	User personal protective equipment (PPE) appropriately.
2015.1.4	Understand and adhere to environmental and safety regulations.

Metallic Structures

2015.2	Assess metallic structures for inspection and maintenance.
2015.2.1	Perform visual and non-destructive inspections of metallic structures.
2015.2.2	Identify common types of defects and damage in metal components.
2015.2.3	Select appropriate repair techniques and materials for metal structures.

Non-Metallic Structures

2015.3	Analyze non-metallic structures for inspection and maintenance.
2015.3.1	Conduct inspections to detect damage and deterioration in non-metallic components.
2015.3.2	Identify types and characteristics of non-metallic materials used in aircraft structures.
2015.3.3	Apply proper repair techniques for non-metallic structures.

Flight Controls

2015.4	Troubleshoot flight control systems effectively.
2015.4.1	Understand the principles of flight control systems and components.
2015.4.2	Use schematic diagrams and technical documentation to troubleshoot system malfunctions.
2015.4.3	Perform functional testing and adjustments on flight control systems.

Airframe Inspection

2015.5	Apply airframe inspection requirements according to regulations.
2015.5.1	Interpret regulatory requirements for airframe inspections.
2015.5.2	Develop and execute inspection procedures in compliance with regulations.
2015.5.3	Document inspection findings and ensure compliance with regulatory standards.

Landing Gear Systems

2015.6	Perform landing gear systems maintenance proficiently.
2015.6.1	Conduct routine maintenance tasks on landing gear components.
2015.6.2	Inspect landing gear for wear, damage, and proper operations.
2015.6.3	Perform troubleshooting and repair of landing gear systems.

Hydraulic and Pneumatic Systems

2015.7	Manage hydraulic and pneumatic systems efficiently.
2015.7.1	Identify key components of hydraulic and pneumatic systems.
2015.7.2	Perform routine maintenance tasks to ensure system integrity and performance.
2015.7.3	Troubleshoot hydraulic and pneumatic system malfunctions.

Aircraft Instrument Systems

2015.8	Troubleshoot aircraft instrument systems accurately.
2015.8.1	Identify various types of aircraft instruments and their functions.
2015.8.2	Interpret instrument readings and indications to diagnose system anomalies.
2015.8.3	Use schematic diagrams and technical documentation to troubleshoot instruments system failures.

Communication and Navigation Systems

2015.9	Maintain communication and navigation systems proficiently.
2015.9.1	Understand principles of communication and navigation systems.
2015.9.2	Perform routine maintenance tasks on communication and navigation equipment.
2015.9.3	Ensure proper calibration and alignment of communication and navigation systems.

Environmental Systems

2015.10	Execute environmental systems maintenance effectively.
2015.10.1	Understand the function and components of environmental control systems.
2015.10.2	Perform maintenance tasks to prevent corrosion and contamination in environmental systems.
2015.10.3	Ensure proper operation of environmental control systems to maintain cabin comfort.

Aircraft Fuel Systems

2015.11	Manage aircraft fuel systems efficiently.
2015.11.1	Identify components of aircraft fuel systems and their functions.
2015.11.2	Perform fuel system inspections, leak checks, and maintenance tasks.
2015.11.3	Troubleshoot fuel system malfunctions and perform repairs as needed.

Aircraft Electrical Systems

2015.12	Maintain electrical systems effectively.
2015.12.1	Understand electrical components and circuits in aircraft.
2015.12.2	Perform electrical system inspections, tests, and maintenance tasks.
2015.12.3	Troubleshoot electrical system faults and perform repairs to ensure system integrity.

Ice and Rain Control Systems

2015.13	Maintain ice and rain control systems proficiently.
2015.13.1	Identify components and subsystems of ice and rain control systems.

2015.13.2	Perform inspections and tests to ensure proper functioning of de-icing and anti-icing systems.
2015.13.3	Execute maintenance tasks to address issues such as ice buildup, malfunctioning heaters, or damaged de-icing boots.
2015.13.4	Implement preventive maintenance measures to enhance the reliability and effectiveness of ice and rain control systems.

This course introduces the student to the knowledge base and technical skills of the Plumbing industry. Plumbing 1 begins with instruction in Basic Safety; Introduction to Construction Math; Introduction to Hand Tools; Introduction to Power Tools; Introduction to Construction Drawings; Basic Rigging; Basic Communication Skills; Basic Employability Skills; and Introduction to Materials Handling. Students will then begin developing skill sets in the fundamentals of Plumbing such as Introduction to the Plumbing Profession and Plumbing Safety. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Safety

2081.1	Demonstrate personal safety, including personal protective equipment (PPE).
2081.1.1	Identify various exposure hazards commonly found on job sites.
2081.1.2	Identify and describe the basic use of PPE used to protect workers from bodily injury.
2081.1.3	Identify and describe various fall hazards.
2081.1.4	Identify and describe equipment and methods used in fall prevention and fall arrest systems.
2081.1.5	Identify and explain how to avoid caught-in and caught-between hazards.
2081.1.6	Identify and explain how to avoid struck-by and caught-in-between hazards.
2081.1.7	Describe basic job-site electrical safety guidelines.
2081.1.8	Demonstrate the proper use and care of all plumbing-related PPE.
2081.2	Demonstrate work environment safety
2081.2.1	Explain the importance of safety, the causes of workplace incidents, and the process of hazard recognition and control.
2081.2.2	Identify various exposure hazards commonly found on job sites.
2081.2.3	Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).
2081.2.4	Identify the benefits of a job safety analysis.
2081.2.5	Identify job-site hazardous work specific to plumbers.
2081.3	Demonstrate tool safety.
2081.3.1	Identify and describe the hand tools commonly used by plumbers.
2081.3.2	Explain and demonstrate how to safely use various types of hand tools.
2081.3.3	Describe the safety requirements for using power and hand tools common to the plumbing trade.
2081.3.4	Identify and demonstrate how to safely use miscellaneous power tools.
2081.4	Demonstrate proper trenching methods.
2081.4.1	Identify the specific dangers related to trenching operations.
2081.4.2	Describe the required safety protocol and PPE when working in and around trenches.
2081.4.3	Explain how to work safely in and around a trench.
2081.4.4	Explain how to work safely in and around confined spaces.

General Plumbing Practices

2081.5	Identify and use plumbing tools.
2081.5.1	Identify and demonstrate proper use of the various tools used in the plumbing trade.
2081.5.2	Demonstrate how to use various types of cutting and shaping tools.
2081.5.3	Identify and demonstrate how to safely use miscellaneous power tools.
2081.6	Interpret an isometric view of a drain, waste, and vent (DWV) system.
2081.6.1	Demonstrate the ability to read an isometric drawing.
2081.6.2	Identify the types of drawings in a complete set of drawings and how they relate to each other.
2081.6.3	Identify various plumbing drawings and describe how the different views are used.
2081.6.4	Describe how code requirements apply to certain drawings.
2081.6.5	Explain how waste moves from a fixture through the drain system to the environment.
2081.6.6	Identify the major components of a drainage system and describe their functions.
2081.6.7	Identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals.
2081.7	Identify plumbing materials and fittings.
2081.7.1	Identify and explain the materials, schedules, and properties of copper tube, fittings, and valves.
2081.7.2	Identify the various types of copper tube.
2081.7.3	Explain the material properties, storage, and handling requirements of copper tube.
2081.7.4	Identify the types of fittings and valves used with copper tube.
2081.7.5	Identify the hazards and safety precautions associated with copper tube.
2081.7.6	Identify the various types of cast-iron pipe.
2081.7.7	Identify the types of fittings and valves used with cast-iron pipe.
2081.7.8	Identify the hazards and safety precautions associated with cast-iron pipe.
2081.7.9	Identify the various types of steel pipe.
2081.7.10	Identify the types of fittings and valves used with steel pipe.
2081.7.11	Identify the hazards and safety precautions associated with steel pipe.
2081.7.12	Identify the various types of plastic pipe.
2081.7.13	Identify the material properties, storage, and handling requirements of plastic pipe.
2081.7.14	Identify the types of fittings and valves used with plastic pipe.
2081.7.15	Identify the hazards and safety precautions associated with plastic pipe.
2081.8	Interpret and comply with general plumbing practices.
2081.8.1	Identify the tasks and responsibilities of the plumbing profession in the construction industry.
2081.8.2	Describe the history of the plumbing profession.
2081.9	Interpret manufacturer's specifications.
2081.9.1	Demonstrate the ability to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.
2081.9.2	Interpret plumbing-related information from a set of drawings.
2081.9.3	Use an architect's scale to draw lines to scale and to measure lines drawn to scale.
2081.9.4	Describe how code requirements apply to certain drawings.
2081.9.5	Interpret plumbing-related information from a set of drawings.
2081.9.6	Describe how code requirements apply to certain drawings.
2081.10	Identify plumbing terminology.
2081.10.1	Demonstrate understanding of the various terms used in the plumbing trade.
2081.11	Identify plumbing symbols.

2081.11.1	Demonstrate the ability to identify the various plumbing symbols.
2081.11.2	Identify the basic symbols used in schematic drawings of pipe assemblies.

Plumbing Service and Repair

2081.12	Display ethical practices in service and repair.
2081.12.1	Identify the responsibilities of a person working in the plumbing industry.
2081.12.2	Demonstrate the ability to confer with customers by telephone or in person to provide information about products or services, take or enter orders, cancel accounts, or obtain details of complaints.
2081.12.3	Develop a customer needs assessment.
2081.12.4	Describe how to keep records of customer interactions or transactions, recording details of inquiries, complaints, or comments, as well as actions taken.
2081.12.5	Explain how to ensure that appropriate changes were made to resolve customers' problems.
2081.12.6	Determine charges for services requested, collect deposits or payments, or arrange for billing.
2081.12.7	Refer unresolved customer grievances to designated departments for further investigation.
2081.12.8	Identify the benefits of ongoing professional development.

Plumbing 2 will continue to build student skill sets in areas such as Plumbing Tools; Introduction to Plumbing Math; Introduction to Plumbing Drawings; Plastic Pipe and Fittings; Copper Pipe and Fittings; Cast-Iron Pipe and Fittings; Carbon Steel Pipe and Fittings; Corrugated Stainless Steel Tubing; Fixtures and Faucets; Introduction to Drain, Waste, and Vent (DWV) Systems; and Introduction to Water Distribution Systems. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Plumbing Math

2082.1	Use formulas.
2082.1.1	Demonstrate the ability to use various math formulas.
2082.1.2	Explain the process for determining the surface area of a cylinder.
2082.1.3	Explain basic angles and geometric shapes and how to calculate their area and volume
2082.2	Add, subtract, multiply, and divide whole numbers and fractions.
2082.2.1	Demonstrate comprehension of the basic math used by plumbers in the field.
2082.2.2	Add, subtract, multiply, and divide whole numbers.
2082.2.3	Add, subtract, multiply, and divide fractions.
2082.2.4	Add, subtract, multiply, and divide decimals.
2082.2.5	Explain what the metric system is and how it is important in the plumbing trade.
2082.2.6	Identify the functions of a construction calculator.
2082.2.7	Define equivalent fractions and show how to find lowest common denominators.
2082.3	Convert measurements.
2082.3.1	Demonstrate the process for converting units of length, weight, volume, and temperature between the imperial and metric systems of measurement.
2082.3.2	Demonstrate the ability to convert between decimals, fractions, and percentages.
2082.3.3	identify and convert units of length measurement between the imperial and metric systems.
2082.3.4	identify and convert units of weight measurement between the imperial and metric systems.
2082.3.5	identify and convert units of volume measurement between the imperial and metric systems.
2082.3.6	identify and convert units of temperature measurement between the imperial and metric systems.
2082.4	Calculate slope and angles with a builder's level/laser.
2082.4.1	Demonstrate how to correctly set up a builder's level.
2082.4.2	Demonstrate how to properly set up a laser level.
2082.4.3	Use a builder's level to calculate grade.
2082.4.4	Use a laser level to calculate grade.
2082.4.5	Identify correct grade of underground piping per local codes.
2082.4.6	Install an aboveground DWV system using appropriate hangers and correct grade or slope.

2082.5	Size drain/waste lines and storm drains
2082.5.1	Determine and set the elevation of an area drain.
2082.5.2	Install floor drains, area drains, and floor sinks.

General Plumbing Practices

2082.6	Demonstrate blueprint reading.
2082.6.1	Describe the types of construction drawings typically used in the plumbing trade, explain the relationship among these drawings, and discuss applicable code requirements.
2082.6.2	Identify various plumbing drawings and describe how the different views are used.
2082.6.3	Describe how code requirements apply to certain drawings.
2082.6.4	Identify the basic symbols used in schematic drawings of pipe assemblies.
2082.6.5	Interpret plumbing-related information from a set of drawings.
2082.7	Interpret an isometric view of a drain, waste, and vent (DWV) system.
2082.7.1	Demonstrate the ability to read an isometric drawing.
2082.7.2	Identify various plumbing drawings and describe how the different views are used.
2082.8	Identify plumbing materials and fittings.
2082.8.1	Identify and explain the materials, schedules, and properties of copper tube, fittings, and valves.
2082.9	Identify plumbing protection methods (i.e., fire caulk, nail plates).
2082.9.1	Identify various insulating materials and their properties.
2082.9.2	Describe common types of firestopping materials and assemblies.
2082.9.3	Identify proper locations for cutting, boring, and sleeving based on applicable codes.
2082.9.4	Identify the various applications of insulating materials.
2082.9.5	Identify walls, floors, and ceilings that require fire-stopping.
2082.10	Interpret manufacturer's specifications.
2082.10.1	Demonstrate proficiency in interpreting manufacturer's specifications.
2082.11	Testing of Plumbing systems.
2082.11.1	Describe the process of testing a water distribution system.
2082.11.2	Explain and demonstrate how to perform an air test.
2082.11.3	Explain and demonstrate how to perform a hydrostatic test.
2082.11.4	Describe how to test an underground piping system.
2082.11.5	Describe how to test an aboveground DWV system.

Joining Pipes and Fittings

2082.12	Join copper pipes, tubes, and fittings.
2082.12.1	Describe how to properly measure, cut, and join copper pipe.
2082.12.2	Demonstrate the process for joining copper pipe, tubes, and fittings.
2082.13	Join plastic pipes and fittings.
2082.13.1	Explain how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping.
2082.13.2	Identify the material properties, storage, and handling requirements of plastic pipe.
2082.13.3	Identify the types of fittings and valves used with plastic pipe.
2082.13.4	Demonstrate the ability to join all types of plastic pipes and fittings.
2082.13.5	Describe how to properly measure, cut, and join plastic piping.
2082.13.6	Demonstrate how to properly measure, cut, and join plastic pipe.

2082.14	Join steel pipes and fittings.
2082.14.1	Describe how to properly measure, cut, and join steel piping.
2082.14.2	Demonstrate the ability to join steel pipes and fittings.
2082.15	Join cast iron pipes and fittings.
2082.15.1	Describe how to properly measure, cut, and join cast iron pipe.
2082.15.2	Demonstrate the ability to join cast iron pipes and fittings.

Drainage

2082.16	Install drain/waste lines and storm drains (i.e., interior, and exterior).
2082.16.1	Describe the factors that influence DWV system design and how different types of fittings, vents, and pipe are used to move waste out of a building.
2082.16.2	Discuss the installation requirements that prevent malfunctions in the system.
2082.16.3	Explain how waste moves from a fixture through the drain system to the environment.
2082.16.4	Identify the major components of a drainage system and describe their functions.
2082.16.5	Identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals.
2082.16.6	Identify significant code and health issues, violations, and consequences related to DWV systems.
2082.16.7	Demonstrate the ability to install interior and exterior drain/waste lines.
2082.16.8	Demonstrate the ability to install interior and exterior storm drains.
2082.17	Describe sizing of basic drainage systems.
2082.17.1	Explain how to determine the proper size for a draining system.
2082.17.2	Identify correct grade of underground piping per local codes.
2082.18	Calculate proper pitch.
2082.18.1	Explain the procedure for correctly setting up levels.
2082.18.2	Describe how to use a builder's level to calculate grade.
2082.18.3	Describe how to use a laser level to calculate grade.
2082.18.4	Explain how to install an aboveground DWV system using appropriate hangers and correct grade or slope.
2082.19	Describe purpose and appropriate locations for clean-out.
2082.19.1	Explain how to determine the appropriate location for a clean-out.

Vent Installation

2082.20	Install a vent system for soil or waste drainage.
2082.20.1	Describe the purpose and function of vents for soil and waste drainage.
2082.20.2	Demonstrate how to properly install drainage vents.
2082.21	Differentiate between types of vents and venting systems.
2082.21.1	Identify the different types of vents in a venting system and describe their functions.

Traps

2082.22	Exhibit knowledge of trap function, installation, and placement.
2082.22.1	Describe the factors that influence DWV system design and how different types of fittings, vents, and pipe are used to move waste out of a building.
2082.22.2	Explain the function of a trap and what determines where it should be placed.
2082.23	Distinguish between approved and non-approved traps.
2082.23.1	Describe the components of a code approved trap

2082.23.2	Explain the characteristics of a non-approved trap.
2082.24	Identify trap components.
2082.24.1	Identify the different types of traps and their components and explain their importance.
2082.25	Identify causes and prevention for trap seal loss.
2082.25.1	Describe the common ways that traps can lose their seals.
2082.25.2	Describe the installation requirements that prevent malfunctions in the system.

Plumbing Service and Repair

2082.26	Display ethical practices in service and repair.
2082.26.1	Describe the common practices of an ethical plumber.
2082.27	Unclog drains and traps.
2082.27.1	Describe the process and tools used for unclogging drains and traps.
2082.27.2	Demonstrate the ability to unclog various drains and traps.

This course will continue to build student skill sets in areas of Plumbing Math Two; Reading Commercial Drawings; Hangers, Supports, Structural Penetrations, and Fire Stopping; Installing and Testing DWV Piping; Installing Roof, Floor, and Area Drains; and Types of Valves. Students 11 utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Plumbing Math

2083.1	Demonstrate how to use Math formulas.
2083.1.1	Demonstrate the ability to use various math formulas.
2083.1.2	Explain the process for determining the surface area of a cylinder.
2083.1.3	Explain basic angles and geometric shapes and how to calculate their area and volume
2083.1.4	Demonstrate how to determine the offset of a pipe.
2083.1.5	Convert decimals to percentages and percentages to decimals.
2083.1.6	Convert fractions to decimals and decimals to fractions.

General Plumbing Practices

2083.2	Demonstrate Blueprint Reading.
2083.2.1	Describe the types of construction drawings typically used in the plumbing trade, explain the relationship among these drawings, and discuss applicable code requirements.
2083.2.2	Demonstrate the ability to read and interpret construction blueprints.
2083.2.3	Identify the basic symbols used in the pipe trades.
2083.2.4	Read and interpret manufacturer's schematics and specifications.
2083.3	Interpret isometric view of drain, waste, vent (DWV) system.
2083.3.1	Demonstrate the ability to read and interpret an isometric drawing.
2083.3.2	Interpret roof drains, leaders, and drainage systems.
2083.3.3	Sketch an orthographic and isometric drawing.
2083.4	Identify plumbing materials and fittings.
2083.4.1	Identify and explain the materials, schedules, and properties of copper tube, fittings, and valves.
2083.4.2	Identify pipes, fittings, materials, and equipment related to the pipe trades.
2083.4.3	Compare the various tools used for plumbing and pipe fitting.
2083.4.4	Define the terms used in the pipe trade industry.
2083.5	Identify plumbing pipe protection methods (i.e., fire caulk, nail plates).
2083.5.1	Identify the various applications of insulating materials.
2083.6	Interpret and comply with general plumbing practices.
2083.6.1	Demonstrate how to interpret and comply with general plumbing code requirements.
2083.7	Interpret manufacturer's specifications.
2083.7.1	Explain what information can be found in manufacturer's schematics and specifications.

2083.7.2	Read and interpret manufacturer's schematics and specifications.
2083.8	Testing of plumbing systems.
2083.8.1	Describe and demonstrate how to test various plumbing systems.
2083.8.2	Test and inspect repaired systems.
2083.8.3	Troubleshoot and diagnose plumbing systems.

Vent Installation

2083.9	Install a vent system for soil or waste drainage.
2083.9.1	Describe how to install a vent system for soil and waste drainage.
2083.9.2	Demonstrate how to correctly install a vent system for soil and waste drainage.
2083.10	Differentiate between types of vents and venting systems.
2083.10.1	Demonstrate the ability to differentiate between different types of vents in a venting system and describe their functions.

Water Supply and Distribution

2083.11	Lay out/rough-in water service and distribution lines.
2083.11.1	Describe the components and functions of a water distribution system and the relationships among the components.
2083.11.2	Demonstrate the ability to lay out and rough-in water service and distribution lines.
2083.12	Install water lines, including water hammer arrestors and/or air chambers.
2083.12.1	Demonstrate the ability to install water lines.
2083.12.2	Describe the function of and demonstrate the ability to install water hammer arrestors and air chambers.
2083.13	Identify various valve types and required locations.
2083.13.1	Identify and describe the basic types of valves.
2083.13.2	Identify straight through flow valves and how they function.
2083.13.3	Identify full flow valves and how they function.
2083.13.4	Identify throttled flow valves and how they function.
2083.13.5	Identify check valves and how they function.
2083.13.6	Identify the pressure ratings for valves.
2083.13.7	Identify the materials used in valves.
2083.13.8	Identify valve sizing requirements.
2083.14	Identify cross-connection and back-flow devices and functions.
2083.14.1	Define backflow and cross connection control.
2083.14.2	Describe the importance of backflow and cross connection control to the health of the public.
2083.14.3	Demonstrate the ability to identify various cross-connection and back-flow devices and describe their functions.
2083.14.4	Identify the proper devices and assemblies for individual applications.
2083.14.5	Explain the "degree of hazard" principle and how it relates to the installation of devices and assemblies.

Code of Conduct

2083.15	Simulated Workplace Manual.
2083.15.1	Demonstrate complete knowledge and understanding of Simulated Workplace Policy and Practices.

Unions and Apprenticeship Programs

2083.16	Unions working with Contractors in Construction Trades.
2083.16.1	Explain the basic components of an Apprenticeship program.

2083.16.2	Identify some common myths associated with Apprenticeship.
2083.16.3	Construction Trade Unions in West Virginia with Apprenticeship programs.
2083.16.4	Discuss Apprenticeship opportunities in Construction trades.
2083.16.5	Explain the process of applying for Apprenticeship in the Construction Trades.
2083.16.6	Discuss Pre-Job Training.
2083.16.7	Discuss best practices for working with your Supervisor and others.
2083.16.8	Explain Harassment and Discrimination policy.
2083.16.9	Discuss the qualities of a Successful Apprentice
2083.16.10	Review common Interview questions.
2083.16.11	Discuss interviewing tips for Construction Apprenticeships.
2083.16.12	Practice mock interviews for Apprenticeships in Construction.
2083.16.13	Discuss some of the benefits of being in an Apprenticeship program.
2083.16.14	Describe some of the responsibilities of business and partners in Apprenticeship programs.

This course will continue to build student skill sets in areas of Installing and Testing Water Supply Piping; Installing Fixtures, Valves and Faucets; Introduction to Electricity; Installing Water Heaters; Fuel Gas Systems; and Servicing of Fixtures, Valves and Faucets. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Joining Pipes and Fittings

2084.1	Join dissimilar materials AR2145 Soldering & Flaring.
2084.1.1	Identify the various types of copper tube.
2084.1.2	Identify the hazards and safety precautions associated with copper tube.
2084.1.3	Identify the material properties, storage, and handling requirements of copper tube.
2084.1.4	Identify the types of fittings and valves used with copper tube.
2084.1.5	Join different types of pipes (including PVC, galvanized, steel, plastic, copper, and cast-iron pipes) according to plumbing codes and specifications using various methods including brazing (Optional), clamping, compression, threading, flange, flaring, gasket-joint, gluing and soldering.
2084.1.6	Measure, mark, and cut different types of pipes using various methods.
2084.1.7	Thread a steel pipe by hand and with a power-driven vise stand or a pipe threading machine.

Hot Water Systems

2084.2	Install basic types of water heaters (i.e., electric and gas).
2084.2.1	Describe the basic operation and components of various water heaters.
2084.2.2	Describe the safety hazards associated with water heaters.
2084.2.3	Install a gas water heater.
2084.2.4	Install an electric water heater.
2084.2.5	Install tankless water heaters.
2084.2.6	Install a heat pump water heater.
2084.2.7	Install an indirect water heater.
2084.3	Install and identify purpose of pressure/temperature relief valve on a water heater.
2084.3.1	Describe the purpose and function of a pressure/temperature relief valve on a water heater.
2084.3.2	Identify the pressure ratings for valves.
2084.3.3	Demonstrate the ability to install a pressure/temperature valve on a water heater.
2084.4	Identify water heater components (i.e., electric and gas).
2084.4.1	Identify the operation and components of an electric water heater.
2084.4.2	Identify the operation and components of tankless water heaters.
2084.4.3	Identify the operation and components of a heat pump water heater.

2084.4.4	Identify the operation and components of indirect water heaters.
2084.4.5	Identify the operation and components of a gas water heater.
2084.5	Display proper venting of a gas water heater.
2084.5.1	Identify gas safety hazards.
2084.5.2	Explain the importance of proper venting on a gas water heater.
2084.5.3	Demonstrate the ability to install a venting system on a gas water heater.

Install Fixtures

2084.6	Install kitchen and lavatory fixtures.
2084.6.1	Demonstrate the ability to install lavatories.
2084.6.2	Demonstrate the ability to properly install sinks.
2084.6.3	Demonstrate the ability to connect a dishwasher.
2084.6.4	Install and connect a garbage disposal.
2084.6.5	Install and connect a refrigerator and ice maker.
2084.6.6	Install and connect a washing machine.
2084.6.7	Describe how to test and protect fixtures.
2084.7	Install water closets.
2084.7.1	Identify ADA requirements for installing fixtures.
2084.7.2	Demonstrate the ability to install water closets.
2084.7.3	Repair and replace water closets, ball cocks, flush valves, floats, lift rods, ball stoppers and trip levers.
2084.7.4	Reseal water closets to flanges.
2084.7.5	Test and inspect repaired systems.
2084.8	Install bathtub/shower.
2084.8.1	Identify ADA requirements for installing fixtures.
2084.8.2	Demonstrate the ability to properly install bathtubs.
2084.8.3	Demonstrate the ability to properly install shower stalls.
2084.9	Install faucets.
2084.9.1	Demonstrate the ability to install and repair both washer and washer-less type faucets.
2084.10	Install urinals.
2084.10.1	Identify ADA requirements for installing urinals.
2084.10.2	Demonstrate the ability to install various types of urinals.

Plumbing Service and Repair

2084.11	Repair washer and washer-less type faucets.
2084.11.1	Identify the materials commonly used to make fixtures, the most common types of fixtures, and the types of faucets available.
2084.11.2	Describe how each type of fixture and faucet operates.
2084.11.3	Demonstrate the ability to service and repair both washer and washer-less type faucets.
2084.11.4	Repair leaks in traps and faucets.
2084.12	Display ethical practices in service and repair.
2084.12.1	Explain the importance of social skills and ways good social skills are applied in the construction trade.
2084.12.2	Identify good personal and social skills.
2084.12.3	State the personal characteristics of a professional.
2084.12.4	Develop quality standards for services.

2084.12.5	Display the ability to confer with customers by telephone or in person to provide information about products or services, take or enter orders, cancel accounts, or obtain details of complaints.
2084.12.6	Demonstrate the ability to determine charges for services requested, collect deposits or payments, or arrange for billing.
2084.12.7	Identify the responsibilities of a person working in the plumbing industry.
2084.12.8	Identify and display ethical practices in plumbing service and repair.
2084.12.9	Develop a system for the evaluation of customer satisfaction.
2084.13	Replace ball cocks and flush valves.
2084.13.1	Explain the purpose and function of a ball cock.
2084.13.2	Explain the purpose and function of a flush valve.
2084.13.3	Demonstrate the ability to service float control and ball cocks.
2084.13.4	Demonstrate the ability to service a flush valve.
2084.14	Unclog drains and traps.
2084.14.1	Describe techniques used to unclog drains and traps.
2084.14.2	Demonstrate the ability to unclog various drains and traps.
2084.15	Replace kitchen plumbing appliances.
2084.15.1	Demonstrate the ability to replace and connect a dishwasher.
2084.15.2	Demonstrate the ability to replace and connect a garbage disposal.
2084.15.3	Display the ability to connect a refrigerator and ice maker.
2084.15.4	Demonstrate the ability to install and connect a gas oven/stove.

This course introduces the student to the knowledge base and technical skills for concepts in Cabinet Construction. Areas of study include wood properties, cabinet component manufacturing and cabinet assembly operations. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to millwork and cabinetmaking occupations.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Wood Properties

2124.1	Wood properties.
2124.1.1	Review wood properties.
2124.1.2	Classify wood by species, grain structure, color, and hardness (hardwood and softwood).
2124.1.3	Investigate the mechanical properties of wood.
2124.1.4	Classify wood and wood products for specific applications in cabinet construction.
2124.1.5	Select woods that may be used to substitute for other species.

Cabinet Component Manufacturing

2124.2	Cabinet component manufacturing.
2124.2.1	Analyze cabinetry styles and how to fabricate cabinet components with a variety of wood joints.
2124.2.2	Distinguish between traditional, provincial, and contemporary designs.
2124.2.3	Lay out and cut cabinet frame components using various joints.
2124.2.4	Lay out and cut end, bottom, and top panels.
2124.2.5	Lay out and cut countertops, backsplashes, trim, and molding.
2124.2.6	Lay out and cut drawers.
2124.2.7	Lay out and cut solid and paneled doors.

Cabinet Assembly Operations

2124.3	Cabinet assembly operations
2124.3.1	Demonstrate cabinet assembly operations.
2124.3.2	Assemble cabinet components using a variety of clamps and clamping techniques.
2124.3.3	Assemble components using dowels, biscuits, and wood joints.
2124.3.4	Construct cabinet components with and without glue and fastening devices.
2124.3.5	Install hardware pulls, knobs, and hinges.
2124.3.6	Install trim, molding, glass panels, surface laminates and covers.

This course introduces the student to the knowledge base and technical skills of the Millwork and Cabinetmaking industry. Millwork and Cabinetmaking 1 begins with extensive workplace Safety instruction. The students will complete modules in Basic Safety; Introduction to Construction Math; Introduction to Hand Tools; Introduction to Power Tools; Introduction to Construction Drawings; Basic Rigging; Basic Communication Skills; Basic Employability Skills; and Introduction to Materials Handling. Students will then begin developing skill sets in the fundamentals of Millwork and Cabinetmaking such as Introduction to the trade; and Woods and Materials Used in Cabinet Construction.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Safety

2126.1	Apply shop and personal safety rules and procedures, including appropriate PPEs.
2126.1.1	Explain the idea of a safety culture and its importance in construction crafts.
2126.1.2	Identify causes of accidents and the impact of accident costs.
2126.1.3	Explain the role of OSHA in job-site safety.
2126.1.4	Explain fall protection, ladder, stair and scaffold procedures and requirements.
2126.1.5	Explain fall protection, ladder, stair and scaffold procedures and requirements.
2126.1.6	Identify struck-by hazards and demonstrate safe working procedures and requirements.
2126.1.7	Identify caught-in-between hazards and demonstrate safe working procedures and requirements.
2126.1.8	Demonstrate the use and care of appropriate personal protective equipment (PPE).
2126.1.9	Demonstrate safe use of all hand and power woodworking tools and machines.
2126.1.10	Establish procedures for safe evacuation of the worksite in the event of an emergency.
2126.2	Identify minor first aid treatment procedures
2126.2.1	Research agencies that are responsible for emergencies in the workplace.
2126.2.2	Develop a plan which outlines the procedures for handling an accident.
2126.2.3	Clean and disinfect wounds.
2126.2.4	Apply dressings or bandages.
2126.2.5	Manage minor burns.
2126.3	Recall fire and electrical safety rules and procedures.
2126.3.1	Recognize hazard recognition and risk assessment techniques.
2126.3.2	Define safe work procedures to use around electrical hazards.
2126.3.3	Demonstrate operating instructions before using any equipment.
2126.3.4	Follow safety and security procedures.
2126.4	Identify SDS-related issues and information.
2126.4.1	Explain the importance of hazard communications (HazCom) and Material Safety Data Sheets (MSDSs).
2126.4.2	Identify other construction hazards on your job site, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires.
2126.4.3	Utilize emergency response procedures outlined in SDS documents, including steps to take in case of chemical spills, exposure incidents, or other emergencies.

Design, Layout and Estimation

2126.5	Interpret blueprints and specifications to industry standards.
2126.5.1	Recognize and identify basic construction drawing terms, components, and symbols.
2126.5.2	Relate information on construction drawings to actual locations on the print.
2126.5.3	Recognize different classifications of construction drawings.
2126.5.4	Interpret and use drawing dimensions.
2126.5.5	Understand floor plans, elevations, and sections to visualize building structures.
2126.5.6	Comply with codes.
2126.6	Interpret shop drawings/rough sketches.
2126.6.1	Recognize and identify basic construction drawing terms, components, and symbols.
2126.6.2	Relate information on construction drawings to actual locations on the print.
2126.6.3	Recognize different classifications of construction drawings.
2126.6.4	Interpret and use drawing dimensions.
2126.7	Interpret detailed drawings.
2126.7.1	Identify dimensions, annotations, and symbols.
2126.7.2	Analyze specifications and requirements.
2126.7.3	Analyze detailed views, sections and enlarged details.
2126.8	Interpret a cut list or bill of materials.
2126.8.1	Review the cut list or bill of materials to identify required components.
2126.8.2	Interpret dimensions provided for each component.
2126.8.3	Recognize specified materials for components.
2126.8.4	Verify quantities needed for each component.
2126.8.5	Use information to plan material sourcing, cutting, and assembly.
2126.8.6	Research approved vendors for pricing.
2126.9	Identify types of joints and their uses.
2126.9.1	Learn to recognize common types of joints used in millwork and cabinetry such as dado, mortise and tenon, dovetail, rabbet, and butt joints.
2126.9.2	Understand the purpose and application of each type of joint in woodworking projects.
2126.9.3	Recognize the strengths and weaknesses of different joint types in terms of durability and load-bearing capacity.
2126.9.4	Gain knowledge of where each type of joint is commonly used in furniture construction and cabinetry assembly.
2126.9.5	Practice identifying joint types from diagrams, illustrations, or actual woodworking samples.
2126.10	Estimate time and materials.
2126.10.1	Assess project requirements and identify necessary materials, including wood species, hardware, and finishing supplies.
2126.10.2	Calculate the quantity of materials needed based on project specifications and dimensions.
2126.10.3	Estimate the time required for each stage of the project, including planning, preparation, cutting, assembly, and finishing.
2126.10.4	Take into account factors such as skill level, equipment availability, and project complexity when estimating time and materials.
2126.10.5	Continuously refine and adjust estimates based on project progress, unexpected challenges, and feedback.

Major Wood and Materials

2126.11	Identify benefits of major woods and wood products.
2126.11.1	Classify wood by species, grain structure, color, and hardness (hardwood or softwood).
2126.11.2	Investigate the mechanical properties of wood.
2126.11.3	Classify wood and wood products for specific applications in cabinet construction.
2126.11.4	Select woods that may be used to substitute for other species.
2126.12	Demonstrate understanding of characteristics of different woods.
2126.12.1	Understand the unique characteristics of each wood species, including grain pattern, color variation, hardness, and durability.
2126.12.2	Compare and contrast the properties of various woods to determine their strengths, weaknesses, and optimal uses in woodworking projects.
2126.12.3	Understand the unique characteristics of each wood species, including grain pattern, color variation, hardness, and durability.
2126.13	Compare and contrast sheet good materials.
2126.13.1	Recognize various sheet goods used in millwork and cabinetry, like plywood, MDF, particleboard, and melamine.
2126.13.2	Assess strengths, weaknesses, and properties of each material, including durability, cost, and resistance to moisture.
2126.13.3	Contrast machinability, finishing ease, and suitability for different applications among sheet goods.
2126.13.4	Consider advantages and disadvantages of each material for specific project needs, such as load-bearing capacity and aesthetic requirements.
2126.13.5	Use analysis to make informed decisions about material selection based on project requirements and budget constraints.

Hand and Portable Power Tools

2126.14	Identify proper use of portable power cutting tools.
2126.14.1	Identify power woodworking tools and their parts.
2126.14.2	Set-up and maintain a table saw and its accessories.
2126.14.3	Perform basic cutting operations utilizing hand and power tools.
2126.14.4	Layout and cut cross grain, rip, miter, dado, groove and tenon cuts with a table saw.
2126.14.5	Set-up and maintain a radial arm saw and its accessories.
2126.14.6	Layout and cut stock to length, dado, mortise and tenon, and make miter cuts with a radial arm saw.
2126.14.7	Set-up and maintain a drill press.
2126.14.8	Layout and bore through holes and to stops with a drill press.
2126.14.9	Set-up and maintain a jointer.
2126.14.10	Join edges and surfaces, square, bevel, stop cut, and taper with a jointer.
2126.14.11	Set-up and maintain a planer and panel sander.
2126.14.12	Plane board surface and edges.
2126.14.13	Set-up and maintain a wood lathe.
2126.14.14	Turn between centers, convex, concave, shoulder, "V" and faceplate turn on a wood lathe.
2126.14.15	Set-up and maintain a band saw.
2126.14.16	Layout and make angular, curve, and ripping cuts with a band saw.
2126.15	Identify proper use of fastening tools.

2126.15.1	Recognize various fastening tools such as drills, drivers, nail guns, and staplers.
2126.15.2	Understand the proper applications and limitations of each fastening tool, including when to use screws, nails, staples, or dowels.
2126.15.3	Master proper techniques for using fastening tools, including drilling pilot holes, setting nail or screw depth, and adjusting stapler pressure.
2126.15.4	Develop skills to use fastening tools efficiently and accurately, minimizing waste and ensuring strong, secure joints.
2126.16	Identify proper use of portable sanders.
2126.16.1	Set-up and maintain belt, disc, and spindle sanders.
2126.16.2	Select appropriate abrasives for desired surface quality.
2126.16.3	Prepare surfaces by removing old finishes and smoothing rough areas.
2126.16.4	Choose the right sandpaper grit for different tasks and materials.
2126.16.5	Master proper sanding techniques to achieve smooth and even results.
2126.16.6	Practice safety measures such as wearing protective gear and ensuring proper ventilation.
2126.17	Identify proper use of portable routers.
2126.17.1	Set-up and maintain routers and shapers.
2126.17.2	Make and use jigs for special shaper or router operations.
2126.17.3	Cut grooves, dovetails, tongue and groove, flutes, beads and rabbets with a shaper or router.
2126.17.4	Cut inside circles, arcs, and follow template forms, or pins, with a shaper or router.
2126.17.5	Select the appropriate router bit for each task, considering the desired cut type, material, and depth.
2126.17.6	Master proper routing techniques, including maintaining a steady hand, moving the router in the correct direction, and controlling the depth of cut.
2126.18	Identify proper use of hand tools.
2126.18.1	Identify hand tools and explain their applications.
2126.18.2	Understand the specific tasks each hand tool is designed for, such as cutting, shaping, smoothing, or drilling.
2126.18.3	Master proper techniques for using hand tools, including maintaining a firm grip, applying even pressure, and using controlled movements.
2126.18.4	Learn to properly clean, maintain, and store hand tools to ensure longevity and optimal performance.
2126.19	Identify proper use of portable drills and drivers.
2126.19.1	Understand how to use drills for drilling holes and drivers for fastening hardware.
2126.19.2	Use a cordless drill with the appropriate drill bit to create holes for installing cabinet hardware or hinges.
2126.19.3	Use an impact driver with a Phillips or flathead bit to drive screws into wood for assembling cabinet frames or installing trim.
2126.19.4	Use a cordless drill/driver combo to install drawer slides by drilling pilot holes and driving screws to secure them to the cabinet sides.
2126.19.4	Use a cordless drill/driver to assemble cabinet components by driving screws into pre-drilled holes for joining panels or attaching trim pieces.
2126.19.5	Use a cordless drill with a paddle bit to create holes for cable routing or installing electrical outlets in cabinetry.
Stationary Power Equipment	
2126.20	Articulate proper use of stationary saws.
2126.20.1	Set-up and maintain a table saw and its accessories.
2126.20.2	Set-up and maintain a radial arm saw and its accessories.

2126.20.3	Set-up and maintain a band saw.
2126.20.4	Choose the correct type and size of blade for the material being cut and the type of cut required (rip, crosscut, or dado).
2126.20.5	Support large or heavy workpieces with auxiliary tables, roller stands, or outfeed supports to prevent tipping or binding during cutting.
2126.20.6	Stand to the side of the saw, not directly in line with the blade, to avoid potential injury from kickback or flying debris.
2126.20.7	Perform regular maintenance checks on the saw, including blade inspection, lubrication of moving parts, and adjustment of alignment and tension, to ensure optimal performance and safety.
2126.21	Demonstrate understanding of how to remove and replace stationary saw blades.
2126.21.1	Ensure the saw is off and unplugged, wear PPE.
2126.21.2	Removal: Loosen arbor nut/bolt. Slide off the old blade, noting washer/spacer orientation.
2126.21.3	Replacement: Choose a matching replacement blade. Slide new blade onto arbor, aligning keyholes/slots. Reinstall washers/spacers. Tighten arbor nut/bolt securely.
2126.21.4	Alignment and Tensioning: Check alignment, adjust if needed. Adjust tension as per manufacturer's instructions.
2126.21.5	Testing: Turn on the saw to check blade spin and perform a test cut on scrap material.
2126.22	Identify proper use of boring machines and tools.
2126.22.1	Tool Selection: Choose the right boring tool for the material and hole size. Ensure the tool is sharp and in good condition.
2126.22.2	Machine Setup: Adjust settings like speed and depth stop. Securely clamp the workpiece.
2126.22.3	Technique: Position the workpiece securely. Start the machine and apply steady pressure. Monitor the operation closely.
2126.22.4	Post-Drilling: Allow the machine to stop completely. Clean the area and perform maintenance checks.
2126.23	Select and use appropriate boring bits.
2126.23.1	Choose a bit suitable for the material and desired hole size.
2126.23.2	Match the bit type to the specific boring operation.
2126.23.3	Ensure the bit fits securely into the machine's chuck or collet.
2126.23.4	Keep bits clean and sharp and store them properly to prolong their lifespan.
2126.24	Identify proper use of planers and joiners.
2126.24.1	Setup: Adjust settings like depth and feed rate. Ensure sharp blades/cutters.
2126.24.2	Planer Use: Feed the workpiece evenly with the grain. Support long pieces to avoid sagging.
2126.24.3	Jointer Use: Flatten one face, then joint one edge. Use push blocks for guidance.
2126.24.4	Post-Milling: Wait for the machine to stop completely. Check milled surfaces for quality. Perform regular maintenance checks.
2126.25	Identify proper use of shapers and stationary routers.
2126.25.1	Setup: Adjust settings like speed and depth. Ensure sharp cutters/bits.
2126.25.2	Shaper Use: Select the right cutter head. Securely clamp the workpiece. Feed steadily into the cutter head.
2126.25.3	Stationary Router Use: Choose the correct router bit. Securely clamp the workpiece. Guide steadily along the router bit.
2126.25.4	Post-Operation: Wait for the machine to stop completely. Check the finished surfaces for quality. Perform regular maintenance checks.
2126.26	Identify proper use of stationary sanders
2126.26.1	Setup: Adjust settings for speed, angle, and height. Ensure the sanding belt/disc is securely mounted.

2126.26.2	Technique: Hold the workpiece firmly against the sanding surface. Move in the direction of the grain with even pressure and a steady feed rate. Use a push stick for smaller pieces.
2126.26.3	Material Consideration: Choose the right grit for the material and desired finish. Start with coarser grits and progress to finer ones.
2126.26.4	Post-Sanding: Wait for the machine to stop. Inspect the surface for quality. Clean the machine and work area.
2126.27	Prepare stock.
2126.27.1	Choose the right lumber or sheet material.
2126.27.2	Measure and cut the stock to required dimensions.
2126.27.3	Flatten and straighten one face of lumber or ensure clean edges for sheet materials.
2126.27.4	Further process stock as needed for specific components.
2126.27.5	Label and store stock in a dry area.

Assembly

2126.28	Identify types and uses of different clamps.
2126.28.1	Bar Clamps: For heavy-duty tasks like assembling cabinets.
2126.28.2	C-Clamps: Versatile for holding materials during gluing or welding.
2126.28.3	Pipe Clamps: Adjustable for woodworking projects.
2126.28.4	Spring Clamps: Quick and easy for light-duty tasks.
2126.28.5	Parallel Clamps: Precise alignment for fine woodworking.
2126.28.6	Toggle Clamps: Handy for securing workpieces during machining.
2126.28.7	Band Clamps: Flexible for irregularly shaped objects.
2126.28.8	Corner Clamps: Perfect for holding mitered corners in place.
2126.29	Identify methods of case construction.
2126.29.1	Frameless Construction: Panels joined without a face frame, maximizing interior space.
2126.29.2	Face Frame Construction: Solid wood frame attached to the front, offering traditional aesthetics.
2126.29.3	Dovetail Construction: Interlocking dovetail joints for strength, commonly used in drawer construction.
2126.29.4	Biscuit Joinery: Quick and efficient method using compressed wood biscuits and glue.
2126.29.5	Dowel Joinery: Wooden dowels and glue for strong and reliable joints.
2126.29.6	Pocket Screw Joinery: Angled pocket holes and screws for fast assembly.
2126.30	Identify various types of joinery.
2126.30.1	Dovetail Joint: Strong and decorative, commonly used in drawer construction.
2126.30.2	Mortise and Tenon Joint: Durable and versatile, ideal for frame construction.
2126.30.3	Rabbet Joint: Creates flush surfaces, often used in cabinet and door construction.
2126.30.4	Half-Lap Joint: Provides strength and alignment, common in frame and carcass construction.
2126.30.5	Butt Joint: Simplest form, often reinforced with dowels or screws.
2126.30.6	Biscuit Joint: Offers alignment and strength in panel glue-ups.
2126.30.7	Dowel Joint: Provides good alignment and clamping force.
2126.30.8	Box Joint (Finger Joint): Strong connection, used in box and drawer construction.
2126.31	Identify methods of face frame construction.
2126.31.1	Research traditional face frame construction.
2126.31.2	Research pocket screw face frame construction.
2126.31.3	Research biscuit joinery face frame construction.
2126.31.4	Research doweling face frame construction.

2126.32	Identify various styles of door construction.
2126.32.1	Examine the differences between framed and frameless door construction methods.
2126.32.2	Contrast traditional raised panel door construction with modern slab door construction.
2126.32.3	Evaluate the suitability of cope and stick joinery for cabinet doors compared to other joinery methods.
2126.32.3	Develop a portfolio of various door styles, including inset, overlay, and partial overlay designs.
2126.33	Identify various types of drawer construction.
2126.33.1	Compare and contrast dovetail joinery with dowel joinery for drawer construction.
2126.33.2	Analyze the differences between traditional drawer construction such as solid wood, plywood or MDF.
2126.33.3	Explore the benefits of using metal drawer slides versus wooden runners in drawer construction.
2126.33.4	Construct sample drawers using techniques such as rabbet joints, dado joints, and box joints.
2126.34	Identify types and uses of hardware and accessories.
2126.34.1	Explore different cabinet knobs, pulls, and handles, and their suitability for various styles and designs.
2126.34.2	Investigate hinges like concealed hinges for frameless cabinets and exposed hinges for traditional styles.
2126.34.3	Identify specialized hardware like soft-close drawer slides, lazy Susans, and pull-out trash bins.
2126.34.4	Evaluate decorative hardware accents, such as ornate backplates or escutcheons in cabinetry.
2126.34.5	Examine specialty hardware like drawer locks, magnetic catches, and adjustable shelf supports.
2126.35	Identify and use various fasteners.
2126.35.1	Experiment with various fasteners to understand their applications, strengths, and limitations.
2126.35.2	Select appropriate fasteners based on material, load requirements, and project specifications.
2126.35.3	Create a comprehensive inventory of fasteners, including screws, nails, bolts, and adhesives.
2126.35.4	Use fasteners such as wood screws, finish nails, brads, confirmat screws, dowels, shelf pins, cam locks, pocket screws, glues, and adhesives.

Finishing

2126.36	Identify types and uses of finishing materials
2126.36.1	Evaluate the characteristics and application methods of oil-based stains versus water-based stains.
2126.36.2	Compare the durability and sheen options of polyurethane varnish with lacquer finishes.
2126.36.3	Investigate the use of wood fillers and putties to repair imperfections in cabinetry surfaces.
2126.36.4	Experiment with different application tools, such as brushes, sprayers, and wiping cloths.
2126.36.5	Explore specialty finishing materials, such as distressing agents, glazes, and toners.
2126.37	Recall safe use and storage of finishing materials.
2126.37.1	Study MSDS for safety information on finishing materials.
2126.37.2	Use proper ventilation and protective gear when working with volatile substances.
2126.37.3	Store finishing materials securely to prevent accidents and maintain quality.
2126.37.4	Wear protective equipment like gloves and goggles during handling.
2126.38	Recall safe use of finishing tools and equipment
2126.38.1	Review safety guidelines for operating various finishing tools and equipment.
2126.38.2	Ensure proper grounding of electrical equipment, such as sanders and polishers.
2126.38.3	Practice routine maintenance and inspection of finishing tools and equipment.
2126.38.4	Use push sticks or featherboards when feeding wood through table saws or routers

Installation

2126.39	Determine how to install a base cabinet.
2126.39.1	Analyze the space and requirements for installing a base cabinet in a given area.

2126.39.2	Measure and mark the placement of the base cabinet, ensuring alignment with surrounding elements.
2126.39.3	Use screws or brackets to anchor the base cabinet to the wall studs or floor joists.
2126.39.4	Level the cabinet horizontally and vertically to ensure proper alignment and stability.
2126.39.5	Verify clearance for doors and drawers to open and close smoothly without obstruction.
2126.40	Determine how to install a wall cabinet.
2126.40.1	Assess the height and available wall space to determine the optimal location for installing a wall cabinet.
2126.40.2	Measure and mark the positions for mounting brackets or cleats, ensuring proper alignment and spacing.
2126.40.3	Use wall anchors or screws to reach studs securely, ensuring they are level and spaced appropriately.
2126.40.4	Position the wall cabinet onto the mounting hardware, ensuring it is level and securely attached.
2126.40.5	Verify clearance for doors and shelves and make adjustments for proper alignment.
2126.41	Identify industry standards for installation.
2126.41.1	Learn relevant codes and regulations set by the National Kitchen & Bath Association (NKBA) or Architectural Woodwork Institute (AWI).
2126.41.2	Review the Architectural Woodwork Standards (AWS) published by the AWI.
2126.41.3	Read cabinet manufacturer's literature to learn about industry standards, new products, and techniques.
2126.41.4	Ensure that installation adhere to building codes and regulations like structural integrity, electrical wiring, and plumbing connections.

Millwork and Cabinetmaking 2 will continue to build student skill sets in areas such as Shop Tools Used in Cabinetmaking; Joints; Assembling the Cabinet; and Sanding and Finishing. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organizations, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Milling

2127.1	Prepare rough stock
2127.1.1	Inspect rough stock for defects such as knots, splits, warping, or insect damage.
2127.1.2	Use a circular saw, handsaw, or chainsaw to cut the lumber into manageable lengths, depending on the intended use.
2127.1.3	Roughly size the lumber into smaller pieces using a chainsaw mill or bandsaw mill.
2127.1.4	Stack the rough-cut lumber with spacers between each layer to allow air circulation.
2127.1.5	Seal the ends of the lumber with wax, paint, or commercial end sealer.
2127.2	Use a jointer.
2127.2.1	Set up the jointer, ensuring the tables are aligned.
2127.2.2	Turn on the jointer and adjust the depth of cut.
2127.2.3	Place the wood on the infeed table, with the face to be flattened against the fence.
2127.2.4	Push the wood steadily across the jointer's bed, applying firm pressure.
2127.2.5	Check the flattened face for flatness.
2127.2.6	Repeat the process if necessary, alternating between faces.
2127.2.7	Optionally, joint the edges using the same method.
2127.2.8	Clean up the jointer and surrounding area after use.
2127.3	Understand thicknessing.
2127.3.1	Set up the thickness planer and adjust the cutter head height.
2127.3.2	Wear safety gear and inspect the lumber for defects.
2127.3.4	Adjust the feed rate and make an initial pass through the planer.
2127.3.5	Check the thickness and adjust the depth of cut as needed.
2127.3.6	Repeat passes until the desired thickness is achieved.
2127.3.7	Inspect and sand the planed surface if necessary.
2127.3.8	Check for uniformity across all pieces.
2127.3.9	Clean up the planer and surrounding area after use.
2127.4	Master rip cutting process.
2127.4.1	Set up the table saw with the rip fence parallel to the blade.
2127.4.2	Mark the desired width on the board.
2127.4.3	Position the board against the rip fence.
2127.4.4	Adjust the blade height slightly above the board.

2127.4.5	Turn on the saw and push the board through the blade.
2127.4.6	Keep hands clear and maintain a steady feed rate.
2127.4.7	Once cut, turn off the saw and inspect the edge.
2127.4.8	Sand if necessary and clean up the workspace.
2127.5	Master cross cutting process.
2127.5.1	Set up the table saw with the miter gauge or crosscut sled.
2127.5.2	Mark the desired length on the board.
2127.5.3	Position the board against the gauge or sled.
2127.5.4	Adjust the blade height slightly above the board.
2127.5.5	Turn on the saw and push the board through the blade.
2127.5.6	Keep hands clear and maintain a steady feed rate.
2127.5.7	Once cut, turn off the saw and inspect the end.
2127.6	Master profiling.
2127.6.1	Choose the desired router bit or shaping tool.
2127.6.2	Secure the wood and adjust the tool depth.
2127.6.3	Turn on the router or shaper.
2127.6.4	Feed the wood steadily against the tool rotation.
2127.6.5	Monitor the cut and adjust feed rate as needed.
2127.6.6	Once cut, turn off the tool and inspect the profile.
2127.6.7	Sand if necessary for a smooth finish.
2127.6.8	Clean up the workspace.
2127.7	Utilize joinery techniques.
2127.7.1	Practice joinery techniques to include dovetail, mortise and tenon, dado, rabbet, biscuit, pocket hole, dowel, half-lap and tongue and groove joints.
2127.7.2	Plan the joint type and design.
2127.7.3	Select suitable wood and prepare it.
2127.7.4	Mark and measure for accuracy.
2127.7.5	Cut joint components precisely.
2127.7.6	Dry-fit and adjust for a snug fit.
2127.7.7	Apply adhesive and assemble the joint.
2127.7.8	Clamp to hold pieces together while drying.
2127.7.9	Sand and finish as desired.
2127.7.10	Test for strength and inspect for quality.
2127.8	Use drilling and boring techniques.
2127.8.1	Select the right drill bit or boring tool.
2127.8.2	Mark the hole locations accurately.
2127.8.3	Drill straight and steady.
2127.8.4	Adjust depth as needed.
2127.8.5	Clean up debris after drilling.
2127.8.6	Test-fit components.
2127.8.7	Finish the wood surface.
2127.9	Demonstrate the assembly process.
2127.9.1	Prepare components and tools.
2127.9.2	Dry-fit pieces to check alignment.
2127.9.3	Apply glue evenly on mating surfaces.

2127.9.4	Join pieces together, applying pressure.
2127.9.5.	Use fasteners for reinforcement.
2127.9.6	Wipe away excess glue and let dry.
2127.9.7	Sand and finish the assembly.
2127.9.8	Test for strength and stability.
2127.10	Demonstrate the sanding process.
2127.10.1	Prepare the wood surface by ensuring it's clean.
2127.10.2	Choose the appropriate grit sandpaper.
2127.10.3	Sand in the direction of the wood grain.
2127.10.4	Start with coarse grit and progress to finer grits.
2127.10.5	Check progress periodically.
2127.10.6	Pay attention to edges and corners.
2127.10.7	Clean the surface after sanding.
2127.10.8	Apply a finish after sanding.
2127.11	Demonstrate the finishing process.
2127.11.1	Prepare the wood surface by sanding and cleaning it.
2127.11.2	Choose and apply the desired finish evenly.
2127.11.3	Allow each coat to dry according to the manufacturer's instructions.
2127.11.4	Sand between coats for a smoother finish.
2127.11.5	Inspect and touch up any imperfections.
2127.11.6	Allow the finish to fully cure before use.
2127.12	Install finished product.
2127.12.1	Prepare the installation area.
2127.12.2	Gather tools and hardware.
2127.12.3	Measure and mark the installation location.
2127.12.4	Securely attach the product.
2127.12.5	Check alignment and stability.
2127.12.6	Inspect for defects.

Sanding and Finishing

2127.13.1	Distinguish between different grits and types of abrasives.
2127.13.2	Use course grit (60-100) for heavy material removal and shaping rough surfaces.
2127.13.3	Use medium grit (120-180) for general sanding tasks like smoothing surfaces and removing scratches.
2127.13.4	Use fine grit (220-400) for finishing and achieving smooth surfaces.
2127.13.5	Use aluminum oxide for sanding wood, metal, and plastic.
2127.13.6	Use silicon carbide for harder metals, glass, and stone.
2127.13.7	Use zirconia alumina for heavy-duty or industrial applications.
2127.13.8	Use garnet for finishing and polishing wood.
2127.14	Practice sanding operations with different types of machines and tools.
2127.14.1	Practice hand sanding for basic control.
2127.14.2	Use an orbital sander for larger surfaces.
2127.14.3	Use random orbital sanders for versatility.
2127.14.4	Use a belt sander for aggressive material removal.
2127.14.5	Use a detail sander for intricate areas.

2127.14.6	Use a spindle sander for curved surfaces.
2127.14.7	Use a disc sander for edge refinement.
2127.14.8	Use combination machines for versatility.
2127.15	Remove excess glue and dust.
2127.15.1	Scrape off excess glue with a putty knife.
2127.15.2	Sand the surface with fine-grit sandpaper.
2127.15.3	Vacuum or brush away dust.
2127.15.4	Wipe with a damp cloth to remove residue.
2127.15.5	Allow to dry completely before finishing.
2127.16	Fill and finish nail and screw holes.
2127.16.1	Apply wood filler to holes.
2127.16.2	Smooth excess filler.
2127.16.3	Let dry completely.
2127.16.4	Sand surface smooth.
2127.16.5	Apply finish or paint as needed.
2127.17	Install wood plugs in prepared holes.
2127.17.1	Use a drill or chisel to create holes of the appropriate size and depth for the wood plugs.
2127.17.2	Apply a small amount of wood glue to the inside of each hole before inserting the wood plugs.
2127.17.3	Place wood plug into hole, ensuring that it fits snugly and is flush with the surface of the wood.
2127.17.4	Tap plugs into place.
2127.17.5	Use fine-grit sandpaper to sand the surface of the wood flush with the plugs.
2127.17.6	Apply finish or paint to the wood surface.
2127.18	Swell a wood dent.
2127.18.1	Apply moisture with a damp cloth.
2127.18.2	Place cloth over entire dent.
2127.18.3	Apply heat with an iron or hairdryer on low heat.
2127.18.4	Allow wood to absorb moisture for several hours.
2127.18.5	Repeat as needed.
2127.18.6	Sand and refinish.
2127.19	Set up and maintain finish application devices and machinery.
2127.19.1	Setup: Follow manufacturer's instructions, assemble components, adjust settings.
2127.19.2	Testing: Conduct test runs on scrap wood, adjust settings.
2127.19.3	Maintenance: clean regularly, lubricate moving parts, check for wear and tear, calibrate properly, store properly.
2127.19.4	Safety: Follow manufacturer's guidelines, use PPE, turn off and unplug when not in use.
2127.20	Apply fillers, stains, sealers, and a variety of surface finishes.
2127.20.1	Prepare the surface by cleaning and sanding.
2127.20.2	Apply fillers if needed and let dry.
2127.20.3	Apply stains for color if desired, then wipe off excess.
2127.20.4	Apply sealers for protection.
2127.20.5	Apply surface finishes like varnish or polyurethane.
2127.20.6	Let each layer dry according to instructions.
2127.20.7	Sand lightly between coats if necessary.
2127.20.8	Inspect and touch up as needed.
2127.21	Troubleshoot spray gun problems.

2127.21.1	Clogging: Clean the nozzle and parts thoroughly with a suitable solvent.
2127.21.2	Uneven Spray Pattern: Adjust air pressure, clean the nozzle, and adjust settings for a consistent pattern.
2127.21.3	Leaks: Tighten fittings, replace damaged seals, and ensure proper assembly.
2127.21.4	Poor Atomization: Check paint viscosity, adjust settings, and ensure the gun is clean.
2127.21.5	Air Pressure Issues: Check compressor, adjust regulator, and repair leaks.
2127.21.6	Electrical Issues (HVLP guns): Check power source, inspect components, and replace faulty parts.
2127.21.7	Improper Technique: Practice correct spraying distance and technique for smoother results.
2127.22	Troubleshoot fish eyes, runs, orange peel, and other finish problems.
2127.22.1	Fisheyes: Clean surface thoroughly and avoid contaminants.
2127.22.2	Runs or Sags: Apply thinner coats, adjust viscosity, and maintain proper distance.
2127.22.3	Orange Peel: Adjust air pressure, viscosity, and spraying technique.
2127.22.4	Bubbles or Blistering: Ensure proper surface prep, compatible coatings, and drying conditions.
2127.22.5	Cracking or Checking: Use compatible coatings, thinner coats, and avoid rapid temperature changes.
2127.22.6	Lifting or Delamination: Prep surfaces properly, use compatible coatings, and allow adequate drying time.
2127.22.7	Staining or Discoloration: Clean surfaces, mix coatings properly, and test compatibility.
2127.23	Employ clean up and disposal operations that are OSHA compliant.
2127.23.1	Promptly clean up spills using spill kits or absorbent materials.
2127.23.2	Avoid dry sweeping and use wet methods or vacuum cleaners with HEPA filters.
2127.23.3	Segregate and label hazardous waste properly before disposal.
2127.23.4	Store hazardous materials in designated areas away from other workspaces.
2127.23.5	Follow proper procedures for storing chemicals and ensure containers are sealed and labeled correctly.
2127.23.6	Provide training on cleanup procedures, PPE usage, and hazard reporting.
2127.23.7	Maintain clear communication channels for reporting incidents.
2127.23.8	Develop an emergency response plan, evacuation procedures and equipment usage.
2127.23.9	Keep records of cleanup activities, training, and incidents for documentation and compliance purposes.

Cabinet Assembly

2127.24	Assemble cabinet components using a variety of clamps and clamping techniques.
2127.24.1	Gather components, clamps, glue, and fasteners.
2127.24.2	Ensure components fit well before gluing.
2127.24.3	Apply glue evenly on mating surfaces.
2127.24.4	Use appropriate clamps for joints and assemblies.
2127.24.5	Tighten clamps gradually and evenly.
2127.24.6	Ensure components remain square and flush.
2127.24.7	Reinforce joints with screws or dowels after glue dries.
2127.24.8	Clean surfaces before finishing.
2127.24.9	Check for imperfections before finalizing assembly.
2127.25	Assemble components using dowels, biscuits, and wood joints.
2127.25.1	Gather materials and tools, including wood components, dowels, biscuits, and appropriate equipment.
2127.25.2	Mark and align the components for joining.
2127.25.3	Drill matching holes, apply glue, insert dowels, and clamp components together.
2127.25.4	Cut slots, apply glue, insert biscuits, and clamp components together for biscuit joinery.
2127.25.5	Cut components to appropriate angles, apply glue, assemble, and reinforce if needed for wood joints.
2127.25.6	Let the glue dry completely as per manufacturer's instructions.
2127.25.7	Inspect for any imperfections before finishing with paint, stain, or varnish.

2127.26	Construct cabinet components with and without glue and fastening devices.
2127.26.1	Gather materials and tools.
2127.26.2	Ensure components fit and mark alignment points.
2127.26.3	With glue:
2127.26.4	-Glue mating surfaces.
2127.26.5	-Secure components with screws, nails, or dowels.
2127.26.6	-Use clamps and allow glue to dry.
2127.26.7	-Check for gaps and add extra fasteners if necessary.
2127.26.8	Without glue:
2127.26.9	-Use dadoes, rabbets, or tongue and groove.
2127.26.10	-Dry fit components and secure with clamps.
2127.26.11	-Add reinforcing blocks or braces if needed.
2127.26.12	-Check for gaps or misalignments and adjust as needed.
2127.27	Install hardware pulls, knobs, and hinges.
2127.27.1	Gather screws, screwdriver, drill, and the hardware (pulls, knobs, hinges).
2127.27.2	Use a measuring tape and pencil to mark where the hardware will be installed.
2127.27.3	Drill pilot holes at the marked locations using a drill with a slightly smaller bit than the screws.
2127.27.4	Place the hardware over the drilled holes and secure with screws using a screwdriver.
2127.27.5	Mark and drill pilot holes for hinge plates on the cabinet and door.
2127.27.6	Attach the hinge plates and hinges, ensuring proper alignment.
2127.27.7	Verify alignment and functionality by opening and closing doors and drawers.
2127.27.8	Make any necessary adjustments for smooth operation.
2127.27.9	Inspect the installed hardware for any loose screws or misalignment.
2127.27.10	Tighten screws and make final adjustments as needed.
2127.28	Install trim, molding, glass panels, surface laminates and covers.
2127.28.1	Gather all needed materials and tools.
2127.28.2	Measure and cut trim, molding, glass panels, laminates, or covers to fit.
2127.28.3	Apply adhesive and secure with nails or screws.
2127.28.4	Secure glass panels using clips or adhesive.
2127.28.5	Clean surfaces, apply adhesive, and press laminate sheets into place.
2127.28.6	Secure covers with adhesive or screws.
2127.28.7	Check for gaps or imperfections and make necessary adjustments.

Countertop Laminate

2127.29	Install plastic laminate on a countertop core.
2127.29.1	Gather the plastic laminate sheets, contact cement, roller, or brush for applying cement, utility knife, router with a flush trim bit, file or sandpaper, and masking tape.
2127.29.2	Ensure the countertop core is clean, dry, and free of any debris.
2127.29.3	If the core is not already cut to size, trim it to fit the countertop space.
2127.29.4	Cut the laminate to slightly larger dimensions than countertop core, leaving some overhang on all sides.
2127.29.5	Apply contact cement to the countertop core and the backside of the laminate using a roller or brush.
2127.29.6	Follow the manufacturer's instructions for the drying time of the cement.
2127.29.7	Once contact cement is dry, position the laminate onto the countertop core, ensuring proper alignment and leaving overhang on all sides.
2127.29.8	Use a roller to firmly press the laminate onto the countertop core, ensuring good adhesion.

2127.29.9	Work from the center outwards to remove any air bubbles and ensure a smooth surface.
2127.29.10	Use a router with a flush trim bit to trim the excess laminate flush with the edges of the countertop core or use a utility knife to score the excess laminate and then carefully snap it off.
2127.29.11	Finish by filing or sanding the edges to smooth out any roughness.
2127.29.12	Apply edge banding to cover the exposed edges of the countertop laminate.
2127.29.13	Use contact cement to adhere the edge banding, and trim it to size with a utility knife or scissors.
2127.29.14	Inspect the installed laminate for any imperfections or areas that need touch-ups.
2127.29.15	Clean up any excess cement or debris from the countertop surface.
2127.30	Layout and cut countertops, backsplashes, trim and molding.
2127.30.1	Gather materials and tools needed: countertop material, backsplash material, trim, measuring tape, straight edge, pencil, saw (circular saw or jigsaw), router, safety equipment.
2127.30.2	Measure and mark dimensions on countertop and backsplash material.
2127.30.3	Use a saw to cut countertop and backsplash material according to layout marks.
2127.30.4	Measure and cut trim and molding pieces as needed.
2127.30.5	Test fit pieces and make adjustments as necessary for a perfect fit.
2127.30.6	Apply adhesive or caulk and install countertops, backsplashes, trim, and molding.
2127.30.7	Inspect installation for imperfections and clean up any excess adhesive or debris.

Millwork and Cabinetmaking 3 will continue to build student skill sets in areas of Applying Plastic Laminate to a Countertop; Cabinet Doors; and Cabinet Drawers. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organizations, WV SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Estimating and Measuring

2128.1	Calculate quantities.
2128.1.1	Utilize industry-standard formulas to calculate quantities of materials required for projects.
2128.1.2	Apply appropriate conversion factors to convert measurements between different units (e.g., feet to inches) for accurate material estimation.
2128.1.3	Interpret architectural drawings and specifications to identify all relevant dimensions and components for estimating material quantities.
2128.1.4	Implement digital tools and software, such as CAD programs or specialized estimating software, to streamline the process of calculating material quantities.
2128.1.5	Collaborate with project stakeholders, including architects, contractors, and clients, to clarify project requirements and ensure accurate estimation of millwork materials.
2128.2	Estimate labor and material costs.
2128.2.1	Utilize labor rate schedules and industry benchmarks to estimate labor costs.
2128.2.2	Calculate material costs by researching current prices of lumber, hardware, and finishing materials from suppliers and vendors.
2128.2.3	Consider additional expenses such as transportation, permits, and subcontractor fees when estimating overall project costs.
2128.2.4	Apply markup percentages to labor and material costs to account for overhead, profit margins, and unforeseen expenses.
2128.2.5	Regularly review and update cost estimates based on market fluctuations, project changes, and feedback from completed projects.

Blueprints, Drawings and Plans

2128.3	Read and interpret blueprints, drawings, and plans.
2128.3.1	Analyze floor plans to identify locations for built-in cabinetry like kitchen islands or custom shelving units.
2128.3.2	Convert blueprint dimensions for a wall cabinet into specific measurements for panel cutting and joinery.
2128.3.3	Recognize symbols denoting electrical outlets or plumbing fixtures to ensure proper clearance in cabinetry design.
2128.3.4	Check blueprint dimensions against ANSI/KCMA standards to ensure cabinets meet durability and performance requirements.

2121.3.5	Collaborate with project stakeholders to address design discrepancies and ensure alignment between blueprint specifications and client expectations.
2128.4	Draw a detailed plan and sectional drawings.
2128.4.1	Draft a floor plan showing the arrangement of kitchen cabinetry, including base cabinets, wall cabinets, and appliance placements.
2128.4.2	Produce elevation drawings showcasing the profile of custom-built bookshelves, including shelf spacing and decorative moldings.
2128.4.3	Draw a sectional view of a built-in closet system, revealing shelf supports, drawer slides, and back paneling details.
2128.4.4	Label dimensions on plan views and elevation drawings to guide carpenters in accurately cutting materials for cabinetry construction.
2128.4.5	Review drawings with interior designers to finalize details such as hardware selection and decorative accents for custom millwork installations.
2128.5	Draw orthographic and isometric sketches of geometric shapes.
2128.5.1	Create orthographic sketches of a rectangular prism to demonstrate front, side, and top views.
2128.5.2	Draw an isometric sketch of a pyramid to depict its three-dimensional form with equal foreshortening along each axis.
2128.5.3	Shade one side of an isometric cube to represent the effects of light and shadow, enhancing the perception of depth.
2128.5.4	Create orthographic sketches of a kitchen cabinet, including front, side, and top views, to convey precise dimensions and detailing.
2128.5.5	Label dimensions on orthographic views of a bookshelf to indicate the height, width, and depth of individual shelves and compartments.
2128.6	Formulate a bill of materials.
2128.6.1	Develop a bill of materials for a custom kitchen cabinet project, including hardwood plywood for panels, solid wood for frames, and hardware such as hinges and drawer slides.
2128.6.2	Determine the amount of hardwood lumber required for cabinetry construction, factoring in allowances for cutting and shaping, as well as potential defects.
2128.6.3	Choose high-quality veneer plywood for cabinet carcasses, balancing cost-effectiveness with aesthetic appeal and structural integrity.
2128.6.4	Specify the grade and thickness of plywood sheets for cabinet panels, along with desired surface finishes such as laminate or veneer.
2128.6.5	Request quotes from multiple suppliers for hardware components such as knobs and pulls, comparing prices and lead times to optimize procurement decisions.
2128.7	Estimate labor and material costs.
2128.7.1	Estimate labor costs for constructing and installing custom kitchen cabinets based on project blueprints and complexity.
2128.7.2	Calculate material costs for a built-in bookcase project by obtaining quotes for hardwood lumber, edge banding, and shelf supports.
2128.7.3	Include costs for delivery of materials and equipment rental fees in the overall project estimate for a custom millwork installation.
2128.7.4	Add a 15% markup to the total labor and material costs to cover overhead expenses and ensure profitability.
2128.7.5	Adjust labor and material cost estimates for a cabinetry renovation project based on updated quotes from suppliers and changes in project requirements.

Cabinet Components

2128.8	Distinguish between traditional, provincial, and contemporary designs.
2128.8.1	Recognize traditional cabinetry features like inset door panels and turned wood legs commonly found in classic kitchen designs.
2128.8.2	Distinguish provincial cabinetry with its weathered appearance, beadboard paneling, and vintage-inspired hardware, typical of farmhouse kitchens.
2128.8.3	Identify contemporary cabinetry styles showcasing flat-panel doors, handle less designs, and high-gloss finishes, reflecting modern kitchen trends.
2128.8.4	Explore the influence of European craftsmanship on traditional cabinetry styles, while considering the practicality and simplicity inherent in provincial designs.
2128.8.5	Tailor cabinetry designs to complement the architectural features of a Victorian-era home, opting for traditional detailing and finishes to maintain historical integrity.
2128.9	Layout and cut cabinet frame components using various joints.
2128.9.1	Measure and mark solid wood stiles and rails for a cabinet door frame to ensure precise dimensions and fit.
2128.9.2	Choose a mortise and tenon joint for assembling cabinet face frames, providing strong and durable connections between vertical and horizontal members.
2128.9.3	Set up and operate woodworking tools including table saws, routers, and chisels to cut joinery and shape cabinet frame components.
2128.9.4	Dry-fit cabinet face frame components together to check for squareness and proper alignment before gluing.
2128.9.5	Apply woodworking techniques such as edge profiling or chamfering to add decorative details to cabinet frame components.
2128.10	Layout and cut end, bottom, and top panels.
2128.10.1	Measure and mark end, bottom, and top panels accurately according to design specifications and project dimensions.
2128.10.2	Set up and calibrate woodworking tools such as table saws or circular saws to ensure accurate and clean cuts on panel materials.
2128.10.3	Use appropriate cutting techniques, such as cross-cutting or ripping, to accurately cut panels to size while minimizing waste.
2128.10.4	Apply edge banding to exposed edges of panels to provide a finished appearance and protect against moisture ingress.
2128.10.5	Dry-fit all panels together to ensure proper alignment and fit before attaching them to the cabinet frame, making any necessary adjustments as needed.

Cabinet Doors and Door Hardware

2128.11	Layout and cut cabinet doors.
2128.11.1	Measure and mark door components accurately on chosen material, considering design specifications and project requirements.
2128.11.2	Set up and calibrate woodworking tools like table saws or router tables to ensure precise and clean cuts on door materials.
2128.11.3	Select appropriate joinery techniques, such as mortise and tenon or cope and stick joints, based on the desired style and structural integrity of the cabinet doors.
2128.11.4	Use specialized router bits or shaper cutters to profile door edges and panels, adding decorative details and enhancing aesthetics.

2128.11.5	Verify the accuracy of door dimensions and fit through test-fitting and dry assembly before final assembly and attachment to the cabinet frame.
2128.12	Select and install hardware for cabinet doors and drawers.
2128.12.1	Evaluate hardware options such as hinges, drawer slides, knobs, and pulls based on design aesthetics, functionality, and compatibility with cabinet construction.
2128.12.2	Measure and mark locations for hardware installation on cabinet doors and drawers, ensuring proper alignment and spacing for functional and aesthetic purposes.
2128.12.3	Utilize appropriate tools and techniques, such as drilling jigs or templates, to accurately install hardware on cabinet surfaces without damaging the material.
2128.12.4	Attach hardware securely to cabinet doors and drawers using screws or fasteners provided with the hardware, ensuring firm and stable installation.
2128.12.5	Test hardware functionality and adjust as necessary to ensure smooth operation and proper alignment of cabinet doors and drawers.

Cabinet Drawers

2128.13	Layout and cut drawers.
2128.13.1	Measure and mark drawer components accurately on chosen material, considering design specifications and project requirements.
2128.13.2	Set up and calibrate woodworking tools like table saws or circular saws to ensure precise and clean cuts on drawer materials.
2128.13.3	Select appropriate joinery techniques, such as dovetail or box joints, based on the desired strength and aesthetics of the drawer construction.
2128.13.4	Use dado blades or router jigs to cut grooves and recesses for drawer bottoms and assembly, ensuring a snug fit and secure construction.
2128.13.5	Verify the accuracy of drawer dimensions and fit through test-fitting and dry assembly before final assembly and attachment to the cabinet frame.
2128.14	Install drawers into cabinets.
2128.14.1	Position drawer slides accurately within the cabinet frame, ensuring alignment with drawer openings and smooth operation.
2128.14.2	Attach drawer slide hardware securely to both the cabinet frame and drawer box using provided screws or fasteners.
2128.14.3	Test drawer slide functionality by sliding the drawer box in and out of the cabinet frame, checking for smooth movement and proper alignment.
2128.14.4	Install drawer fronts onto drawer boxes using appropriate hardware such as screws or adhesive, ensuring proper alignment and spacing.
2128.14.5	Verify the fit and alignment of installed drawers within the cabinet frame, making any final adjustments to ensure uniformity and functionality.

Cabinet Shelves and Shelf Hardware

2128.15	Manufacture cabinet shelves.
2128.15.1	Measure and mark shelf dimensions accurately on chosen material, accounting for cabinet interior dimensions and desired shelf spacing.
2128.15.2	Set up and calibrate woodworking tools like table saws or circular saws to ensure precise and clean cuts on shelf materials.

2128.15.3	Cut shelf components to size using appropriate cutting techniques, such as cross-cutting or ripping, to achieve the desired dimensions.
2128.15.4	Apply edge banding to exposed edges of shelves to provide a finished appearance and protect against moisture ingress.
2128.15.5	Test-fit shelves within the cabinet carcass to verify proper fit and alignment, making any necessary adjustments before final installation.
2128.16	Select and install hardware for cabinet shelves.
2128.16.1	Evaluate hardware options such as shelf pins, brackets, and supports based on shelf material, load capacity, and installation method.
2128.16.2	Measure and mark locations for hardware installation on the interior sides of the cabinet carcass, ensuring proper alignment and spacing for shelf placement.
2128.16.3	Utilize appropriate tools and techniques, such as drilling guides or templates, to accurately install shelf hardware without damaging the cabinet material.
2128.16.4	Attach shelf hardware securely to the cabinet sides using screws or fasteners provided with the hardware, ensuring firm and stable installation.
2128.16.5	Test the stability and functionality of installed shelf hardware by placing shelves onto the supports and applying pressure to ensure they can bear the intended load.

Mass Production Cabinetmaking

2128.17	Research how cabinets are mass produced.
2128.17.1	Study manufacturing processes employed by large-scale cabinet manufacturers, including automated cutting, machining, and assembly techniques.
2128.17.2	Research how CNC (Computer Numerical Control) machines are used to precisely cut and shape cabinet components from sheet materials like plywood or MDF.
2128.17.3	Explore the use of specialized machinery for edge banding, drilling, and hardware insertion in mass production facilities to streamline cabinet assembly.
2128.17.4	Study how cabinets are assembled in a series of sequential steps on an assembly line, with each worker responsible for a specific task.
2128.17.5	Investigate the integration of technology and automation, such as robotics and computerized inventory systems, to enhance productivity and quality control.
2128.17.6	Examine supply chain management practices and material sourcing strategies utilized by mass production cabinet manufacturers to ensure consistent quality and timely delivery.
2128.18	Mass produce a small cabinet.
2128.18.1	Design a standardized cabinet prototype using CAD software, specifying dimensions, materials, and construction methods for efficient mass production.
2128.18.2	Design a small wall-mounted cabinet with standardized dimensions and simple joinery techniques suitable for mass production.
2128.18.3	Develop plans, drawings and layouts of cabinet and components.
2128.18.4	Optimize material usage and cutting layouts to minimize waste and maximize efficiency in production processes.
2128.18.5	Arrange cabinet components on sheet materials to minimize material waste during CNC cutting and machining.
2128.18.6	Set up and program CNC machines to accurately cut and shape cabinet components from sheet materials like plywood or MDF.

2128.18.7	Implement assembly line techniques and standardized workflows to streamline cabinet assembly processes.
2128.18.8	Conduct quality control checks at various stages of production to ensure consistency and compliance with design specifications.
2128.18.9	Inspect finished cabinets for dimensional accuracy, alignment of components, and overall quality before packaging and shipment.

Millwork and Cabinetmaking 4 will continue to build student skill sets in areas of Cabinet Doors and Drawer Hardware; Cabinet Shelves and Shelf Hardware; and Mass Production Cabinetmaking.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

History of Apprenticeship

2129.1	Identify how apprenticeships are used for exploitation.
2129.1.1	Identify signs of exploitation in apprenticeship programs, such as inadequate wages, excessive working hours, and unsafe working conditions.
2129.1.2	Research instances of exploitation in apprenticeship programs to labor departments or trade unions for investigation and intervention.
2129.1.3	Explore resources and support to apprentices facing exploitation, including legal assistance and access to confidential reporting channels.
2129.1.4	Understand apprenticeship rights and entitlements under labor laws and apprenticeship agreements.
2129.2	Research examples of early apprenticeships.
2129.2.1	Illustrate how early apprenticeships provided hands-on training and mentorship.
2129.2.2	Research early apprenticeships in fields such as blacksmithing, carpentry, textiles, and shipbuilding.
2129.2.3	Identify tasks performed in early apprenticeships.
2129.3	Discuss apprenticeship expansion in the Industrial Revolution.
2129.3.1	Explore apprenticeship programs in 19th-century furniture factories.
2129.3.2	Explore how apprentices learned to operate spinning frames, looms, and other machinery crucial to the industrial production of textiles.
2129.3.3	Discuss how apprentices learned carpentry skills for framing, roofing, and finishing work on residential and commercial buildings.
2129.3.4	Research apprenticeships in mechanical engineering to train workers in designing and maintaining steam engines, pumps, and other mechanical systems crucial to industrial production.
2129.4	Explore modern apprenticeship programs.
2129.4.1	Explore Apprenticeship In Motion (AIM).
2129.4.2	Review regional workforce development boards.
2129.4.3	Explore WorkForce WV website.
2129.5	Increase support of apprenticeship programs.
2129.5.1	Research government funding and incentives for apprenticeship programs.
2129.5.2	Explore the Woodwork Career Alliance (WCA).
2129.5.3	Establish partnerships with local vocational schools, community colleges, and technical institutes to offer classroom instruction and technical training as part of apprenticeship programs.

Unions and Apprenticeship Programs

2129.6	Explore pre-job training.
2129.6.1	Conduct an assessment of apprentice skill levels and knowledge gaps to tailor pre-job training programs to meet individual needs and prepare apprentices for on-the-job tasks.

2129.6.2	Create online tutorials or workshops that introduce apprentices to common woodworking tools and equipment, emphasizing proper usage and maintenance practices.
2129.6.3	Conduct classroom sessions where apprentices learn to interpret cabinet drawings and translate design specifications into cutting lists and assembly instructions.
2126.6.4	Arrange field trips to local cabinetmaking shops where apprentices can observe journeymen craftsmen fabricating and installing custom cabinetry, providing context for pre-job training topics.
2129.7	Working on the jobsite.
2129.7.1	Assist with site preparation tasks such as material handling, setup of workstations, and safety measures to ensure a productive and safe work environment.
2129.7.2	Collaborate with journeymen and experienced craftsmen to perform assigned tasks such as measuring, cutting, and fitting cabinetry components according to project specifications.
2129.7.3	Communicate effectively with team members and supervisors to receive instructions, provide progress updates, and address any challenges or concerns encountered on the jobsite.
2129.7.4	Apply woodworking techniques and skills learned during apprenticeship training to execute tasks such as installing cabinets, applying finishes, and making adjustments to ensure quality craftsmanship.
2129.7.5	Follow established safety protocols and regulations to mitigate risks and prevent accidents on the jobsite, including wearing appropriate personal protective equipment (PPE) and adhering to safe work practices.
2129.7.6	Ensure a clean work environment.
2129.8	Working with your supervisor and others.
2129.8.1	Collaborate with supervisors and team members to understand project objectives, timelines, and expectations, ensuring alignment with company standards and client requirements.
2129.8.2	Seek guidance and clarification from supervisors when faced with uncertainties or challenges, demonstrating a willingness to learn and improve skills through mentorship.
2129.8.3	Communicate effectively with supervisors and colleagues to provide progress updates, share insights, and address any issues or obstacles encountered during work assignments.
2129.8.4	Actively participate in team meetings, brainstorming sessions, and training opportunities to contribute ideas, share expertise, and foster a collaborative work environment.
2129.8.5	Demonstrate professionalism, respect, and a positive attitude when interacting with supervisors and coworkers, fostering a supportive and inclusive workplace culture conducive to productivity and growth.
2129.9	Decreasing harassment and discrimination.
2129.9.1	Report instances of harassment or discrimination to human resources or management, following established procedures for filing complaints and seeking resolution.
2129.9.2	Support coworkers who have experienced harassment or discrimination by offering empathy, solidarity, and resources for accessing support services or legal assistance.
2129.9.3	Set clear boundaries and assertively communicate expectations for respectful behavior in the workplace, addressing any instances of harassment or discrimination promptly and directly.
2129.9.4	Advocate for policy changes and organizational measures to prevent harassment and discrimination, such as implementing anti-bullying policies.

Apprenticeship Readiness

2129.10	Obtain the qualities of a successful apprentice.
2129.10.1	Arrive on time each day and give your full attention to all assigned tasks.
2129.10.2	Be open to learning new skills and techniques.
2129.10.3	Communicate effectively and collaborate with colleagues.

2129.10.4	Pay attention to detail and strive for quality in your work.
2129.10.5	Maintain a positive attitude and respect for others.
2129.11	Interviewing for apprenticeships in construction.
2129.11.1	Research the company and role, preparing to discuss your interest in woodworking and construction apprenticeship.
2129.11.2	Emphasize relevant skills and experiences, showcasing your enthusiasm for learning and working with wood.
2129.11.3	Ask thoughtful questions about the apprenticeship program and express eagerness to develop new skills under mentorship.
2129.11.4	Communicate clearly and professionally, demonstrating your reliability and commitment to contributing to the construction team.
2129.11.5	Dress appropriately and thank the interviewer for their time and consideration.
2129.12	Interviewing tips for construction apprenticeships.
2129.12.1	Be honest and authentic in your responses.
2129.12.2	Prepare for technical questions related to construction.
2129.12.3	Highlight your potential and willingness to learn.
2129.12.4	Prepare a portfolio of your work on various projects.
2129.13	Practice common interview questions.
2129.13.1	Why are you interested in pursuing a career in millwork and cabinetry?
2129.13.2	Can you tell us about any previous experience or skills you have that are relevant to woodworking or construction?
2129.13.3	What do you know about our company and the types of projects we specialize in?
2129.13.4	Describe a woodworking project you completed successfully. What was your role, and what challenges did you face?
2129.13.5	How do you prioritize safety in a workshop environment? Can you provide examples of safety protocols you follow?
2129.13.6	What are your long-term career goals, and how do you see this apprenticeship fitting into your plans?
2129.13.7	What do you hope to gain from this apprenticeship, and how do you plan to contribute to our team?
2129.14	Complete a project portfolio.
2129.14.1	Compile images of custom cabinets, furniture pieces, or woodworking projects you've completed, along with detailed notes on materials used and techniques applied.
2129.14.2	Create an online portfolio showcasing your woodworking projects, categorized by type (e.g., cabinets, furniture) and including descriptions of each project's scope and specifications.
2129.14.3	Showcase innovative design elements, intricate joinery techniques, or custom finishes that set your work apart and illustrate your proficiency
2129.14.4	Document the stages of a kitchen remodel, from initial layout and planning to construction and final installation, to showcase your involvement and expertise in the project's execution.
2129.14.5	Regularly add new projects to your portfolio and remove outdated or less relevant entries.

Apprenticeship Awareness

2129.15	Identify the basics of apprenticeships
2129.15.1	Research on-the-job training: Apprentices work alongside experienced professionals in a real-world setting, gaining hands-on experience and learning practical skills relevant to the trade.

2129.15.2	Understand the classroom instruction: Apprentices attend formal classes, workshops, or technical training sessions to supplement their on-the-job learning. These sessions cover theoretical knowledge, safety protocols, and industry best practices.
2129.15.3	Explore mentorship: Apprentices are assigned a mentor or supervisor who provides guidance, support, and feedback throughout their training. Mentors share their expertise, offer instruction, and oversee the apprentice's progress.
2129.15.4	Develop progressive skill development: Apprenticeships are structured to allow for gradual skill development, starting with basic tasks and progressing to more complex responsibilities as the apprentice gains experience and proficiency.
2129.15.5	Research certification or credentialing: Upon completing the apprenticeship program and meeting specified requirements, apprentices may receive a certificate, diploma, or industry-recognized credential that verifies their competency in the trade.
2129.15.6	Discuss duration: Apprenticeships typically have a fixed duration, ranging from one to five years depending on the complexity of the trade and the requirements of the program.
2129.15.7	Make a plan for employment: Apprentices are typically employed by a company or organization throughout the duration of their apprenticeship, receiving wages or a stipend that may increase as they progress through the program.
2129.15.8	Understand Regulation: Apprenticeship programs may be regulated by government agencies, industry associations, or trade unions to ensure adherence to quality standards, safety regulations, and equitable treatment of apprentices.
2129.16	Explore benefits of apprenticeship.
2129.16.1	Gain practical experience through hands on training in a real work environment.
2129.16.2	Earn a wage or stipend while training.
2129.16.3	Acquire skills and knowledge that are directly applicable to their chosen career
2129.16.4	Utilize mentorships and guidance from industry professionals.
2129.16.5	Gain a pathway to full-time employment.
2129.17	Research apprenticeship components and models.
2129.17.1	Explore various apprenticeship models such as traditional, competency-based, or hybrid models.
2129.17.2	Determine the key components of apprenticeship programs, including on-the-job training, classroom instruction, mentorship, assessment methods, and certification requirements.
2129.17.3	Research organizations, companies, or educational institutions that offer apprenticeships, considering factors such as reputation, accreditation, facilities, and instructor qualifications.
2129.17.4	Familiarize yourself with apprenticeship agreements or contracts that outline the roles, responsibilities, rights, and obligations of apprentices, employers, and training providers.
2129.17.5	Consult with industry professionals, career counselors, or apprenticeship coordinators to obtain advice, resources, and assistance in selecting an apprenticeship program that aligns with your goals and interests.
2129.18	Explore WV Businesses and partners.
2129.18.1	Explore construction trades unions in West Virginia with apprenticeship programs.
2129.18.2	Research unions working with contractors in construction trades.
2129.18.3	Understanding apprenticeship opportunities in construction trades.
2129.18.4	Applying for apprenticeship in the construction trades.
2129.19	Common apprenticeship myths.
2129.19.1	Explain myths related to apprenticeships and the truth negating them such as the myths listed below.
2129.19.2	- Apprenticeships are only for people who couldn't get into college.
2129.19.3	- Apprenticeships are low-paying and dead-end jobs.

2129.19.4	- Apprenticeships are only for men.
2129.19.5	- Apprenticeships are only for "blue-collar" jobs.
2129.19.5	- Apprenticeships are only for young people straight out of high school.

Mass Production Cabinetmaking

2129.20	Mass Production Cabinetmaking
2129.20.1	Demonstrate knowledge of the mass production of Cabinets.
2129.20.2	Complete research describing how cabinets are mass produced.
2129.21	Cabinet Making Project
2129.21.1	Demonstrate the skill sets required to complete a cabinet project.
2129.21.2	Complete a capstone cabinet project.
2129.21.3	Complete and submit a Student Portfolio.

This course introduces the student to the base and technical skills in Soldering and Flaring Copper Tubing. Areas of study include assembly, installation and repair of piping systems using copper tubing and fittings. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Copper Tubing and Fittings

2145.1	Copper Tubing and Fittings
2145.1.1	Soldering and flaring copper tubing.
2145.1.2	Select the common types of materials and schedules used with copper tubing.
2145.1.3	Select the common types of fittings and valves used with copper tubing.
2145.1.4	Show the ability to hand and support copper tubing.
2145.1.5	Measure, cut, ream, and join copper tubing.
2145.1.6	Assemble a flare joint, swage joint, and a compression joint.
2145.1.7	Show the ability to use pro-press and shark-bite fittings.
2145.1.8	Test a copper tubing system.

This course introduces the student to the knowledge base and technical skills for all courses in Gas Piping. Areas of study include designing, assembling, installing, and repairing pipes and fittings used in a gas piping system, as well as receiving flexible gas piping certifications during the course. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Carbon Steel Pipe and Fittings

2146.1	Carbon Steel Pipe and Fittings
2146.1.1	Carbon steel pipe and fittings.
2146.1.2	Choose the common types of materials and schedules used with carbon steel pipe.
2146.1.3	Select fittings and valves used with carbon steel pipe.
2146.1.4	Hang and support carbon steel pipe.
2146.1.5	Measure, cut, and join carbon steel pipe.
2146.1.6	Test a carbon steel piping system.
2146.1.7	Use the Fuel Gas Code to cite the requirements for carbon steel pipe.

Flexible Gas Pipe and Fittings

2146.2	Flexible Gas Pipe and Fittings
2146.2.1	Flexible gas pipe and fittings.
2146.2.2	Compare the common types of flexible gas piping materials.
2146.2.3	Choose the common types of fittings and valves used in a flexible gas piping system.
2146.2.4	Hang and support flexible gas piping.
2146.2.5	Use Fuel Gas Code to cite the requirements for flexible gas piping.
2146.2.6	Test a flexible gas piping system.

Fuel Gas Systems

2146.3	Fuel Gas Systems
2146.3.1	Fuel gas systems.
2146.3.2	Evaluate the major components of natural gas, liquified petroleum gas, and fuel oil gas systems.
2146.3.3	Determine the proper procedures for hooking up appliances in a fuel gas system.
2146.3.4	Use the fuel gas code book to design, size, and test a fuel gas system.

This course introduces the student to the knowledge base and technical skills concepts in Drains, Waste and Vent Systems. Areas of study include assembly, installation, and repair of DWV systems, types of vents and indirect and special waste. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Introduction to Drains, Waste, and Vents

2148.1	Introduction to Drains, Waste, and Vents
2148.1.1	Drains, traps, fittings, and DWV systems.
2148.1.2	Show how waste moves from a fixture through the drain system to the environment.
2148.1.3	Determine the major components and functions of drainage systems.
2148.1.4	Assemble different types of traps.
2148.1.5	Select various types of DWV fittings.
2148.1.6	Show the components of building a sewer.
2148.1.7	Assemble a DWV system.
2148.1.8	Test a DWV system.

Venting Systems Installations

2148.2	Venting Systems Installations
2148.2.1	Assembling and testing venting systems.
2148.2.2	Develop an understanding of the scientific principles of venting.
2148.2.3	Create a vent system according to local codes.
2148.2.4	Sketch the different types of vents.
2148.2.5	Assemble the different types of vent systems.

Water Systems

2148.3	Water Systems
2148.3.1	Waste systems.
2148.3.2	Determine the reasons for using an indirect system.
2148.3.3	Discuss the requirement for receptors and backflow preventers.
2148.3.4	Install an indirect waste system.
2148.3.5	Tell why we need special waste systems.
2148.3.6	Determine the requirements for using indirect and special waste disposal systems.

This course introduces the student to the knowledge base and technical skills related to Plumbing Fixtures. Areas of study include identifying various types of plumbing fixtures and faucets and how to properly install and test plumbing fixtures. Emphasis will be placed on career exploration, job seeking skills and personal and professional ethics. Safety instruction is integrated into all activities.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Fixtures and Faucets

2149.1	Fixtures and Faucets
2149.1.1	Fixtures and faucets.
2149.1.2	Compare the basic types of plumbing fixtures and fixture materials.
2149.1.3	Assemble common types of sinks and faucets.
2149.1.4	Compare common bathtubs and showers.
2149.1.5	Assemble and set a water closet and urinal.
2149.1.6	Differentiate between drinking fountains and water coolers.
2149.1.7	Identify types of garbage disposals and domestic dishwashers.
2149.1.8	Explain the function, components, and operation of sewage and sump pumps.

Water Heaters

2149.2	Water Heaters
2149.2.1	Water heaters.
2149.2.2	Show the basic operation of water heaters.
2149.2.3	Diagnose and repair an electric water heater.
2149.2.4	Diagnose and repair a gas water heater.
2149.2.5	Diagnose and repair a tankless water heater.
2149.2.6	Use the local plumbing code to cite requirements for installing a water heater.

This course is designed to provide knowledge and skills needed in the fire service field including exploration of fire service as a system. Students will: analyze and demonstrate the use of fire services equipment; demonstrate basic firefighting techniques; engage in incident management communications; demonstrate the correct use of personal protective equipment; analyze command structure within the fire service; analyze various aspects of safety and health in the fire service environment; explore the legal and ethical responsibilities of the fire service; and gain an appreciation for the role that the fire service plays in the day-to-day safety and security of every community.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Fire Service Orientation

2202.1	Fire Service Orientation
2202.1.1	Identify the various requirements for Fire Fighters related to age, education, physical fitness, etc.
2202.1.2	Compare and contrast the roles and responsibilities of Fire Fighter I & II.
2202.1.3	Examine the organization of the fire service such as chain of command, etc.
2202.1.4	Discuss the history of American Fire Service, building codes, payment for fire service, etc.

Fire Fighter Safety

2202.2	Fire Fighter Safety
2202.2.1	Identify causes of fire fighter deaths and injuries.
2202.2.2	Discuss methods of injury prevention.
2202.2.3	Examine safety standards and procedures.
2202.2.4	Demonstrate safety methods for various situations such as during training, emergency response, at emergency incidents, at the fire station and outside the workplace.
2202.2.5	Examine personal protective equipment including the structural firefighting ensemble and specialized protective clothing.
2202.2.6	Determine respiratory hazards of fires and other toxic environments.
2202.2.7	Examine situations requiring breathing apparatus.
2202.2.8	Analyze types of breathing apparatus.
2202.2.9	Demonstrate inspection and maintenance of SCBA's.

Fire Service Communications

2202.3	Fire Service Communications
2202.3.1	Examine communications facility requirements and equipment.
2202.3.2	Discuss receiving and dispatching emergency calls.
2202.3.3	Examine radio equipment and operations.
2202.3.4	Demonstrate methods of obtaining, coding, and recording necessary information.

Incident Command System

2202.4	Incident Command System
2202.4.1	Relate the history of the ICS.

2202.4.2	Discuss characteristics of the ICS such as jurisdictional authority, all-risk and all-hazard system, unity of command, etc.
2202.4.3	Define common terms relating to ICS.
2202.4.4	Examine consolidated incident action plans.
2202.4.5	Describe designated incident facilities.

Fire Behavior

2202.5	Fire Behavior
2202.5.1	Analyze the chemistry of fire and combustion.
2202.5.2	Describe states of matter, types of fuels and types of energy.
2202.5.3	Describe the classification of fires.
2202.5.4	Compare and contrast the characteristics of solid-, liquid-, and gas-fuel fires.
2202.5.5	Determine the key attributes of smoke and what is influencing them.

Building Construction

2202.6	Building Construction
2202.6.1	Examine the interactions between building construction, occupancy, and contents.
2202.6.2	Describe occupancy classifications and associated building code requirements.
2202.6.3	Analyze risks of various building contents.
2202.6.4	Identify types of construction materials and the factors that affect the fire behavior of these materials.
2202.6.5	Describe five classifications of building construction and how they are related to fire protection and fire behavior.
2202.6.6	Examine the major components of a building including the: foundations; floors and ceilings; roofs; trusses; walls; doors and windows; and interior finishes and floor coverings.
2202.6.7	Relate the various components to safety risk.
2202.6.8	Explain the importance of pre-incident planning.
2202.6.9	Investigate safe operating procedures including personal accountability systems and emergency communication procedures.
2202.6.10	Discuss fire fighter survival procedures including maintaining orientation, self-rescue, and safe havens.
2202.6.11	Demonstrate the rescue of a downed fire fighter.
2202.6.12	Describe the factors, causes, and need for rehabilitation.
2202.6.13	Analyze the incidents affecting fire fighter rehabilitation.
2202.6.14	Describe how rehabilitation works and the role of personal responsibility in rehabilitation.
2202.6.15	Describe examples of critical incidents.
2202.6.16	Explain critical incident stress debriefing.
2202.6.17	Examine the functions of various tools.

This course is designed to provide knowledge and skills needed in the fire service field including the basic fundamentals of firefighting. Students will demonstrate proper procedures used in responding to a structure fire; safety procedures, lifting and carrying of equipment; forcible entry; rescue; use of radio equipment; working in hazardous environments; fire attack; advancement of hose lines and ventilation; disabling utilities; set-up of supply lines and fire apparatus; and hazardous materials awareness.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

General Law, Public Safety and Security Technical Skills

2203.1	Identify and use appropriate terminology for the law and public safety fields.
2203.1.1	Identify and define specialized terminology and language specific to law enforcement and public safety.
2203.1.2	Utilize appropriate terminology in written reports, verbal communication, and class discussions.
2203.1.3	Apply terminology accurately in practical exercises and scenario-based simulations.
2203.2	Demonstrate knowledge, skills, and abilities (KSA's) in the law and public safety fields.
2203.2.1	Explain key principles and procedures in law enforcement and public safety.
2203.2.2	Demonstrate proficiency in essential skills such as crisis intervention, incident management, and legal procedures.
2203.2.3	Apply acquired knowledge and skills to simulated scenarios and practical assessments.

Emergency and Fire Management Services Technical Skills

2203.3	Identify and apply National Incident Management Systems (NIMS) protocols.
2203.3.1	Explain the purpose and components of the National Incident Management System (NIMS).
2203.3.2	Identify NIMS protocols and their application in emergency response scenarios.
2203.3.3	Demonstrate the ability to effectively implement NIMS protocols in simulated incident command exercises.
2203.4	Identify and apply the principles of fire science.
2203.4.1	Describe fundamental principles of fire behavior, including combustion, heat transfer, and fire dynamics.
2203.4.2	Identify various types of fires and their characteristics based on fuel sources, ignition sources, and environmental factors.
2203.4.3	Apply knowledge of fire science principles to analyze and assess fire-related risks and develop appropriate firefighting strategies and tactics.

Academic Foundations

2203.5	Apply mathematical skills in a law and public safety environment.
2203.5.1	Apply mathematical concepts and calculations to analyze data, assess risks, and make decisions in law enforcement and public safety scenarios.
2203.5.2	Interpret and utilize numerical data presented in various formats, including charts, graphs, and statistical reports.
2203.5.3	Demonstrate proficiency in performing mathematical calculations relevant to law enforcement and public safety tasks, such as determining distances, calculating speeds, and estimating resource requirements.
2203.6	Apply science skills in a law and public safety environment.

2203.6.1	Apply scientific principles and methods to understand and analyze phenomena relevant to law enforcement and public safety, including fire behavior, forensic evidence, and environmental hazards.
2203.6.2	Use scientific inquiry and critical thinking skills to investigate and solve problems encountered in law enforcement and public safety contexts.
2203.6.3	Apply knowledge of scientific concepts and techniques to support decision-making and operational planning in law enforcement and public safety scenarios.
2203.7	Apply reading skills in a law and public safety environment.
2203.7.1	Read and comprehend legal documents, including statutes, regulations, and case law relevant to law enforcement and public safety.
2203.7.2	Analyze and interpret written instructions, incident reports, and procedural manuals used in law enforcement and public safety operations.
2203.7.3	Extract and synthesize relevant information from written sources to make informed decisions and solve problems in law and public safety contexts.
2203.8	Apply writing skills in a law and public safety environment.
2203.8.1	Communicate effectively in written form using appropriate terminology and language conventions.
2203.8.2	Draft various types of documents commonly used in law enforcement and public safety, such as incident reports, memos, and court documents, following prescribed formats and standards.
2203.8.3	Demonstrate the ability to convey complex information clearly and concisely in writing, adhering to legal and ethical considerations relevant to law and public safety professions.

Systems

2203.9	Analyze the impact on law and public safety based on technological advances.
2203.9.1	Evaluate the influence of technological advancements on law enforcement and public safety practices, including changes in communication, surveillance, and forensic capabilities.
2203.9.2	Assess the benefits and challenges associated with the adoption of new technologies in law enforcement operations, emergency response procedures, and crime prevention strategies.
2203.9.3	Analyze the implications of emerging technologies, such as drones, body cameras, and data analytics, on privacy rights, ethical considerations, and community policing efforts.
2203.10	Describe the relationships, roles, and responsibilities among law and public safety professionals.
2203.10.1	Identify and describe the various professionals involved in law enforcement and public safety, including police officers, firefighters, emergency medical technicians (EMTs), and dispatchers.
2203.10.2	Explain the interdependence and collaboration among different agencies and roles.
2203.10.3	Understand the specific responsibilities and duties associated with different roles, such as maintaining public order, responding to emergencies, and enforcing laws and regulations.

Ethics and Legal Responsibilities

2203.11	Identify ethical issues and demonstrate ethical behavior in law and public safety situations.
2203.11.1	Recognize ethical dilemmas and challenges commonly encountered in law enforcement and public safety contexts.
2203.11.2	Analyze ethical considerations and implications of decisions and actions taken in law and public safety situations, considering principles such as integrity, fairness, and accountability.
2203.11.3	Demonstrate ethical behavior by adhering to professional codes of conduct, moral principles, and ethical standards.
2203.12	Apply appropriate laws, regulations, and industry standards in law and public safety situations.
2203.12.1	Interpret and apply relevant laws, regulations, and industry standards governing law enforcement and public safety operations.

2203.12.2	Identify legal requirements and compliance obligations in various law and public safety scenarios, such as emergency response, crime prevention, and incident management.
2203.12.3	Demonstrate the ability to make informed decisions and take appropriate actions in accordance with applicable laws, regulations, and standards.

Communications

2203.13	Interpret and use tables, charts, and figures to support written and oral communication.
2203.13.1	Incorporate data from tables, charts, and figures into written reports and oral presentations to enhance clarity and support key points.
2203.13.2	Create tables, charts, and figures to visually represent data and convey information clearly in written and oral communication.

Information Technology Applications

2203.14	Use word processing, presentation software, and email applications to prepare communications.
2203.14.1	Create and format documents like reports, memos, and letters using word processing software, following formatting standards.
2203.14.2	Proficiently compose, send, and manage professional emails, including attachments and distribution lists, while following etiquette and privacy protocols.
2203.15	Use spreadsheet and database applications to manage and communicate data and information.
2203.15.1	Employ spreadsheet applications to organize, analyze, and visualize data sets, including performing calculations, creating charts, and generating reports.
2203.15.2	Utilize database applications to store, retrieve, and manipulate structured data, including querying databases, creating forms, and generating.

Problem Solving, Critical Thinking and Decision Making

2203.16	Use problem solving and critical thinking skills to locate credible sources of information about problems and determine appropriate methods for investigating causes.
2203.16.1	Develop skills to find reliable information and choose suitable investigation methods.
2203.16.2	Select suitable methods for analysis based on critical evaluation.
2203.17	Use problem solving and critical thinking skills to determine root causes of problems and to suggest and evaluate solutions
2203.17.1	Enhance abilities to identify root causes and assess effective solutions.
2203.17.2	Evaluate their effectiveness through critical thinking and analytical reasoning.

Safety, Health and Environmental

2203.18	Demonstrate appropriate emergency and first aid knowledge and procedures for law and public safety occupations.
2203.18.1	Develop competency in emergency response and first aid techniques.
2203.18.2	Demonstrate the ability to assess, prioritize, and administer appropriate medical assistance in various emergency situations.
2203.19	Identify and practice appropriate environmental procedures for law and public safety occupations.
2203.19.1	Recognize environmental hazards and apply appropriate safety procedures.
2203.19.2	Emphasize preventive measures, hazard mitigation, and compliance with environmental regulations.

Employability and Career Development

2203.20	Demonstrate appropriate workplace behaviors related to a career in law and public safety.
2203.20.1	Develop essential skills like communication, teamwork, and ethical conduct.
2203.21	Pursue career development skills to advance in law and public safety careers.
2203.21.1	Acquire skills in goal setting, resume writing, and networking to pursue career advancement and personal growth.

Firefighting Tools and Equipment

2203.22	Demonstrate the ability to identify and properly use portable fire extinguishers.
2203.22.1	Examine the purposes and uses of portable fire extinguishers and special extinguishing agents.
2203.22.2	Relate the classes of fires to the use of portable fire extinguishers.
2203.22.3	Describe the classifications of fire extinguishers.
2203.22.4	Explain the labeling and placement of fire extinguishers.
2203.22.5	Demonstrate the methods of fire extinguishment.
2203.22.6	Identify the types of extinguishing agents.
2203.22.7	Describe fire extinguisher design and characteristics.
2203.22.8	Explain the use and care of fire extinguishers.
2203.23	Understand and adhere to safety protocols while handling firefighting tools and equipment.
2203.23.1	Describe safety and other conditions of operating tools and equipment.
2203.23.2	Ensure safe and efficient operations in various emergency scenarios.
2203.24	Identify and describe the functions of various tools.
2203.24.1	Examine the functions of various tools.
2203.24.2	Discuss the phases of use of tools.
2203.25	Define tool staging
2203.25.1	Understand the importance of strategically staging firefighting tools and equipment.
2203.25.2	Ensuring quick and efficient deployment during emergency responses to optimize operational effectiveness.
2203.26	Demonstrate the ability to perform routine maintenance tasks on firefighting tools and equipment.
2203.26.1	Describe the cleaning and inspecting of various types of tools.
2203.26.2	Ensure optimal functionality and reliability during firefighting operations.
2203.27	Acquire proficiency in tying various knots and using ropes for firefighting tasks.
2203.27.1	Describe types of ropes, rope materials and rope construction.
2203.27.2	Explain how this affect rope strength.
2203.27.3	Demonstrate rope maintenance.
2203.27.4	Describe and demonstrate types of knots.
2203.28	Master the skills required to handle, raise, lower, climb, and secure ladders safely and effectively.
2203.28.1	Examine various methods of hoisting.
2203.28.2	Describe the functions of ladders.
2203.28.3	Examine ladder construction and types of ladders.
2203.28.4	Describe the inspection, maintenance, and service testing of portable ladders.
2203.28.5	Discuss ladder safety.
2203.28.6	Describe the use of portable ladders.
2203.28.7	Analyze procedures for a chimney check.
2203.29	Demonstrate understanding of proper use of fire hoses and nozzles.
2203.29.1	Examine principles of fire hydraulics such as flow and pressure.
2203.29.2	Explain the functions and construction of fire hoses.

2203.29.3	Explain hose appliances.
2203.29.4	Discuss the methods for hose rolls.
2203.29.5	Examine methods of fire hose evolutions.
2203.29.6	Define types of nozzles.
2203.29.7	Explain foam classifications, equipment, and application techniques.

Response Techniques

2203.30	Demonstrate knowledge of response techniques.
2203.30.1	Describe the response to receiving an alarm.
2203.30.2	Describe various response techniques including riding and dismounting an apparatus.
2203.30.3	Describe procedures for controlling utilities and other necessities for arrival at the incident scene.
2203.30.4	Discuss size-up evaluations and incident action plans.
2203.30.5	Examine forcible entry situations and tools for various types of entry.

Search and Rescue

2203.31	Demonstrate knowledge of search and rescue safety, operations, and techniques.
2203.31.1	Examine search and rescue operations.
2203.31.2	Demonstrate search and rescue techniques and equipment.
2203.31.3	Discuss methods for search safety including risk management.

Ventilation

2203.32	Analyze ventilation in firefighting.
2203.32.1	Explain the benefits of proper ventilation.
2203.32.2	Discuss considerations relating to backdraft and flashback.
2203.32.3	Examine factors affecting ventilation.
2203.32.4	Explain how building construction affects ventilation.
2203.32.5	Discuss tactical principles for venting.
2203.32.6	Examine types of ventilation including horizontal, mechanical, and vertical.
2203.32.7	Describe indicators of roof collapse.
2203.32.8	Demonstrate equipment maintenance.

Water Supply

2203.33	Analyze water supply in firefighting.
2203.33.1	Describe sources of water.
2203.33.2	Examine water treatment and distribution systems.
2203.33.3	Explain types of fire hydrants.
2203.33.4	Discuss location, operation, and maintenance of fire hydrants.

Salvage and Overhaul

2203.34	Analyze salvage and overhaul in firefighting.
2203.34.1	Examine salvage and overhaul safety principles and practices.
2203.34.2	Describe lighting equipment.
2203.34.3	Examine salvage tools.
2203.34.4	Discuss salvage techniques to limit/prevent water, smoke, and heat damage.
2203.34.5	Describe overhaul techniques and tools.

This course is designed to provide knowledge and skills needed in the fire service field including proper procedures for incident response involving automobile rescue, extrication, and fires; the role of emergency medical care in fire service; and basic emergency medical care. Students will analyze emergency scenes to develop and execute emergency action plans; cover a fire scene and demonstrate proper procedure to preserve property and the chain of evidence when presented with evidence of criminal activity; analyze the role of the first responder to acts of terrorism; and analyze and demonstrate the role of fire service in fire prevention and education in the community.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

General Law, Public Safety and Security Technical Skills

2205.1	Describe risk management practices that minimize liability.
2205.1.1	Identify potential risks and hazards in firefighting operations, including environmental factors, equipment failures, and human errors.
2205.1.2	Implement proactive measures to mitigate risks and prevent accidents or injuries, such as regular equipment maintenance, safety inspections, and hazard controls.
2205.1.3	Understand relevant laws, regulations, and industry standards governing firefighting operations.
2205.1.4	Follow established safety procedures and protocols, including incident command systems, personal protective equipment (PPE) usage, and emergency response plans.
2205.1.5	Accurately document and report safety incidents, near misses, and risk assessments, ensuring comprehensive record-keeping and accountability.

Emergency and Fire Management Services Technical Skills

2205.2	Identify types of and procedures for entrapment and extrication.
2205.2.1	Identify types, parts, and frames of various vehicles.
2205.2.2	Describe techniques for responding to the scene including arrival and size-up.
2205.2.3	Examine hazards affecting scene stabilization.
2205.2.4	Demonstrate the tools and techniques related to vehicle extrication.
2205.2.5	Examine methods for removing and transporting victims.
2205.2.6	Describe techniques for securing an accident scene.
2205.3	Recognize and respond appropriately to hazardous materials incidents.
2205.3.1	Identify different types of hazardous materials and substances commonly encountered in emergency response scenarios, including chemical, biological, radiological, and explosive hazards.
2205.3.2	Identify characteristics of hazardous materials.
2205.3.3	Discuss the effects of hazardous exposure and contamination.
2205.3.4	Examine types of hazardous materials.
2205.3.5	Analyze methods for recognizing and identifying hazards.
2205.3.6	Develop methods for implementing a response.
2205.3.7	Demonstrate use of personal protective equipment, scene safety and scene control.
2205.3.8	Identify response priorities and actions.
2205.3.9	Discuss types and methods of decontamination and the decontamination process.
2205.4	Identify appropriate emergency vehicle procedures.

2205.4.1	Demonstrate proficiency in operating emergency vehicles safely and responsibly, including understanding vehicle controls, maneuvering techniques, and traffic laws.
2205.4.2	Demonstrate knowledge of emergency response protocols and procedures for driving to and from incident scenes.
2205.4.3	Assess and adapt to various road and environmental conditions encountered during emergency responses, ensuring effective navigation and incident scene management.
2205.4.4	Identify and mitigate dangers in emergency vehicle operations to ensure safety for all involved through proactive risk assessment.

Leadership and Teamwork

2203.5	Apply leadership qualities to improve the quality of work and the work environment.
2203.5.1	Develop leadership skills such as communication, decision-making, and problem-solving to effectively guide peers and improve the quality of work.
2203.6	Work effectively in a team environment to improve the quality of work and the work environment.
2203.6.1	Cultivate teamwork skills, including collaboration, cooperation, and conflict resolution, to contribute positively to team dynamics and enhance the quality of work.

Firefighter Survival and Rehabilitation

2205.7	Master essential firefighter skills including safety procedures, rescue techniques, and critical incident management.
2205.7.1	Investigate safe operating procedures including personal accountability systems and emergency communication procedures.
2205.7.2	Discuss fire fighter survival procedures including maintaining orientation, self-rescue, and safe havens.
2205.7.3	Demonstrate the rescue of a downed fire fighter.
2205.7.4	Describe the factors, causes, and need for rehabilitation.
2205.7.5	Analyze the incidents affecting fire fighter rehabilitation.
2205.7.6	Describe how rehabilitation works and the role of personal responsibility in rehabilitation.
2205.7.7	Describe examples of critical incidents.
2205.7.8	Explain critical incident stress debriefing.
2205.7.9	Examine the functions of various tools.

Wildland and Ground Fires

2205.8	Understand the fundamental concepts of wildland firefighting.
2205.8.1	Describe the fire triangle.
2205.8.2	Discuss the effect of weather and topography on wildland fires.
2205.8.3	Analyze the anatomy of wildland fire.
2205.8.4	Explain the methods of extinguishing wildland fires including types of attacks.
2205.8.5	Describe the fire apparatus used for wildland fires.
2205.8.6	Discuss safety issues and the use of personal protective equipment for wildland fires.

Fire Suppression

2205.9	Understand firefighting strategies.
2205.9.1	Compare and contrast offensive vs. Defensive operations.
2205.9.2	Demonstrate hose line operations.
2205.9.3	Discuss protecting various exposures.
2205.9.4	Explain methods for attacking and overhauling vehicle fires.

2205.9.5	Discuss the hazards and suppression of fires relating to flammable liquids and gas and electrical fires.

Pre-incident Planning

2205.10	Master hazard identification and pre-incident planning.
2205.10.1	Identify target hazards and develop a pre- incident plan.
2205.10.2	Examine a pre-incident survey.
2205.10.3	Discuss tactical information regarding various pre- incident plans including those for search and rescue, forcible entry, ladder placement and ventilation.
2205.10.4	Examine occupancy consideration and settings.

Terrorism Awareness

2205.11	Explore terrorism targets and tactics.
2205.11.1	Examine various targets and tactics such as infrastructure targets and ecoterrorism.
2205.11.2	Describe types of agents and devices such as explosives and incendiary devices and chemical and biological and radiological agents.
2205.11.3	Discuss operations such as initial actions, interagency coordination, decontamination, etc.

Fire Prevention/Education and Cause Determination

2205.12	Explore aspects of fire safety and investigation.
2205.12.1	Examine fire codes.
2205.12.2	Describe public fire safety education programs.
2205.12.3	Examine fire safety surveys.
2205.12.4	Discuss fire investigations.
2205.12.5	Explain causes of fires.
2205.12.6	Examine how to determine the origin and cause of a fire.
2205.12.7	Describe fire-ground operation procedures.
2205.12.8	Explain the process for securing and transferring property regarding incendiary fires.
2205.12.9	Discuss the characteristics of types of arsonists.

Fire Detection, Protection and Suppression Systems

2205.13	Understand the components of fire alarm systems across different settings.
2205.13.1	Describe the components of fire alarm systems for various settings.
2205.13.2	Discuss fire alarm functions.
2205.13.3	Describe various fire suppression systems.

The Skill Sets in this course focus on knowledge and skills needed in the public safety telecommunication and emergency dispatch field. The course is an elective within the Law and Public Safety and Emergency and Firefighting Management Services Programs of Study.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Emergency Dispatch Basics

2207.1	Emergency Dispatch Basics
2207.1.1	Explain types of communication centers and the Public Safety Answering Point.
2207.1.2	Describe the positions and duties within types of communication centers.
2207.1.3	Explore the functions, roles, and responsibilities of an effective emergency dispatcher.
2207.1.4	Compare and contrast police, fire, and emergency medical communications.
2207.1.5	Describe crimes and police terms and services and related call-taking and dispatching guidelines.
2207.1.6	Explain fire communications terms and services and related call-taking and dispatching guidelines.
2207.1.7	Describe emergency medical services and best practices of an emergency medical dispatcher.
2207.1.8	Describes types and stages of crisis situations and the place of the dispatcher in the crisis.
2207.1.9	Articulate the role of an emergency dispatcher as a member of an agency's public safety team and relating to the National Incident Command/Management System.
2207.1.10	Assess the role of the Public Safety Telecommunicator in and responsibility for first responder safety.
2207.1.11	Investigate state and local rules relating to the performance requirements of emergency dispatchers.
2207.1.12	Investigate specific legal liability issues related to call-taking and dispatch of emergency responders.
2207.1.13	Investigate specific legal liability issues related to mutual and automatic aid and operational recovery planning responses.
2207.1.14	Examine specific liability issues related to interaction with other agencies.
2207.1.15	Examine concepts such as negligence, abandonment, confidentiality, and standard of care.
2207.1.16	Examine characteristics of public safety consumers including callers, community members, public/private entities, responders, user-agency personnel, etc.
2207.1.17	Discuss issues regarding topography within a local public service area.
2207.1.18	Explore the topography within the boundaries of a local public safety service area.
2207.1.19	Determine local public safety authorities and resources.
2207.1.20	Examine non-traditional public safety service providers such as tribal authorities, military liaisons, port authorities, private/proprietary security forces, etc.
2207.1.21	Investigate Incident Command/Integrated Command Systems and Tactical Dispatch Teams.
2207.1.22	Use elements of appropriate speech.
2207.1.23	Interpret verbal and nonverbal communication.
2207.1.24	Apply basic speaking and active listening skills including reflection, restatement, and clarification techniques.
2207.1.25	Recognize barriers to communication.
2207.1.26	Recognize the elements of communication using a sender-receiver model.
2207.1.27	Apply speaking and active listening skills.
2207.1.28	Demonstrate elements of effective written and electronic communication.

2207.1.29	Recognize the importance of courtesy and respect for customers and colleagues and maintain good interpersonal relationships.
2207.1.30	Discuss how to adapt communication skills to varied levels of understanding and cultural orientation including diverse age, cultural, economic, ethnic, and religious groups.
2207.1.31	Distinguish between and report subjective and objective information.
2207.1.32	Report relevant information in order of occurrence.
2207.1.33	Locate, organize, reference, and employ written information from various sources.
2207.1.34	Develop and interpret tables and charts to support written and oral communication.
2207.1.35	Examine methods for managing stress and other skills of emotional wellness including lifestyle assessment.
2207.1.36	Explore principles of Critical Incident Stress Debriefing.
2207.1.37	Discuss causes, signs and symptoms and treatment of Post-Traumatic Stress Disorder.

Public Safety Communication Center Technologies and Systems

2207.2	Public Safety Communication Center Technologies and Systems
2207.2.1	Examine proper operation of various 9-1-1 systems.
2207.2.2	Use Automated Number Identification (ANI) technology.
2207.2.3	Use Automated Location Identification (ALI) technology.
2207.2.4	Discuss issues relating to wireless/VoIP technology.
2207.2.5	Explore Selective Routing technology.
2207.2.6	Explore Private Branch Exchange (PBX) technology.
2207.2.7	Utilize Telecommunications Device for the Deaf (TTD/TTY) technology.
2207.2.8	Examine call box technology.
2207.2.9	Assess considerations regarding dispatch when intra-agency phone systems are involved.
2207.2.10	Demonstrate efficient, effective, and professional use of public radio systems with all classes of public safety consumers.
2207.2.11	Apply typical policies/procedures related to normal and emergency radio-system uses.
2207.2.12	Use typical agency approved radio codes and signals efficiently and effectively.
2207.2.13	Demonstrate the appropriate use of talk groups or frequency coordination.
2207.2.14	Articulate the application of existing interoperability communication plans.
2207.2.15	Explore current FCC rules pertaining to the use of public safety radio spectra.
2207.2.16	Investigate incident command management systems.

Call Receiving and Processing

2207.3	Call Receiving and Processing
2207.3.1	Explain the best practices of call taking in terms of required skills, knowledge and attitudes including sequencing.
2207.3.2	Explain the use of the 6 W's for call taking basics -- where, what, who, when, why, and weapons.
2207.3.3	Describe various call types.
2207.3.4	Discuss the nature of difficult calls and methods for handling them.
2207.3.5	Describe methods for using voice language.
2207.3.6	Explain the purposes and methods for courtesy, empathy, explaining, reassuring and other methods of call control.
2207.3.7	Discuss the importance of assessing and portraying a call accurately.
2207.3.8	Describe methods for documenting various call types, using abbreviations, writing narratives and other necessary recording.

2207.3.9	Describe call updating, canceling, and transferring practices.
2207.3.10	Demonstrate appropriate call receiving and processing best practices in police, fire, and emergency medical situations.
2207.3.11	Apply concepts related to confidentiality.
2207.3.12	Role play worst case scenarios.

Emergency Medical Concepts and Practices

2207.4	Emergency Medical Concepts and Practices
2207.4.1	Define medical terms and use appropriate medical abbreviations.
2207.4.2	Demonstrate how to obtain indicators of various conditions.
2207.4.3	Define shock and explain the symptoms and types.
2207.4.4	Demonstrate how to use shock information.
2207.4.5	Describe five categories of disorders of the abdomen and their symptoms.
2207.4.6	Demonstrate how to use abdominal pain information.
2207.4.7	Explain the categories, classifications, and sources of burns.
2207.4.8	Demonstrate how to use burn information.
2207.4.9	Describe chest pain as it relates to the heart and vascular system.
2207.4.10	Explain acute causes of chest pain.
2207.4.11	Demonstrate how to use chest pain information.
2207.4.12	Define diabetes and describe signs and symptoms of a diabetic reaction.
2207.4.13	Demonstrate how to use diabetes information.
2207.4.14	Explain the effects of electric shock on the human body.
2207.4.15	Demonstrate how to use electrocution information.
2207.4.16	Differentiate between drowning and near drowning.
2207.4.17	Demonstrate how to use drowning information.
2207.4.18	Explain neurological disorders and cerebral insults.
2207.4.19	Demonstrate how to assess level of consciousness, breathing, seizure, and head pain.
2207.4.20	Describe types of environmental emergencies and disorders related to exposure.
2207.4.21	Demonstrate how to use environmental information.
2207.4.22	Contrast normal breathing and respiratory distress.
2207.4.23	Describe diseases or conditions that alter normal breathing.
2207.4.24	Demonstrate how to use respiratory information.
2207.4.25	Explain obstetrical emergencies.
2207.4.26	Demonstrate how to assess the stage of labor.
2207.4.27	Discuss problems relating to each trimester.
2207.4.28	Demonstrate how to use OB information.
2207.4.29	Discussion special considerations relating to emergencies affecting children.
2207.4.30	Demonstrate how to use pediatric information.

Emergency Services Resources

2207.5	Emergency Services Resources
2207.5.1	Review information resources available nationally and locally to the emergency Call Taker such as phone directories, maps, websites, TV stations, etc.
2207.5.2	Investigate community stakeholders who can contribute specialized services such as language translation and cultural insights.

The Skill Sets in this course focus on knowledge and skills needed for auto extrication in the fire service field as required by National Fire Protection Association Standards 1006 and 1670.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Vehicle Rescue and Extrication Basics

2208.1	Vehicle Rescue and Extrication Basics
2208.1.1	Discuss NFPA standards and other procedures relevant to safe, legal, and ethical auto extrication processes.
2208.1.2	Explain proper procedures for extrication call receipt and dispatch.
2208.1.3	Describe four methods of vehicle power.
2208.1.4	Explain hazards associated with various vehicle types.
2208.1.5	Describe the parts of a motor vehicle.
2208.1.6	Identify two types of motor vehicle frames and their relevance to auto extrication.
2208.1.7	Describe the characteristics and classifications of various vehicle types including: passenger; bus; truck; industrial; agricultural; and miscellaneous.
2208.1.8	Apply the characteristics of various vehicle types to extrication techniques and situations.
2208.1.9	Evaluate dispatch information for appropriate response.
2208.1.10	Describe hazards involved in responding to an emergency scene.
2208.1.11	Explain the hazards to assess at the scene of vehicle extrication situation.
2208.1.12	Describe methods for determining the scope of an incident.
2208.1.13	Discuss additional resources that may be available to responders in certain situations.
2208.1.14	Relate the steps for scene size-up.
2208.1.15	Describe the steps for scene stabilization including reducing, removing, and mitigating hazards.
2208.1.16	Explain the steps for stabilizing a vehicle after a crash.
2208.1.17	Explain the four functions to gain access and disentangle victims.
2208.1.18	Discuss issues of physical and mental wellness necessary for success as first responders.

Rescue and Extrication Equipment

2208.2	Rescue and Extrication Equipment
2208.2.1	Discuss the purpose for rescue and extrication equipment.
2208.2.2	Demonstrate the proper use of rescue and extrication equipment.
2208.2.3	Explain methods for planning the removal of a victim.
2208.2.4	Discuss the purpose for equipment used in providing initial medical care.
2208.2.5	Demonstrate the proper use of equipment used in providing initial medical care.
2208.2.6	Describe the compartments of rescue vehicles.

Scene Management and Incident Control

2208.3	Scene Management and Incident Control
2208.3.1	Explore roles of various agencies and organization involved in incident response and control.
2208.3.2	Determine variables involved in planning for response to extrication calls.

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2208.3.3	Discuss responsibilities of emergency services personnel in the extrication process.
2208.3.4	Explain basic safety procedures for scene control.
2208.3.5	Discuss typical control zones for extrication incidents.
2208.3.6	Explain typical command and control structures for extrication incidents.
2208.3.7	Describe steps for incident termination including emotional processing and documentation.

Skills in this course focus on the professional qualifications required by National Fire Protection Association (NFPA) Standard 1002 for fire apparatus drivers/pump operators in the fire service field.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Fundamentals for Apparatus Drivers/Pump Operators

2209.1	Fundamentals for Apparatus Drivers/Pump Operators
2209.1.1	Examine NFPA Standard 1002 4.3 regarding qualifications for fire apparatus/pump operators.
2209.1.2	Examine NFPA Standard 1002 4.2 regarding performing routine tests, inspections and preventive servicing and maintenance functions on systems and components of vehicles.
2209.1.3	Investigate laws applying to emergency response vehicles.
2209.1.4	Discuss the responsibilities of a fire service driver.
2209.1.5	Discuss the responsibilities of a pump operator.
2209.1.6	Assess limitations of emergency vehicles.
2209.1.7	Examine the steps involved in a pre-trip vehicle inspection.
2209.1.8	Describe the documentation of a pre-trip vehicle inspection.
2209.1.9	Explain the conditions under which an emergency vehicle should be placed out of service.
2209.1.10	Describe function and use of the Authority Having Jurisdiction's (AHJ) vehicle preventive maintenance record forms.
2209.1.11	Explain routine servicing needs of emergency services vehicles and related record keeping.
2209.1.12	Describe service needs that require further investigation by a certified mechanic.
2209.1.13	Examine procedures/skills associated with safe and effective driving of various emergency vehicles.
2209.1.14	Describe precautions that drivers of emergency services vehicles must take when driving in various weather conditions.
2209.1.15	Describe the proper placement of equipment at a hydrant, dump tank, accident scene, drafting site and common scene.
2209.1.16	Explain the use of equipment/tools associated with various vehicles in emergency services.
2209.1.17	Describe response procedures for various apparatus including types of calls which require their use.

Apparatus Types

2209.2	Apparatus Types
2209.2.1	Describe the use of various types of fire apparatus pumps.
2209.2.2	Describe the components of pumps and their functions.
2209.2.3	Describe the performance of various pump operation tasks.
2209.2.4	Explain pump operations from various water sources.
2209.2.5	Discuss considerations regarding relay pumping operations.
2209.2.6	Describe the disengagement of fire apparatus pumps and their return to normal road operation mode.

This course provides students with a comprehensive understanding of foundational concepts essential for success in the field of emergency medical services (EMS). Students will develop proficiency in identifying topographic terms, understanding anatomy and physiology of major body systems, and applying writing skills in a law and public safety environment. Emphasis is placed on safety practices, client/patient interaction, EMS operations, and information collection within the EMS framework.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Academic Foundation

2248.1	Identify topographic terms.
2248.1.1	Label the following topographic terms: medial, lateral, proximal, distal, superior, inferior, anterior, posterior, midline, right and left, mid- clavicular, bilateral, and mid-axillary.
2248.2	Identify anatomy and function of major body systems.
2248.2.1	Describe and identify the anatomy and function of the following major body systems: respiratory, circulatory, musculoskeletal, Nervous, integumentary, digestive, urinary, genital, and endocrine.
2248.2.2	Name and label the structures of the respiratory and circulatory systems.
2248.3	Apply writing skills in a law and public safety environment.
2248.3.1	Learn to effectively document client/patient care information.
2248.3.2	Develop proficiency in charting client/patient encounters using standardized medical terminology and formats.
2248.3.3	Understand the importance of accurately documenting incidents and client/patient encounters.
2248.4	Describe respiratory ventilation, oxygenation, and cardiovascular pathophysiology.
2248.4.1	Describe the pulmonary ventilation process to include mechanics of ventilation and alveolar ventilation. (tidal volumes, dead space, etc.).
2248.4.2	Describe the oxygenation process.
2248.4.3	Explain both external and internal respiration processes.
2248.4.4	Chart the life support chain, aerobic metabolism, and anaerobic metabolism.
2248.4.5	Define pathophysiology.
2248.4.6	Discuss pathophysiology of the respiratory and cardiovascular systems.
2248.5	Identify stages of life and physiological characteristics.
2248.5.1	Describe the terms used to designate the following stages of life: infants, toddlers, preschoolers, school-age children, adolescents (teenagers), early adults, middle adults, and late adults.
2248.5.2	Describe the major physiologic and psychosocial characteristics of an infant's life; a toddler and preschooler's life; a school age child's life; an adolescent's life; an early adults' life; a middle adult's life; a late adult's life.

Client/Patient Interaction

2248.6	Develop proficiency in therapeutic and culturally sensitive communication techniques.
2248.6.1	Describe principles of therapeutic and effective communication with clients/patients in a manner that achieves a positive relationship.

2248.6.2	Discuss adjusting communication strategies to effectively communicate to differing age groups, developmental stages, clients/patients with special needs and differing cultures including language barriers.
2248.6.3	Discuss the communication techniques that should be used to interact with the client/patient, client/patient family members, bystanders and individuals from other agencies including verbal diffusion and interview techniques.
2248.6.4	State the steps the EMT should take when approaching a family confronted with death and dying.

EMS Foundation

2248.7	Examine EMS roles, history, regulations, safety, certification, and quality improvement.
2248.7.1	Discuss and explain the roles, responsibilities, and professionalism of EMS personnel.
2248.7.2	Define Emergency Medical Services (EMS) Systems.
2248.7.3	Discuss the historical background of the development of the EMS system.
2248.7.4	Identify the four levels of national EMS's providers (EMR, EMT, AEMT and PM), as well as the three levels in the state of West Virginia.
2248.7.5	State the specific statutes and regulations regarding the EMS system in West Virginia.
2248.7.6	Characterize the EMS system's role in prevention and public education.
2248.7.7	Discuss the roles and responsibilities of the EMT related to personal safety of the crew, client/patient, and bystanders.
2248.7.8	Discuss the maintenance of certification and licensure for the EMT in the state of West Virginia.
2248.7.9	Define quality improvement and discuss the EMT's role in the process.
2248.7.10	Discuss EMS's research and evidence-based decision making.
2248.7.11	Discuss the roles and responsibilities of the EMT related to personal safety and certification maintenance.

Safety and wellbeing

2248.8	Conduct scene assessment for safety issues.
2248.8.1	Explain the need to determine scene safety.
2248.8.2	Recognize and describe hazards/potential hazards at the scene.
2248.8.3	Determine if the scene is safe to enter.
2248.8.4	Discuss stress management techniques useful for both the EMT and the client/patient
2248.9	Identify principles of safety operating a ground ambulance.
2248.9.1	Discuss safety practices for Emergency Medical Technicians (EMTs).
2248.9.2	Discuss the significance of using correct safety precautions to ensure the safety of the client/patient, the EMT, and the EMS team.
2248.9.3	Provide examples of high-risk situations and hazards affecting ambulance safety.
2248.10	Describe EMS operations during a multiple casualty incident.
2248.10.1	Describe the specific condition defining a mass-casualty incident (MCI) and give examples.
2248.10.2	Describe primary and secondary triage and how destination decisions are made.
2248.10.3	Discuss safe air medical operations and criteria for utilizing air medical response.
2248.11	Identify procedures involved in safely operating in and around an air medical operation landing zone.
2248.11.1	Describe key scene safety considerations when preparing for a helicopter medivac.
2248.11.2	Discuss personal and client/patient safety during vehicle extrication.
2248.11.3	Explain the difference between simple access and complex access in vehicle extrication.
2248.12	Identify risks and responsibilities of operating during a terrorism event or during a natural or man-made disaster.
2248.12.1	Describe personal and client/patient safety during a natural or man-made disaster.

2248.12.2	Discuss the factors related to ensuring situational safety at the site of a disaster and the required procedures.
2248.13	Demonstrate knowledge of appropriate communication and interpersonal skills.
2248.13.1	Identify the essential components of a verbal report and legal aspects that need to be considered.
2248.13.2	Discuss stress management techniques useful for both the EMT and the client/patient.
2248.14	Demonstrate competence in client/patient handling and safety procedures.
2248.14.1	Discuss the procedures to safely lift and move clients/patients of various age groups and situations.
2248.14.2	Describe the guidelines and safety precautions for carrying clients/patients and/or equipment.
2248.14.3	Discuss client/patient positioning in common emergency situations.
2248.14.4	Discuss situations that may require the use of medical restraints on the client/patient and explain guidelines and safety considerations for their use.
2248.14.5	Discuss the guidelines and safety precautions that need to be followed when lifting a client/patient.
2248.15	Demonstrate knowledge of infectious disease control and prevention.
2248.15.1	Define "infectious disease" and "communicable disease."
2248.15.2	Describe the routes of transmission for infectious diseases.
2248.15.3	Explain the mode of transmission and the steps to prevent/deal with an exposure of various diseases.
2248.15.4	Discuss the importance of body substance isolation (BSI).
2248.15.5	Explain how immunity to infectious diseases is acquired.
2248.15.6	Explain post-exposure management of exposure to client/patient blood or body fluids.
2248.15.7	Define "infectious disease" and "communicable disease."
2248.16	Demonstrate knowledge of physical fitness and mental wellbeing.
2248.16.1	Describe the components of physical fitness and mental well-being.
2248.16.2	Recognize the warning signs of personal stress.
2248.16.3	Discuss strategies of stress management for the EMT.
2248.17	Demonstrate knowledge of vehicle and equipment operations.
2248.17.1	Discuss the importance of performing regular vehicle and equipment inspections.
2248.17.2	Describe the general provisions of West Virginia laws relating to the operation of an ambulance.
2248.17.3	Discuss "Due Regard for Safety of All Others" while operating an emergency vehicle.
2248.17.4	Provide examples of some high-risk situations and hazards that may affect the safety of the ambulance and its passengers during both pre-transport and during transport.

Intra Team Communication

2248.18	Demonstrate knowledge of components of the EMS communications system.
2248.18.1	Discuss communication of vehicle and equipment readiness.
2248.18.2	Discuss the roles and responsibilities of the EMT to operate emergency vehicles, provide scene leadership, perform client/patient assessment, and administer emergency care.
2248.18.3	Understand the basic principles of the various types of communications equipment used in EMS.
2248.18.4	Describe the use of radio communication and correct radio procedures, including the proper methods of initiating and terminating the radio call/transmission.
2248.18.5	State the proper procedures and sequence for delivery of client/patient information to other healthcare professionals.

Information Collection

2248.19	Demonstrate knowledge of medical terminology, principles of medication documentation, and report writing.
2248.19.1	Identify the medical terminology and medical terms associated with the EMT level.

2248.19.2	Describe the use of written communication and documentation.
2248.19.3	Explain the legal implication of the client/patient care report.
2248.19.4	Identify the minimum dataset reference client/patient information and administrative information on the client/patient care report.
2248.19.5	Understand how to document refusal of care, including legal implications.

This course provides comprehensive training in essential emergency medical procedures. Students learn airway management techniques, cardiovascular and respiratory system assessment, trauma management, and medication administration. Special emphasis is placed on legal and ethical considerations, client/patient confidentiality, and obtaining consent. Through hands-on demonstrations and theoretical discussions, students gain practical skills for Healthcare Provider certification and readiness for careers in emergency medical services.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Emergency Medical Care Technical Skills

2249.1	Demonstrate proficiency in various airway management techniques.
2249.1.1	Identify and apply National Incident Management Systems (NIMS) protocols.
2249.1.2	State what care should be provided for a client/patient with or without adequate breathing.
2249.1.3	Describe and demonstrate the steps in performing the head-tilt chin-lift.
2249.1.4	Relate the mechanism of injury to opening the airway.
2249.1.5	Describe and demonstrate the steps in performing the jaw thrust.
2249.1.6	Describe and demonstrate the techniques of suctioning and its importance.
2249.1.7	Describe how to assess for adequate and inadequate respiration, including the use of pulse oximetry.
2249.1.8	List the components, purpose, indications, contraindications, complications, and procedures for oxygen delivery devices.
2249.1.9	Demonstrate oxygen administration for the pediatric and geriatric client/patient.
2249.1.10	Describe and demonstrate the steps in assisting ventilation for the conscious client/patient in respiratory distress using a bag-valve-mask (BVM) and continuous positive airway pressure (CPAP).
2249.1.11	Demonstrate how to insert an oropharyngeal (oral) and a nasopharyngeal (nasal) airway.
2249.1.12	Describe and demonstrate how to artificially ventilate a client/patient with a pocket mask.
2249.1.13	Describe and demonstrate the steps in artificially ventilating a client/patient with a BVM for one or two rescuers.
2249.1.14	Describe and demonstrate the signs of adequate and inadequate artificial ventilation using the BVM.
2249.1.15	Describe and demonstrate the steps in artificially ventilating a client/patient with a manually triggered ventilation device.
2249.1.16	Demonstrate how to artificially ventilate the pediatric and geriatric client/patient.
2249.1.17	Describe and demonstrate how to perform the Sellick Maneuver (cricoid pressure).
2249.1.18	Recognize the differences between normal and positive pressure ventilation.
2249.1.19	Describe and demonstrate the steps in performing the jaw thrust.
2249.2	Execute timely and effective interventions for cardiovascular emergencies.
2249.2.1	Demonstrate how to measure blood pressure by palpation, auscultation, and electronic devices while in the field.
2249.2.2	Discuss withholding resuscitation if irreversible death is obvious or if a "Do Not Resuscitate" (DNR) is present.
2249.2.3	Review the anatomy and physiology of the respiratory and cardiovascular systems.
2249.2.4	Explain the system components of CPR, the four links in the AHA Chain of Survival (adult and pediatric), and how each one relates to maximizing the survival of the client/patient.

2249.2.5	Secure healthcare provider certification (required prior to EMT program completion).
2249.2.6	Describe shock, including the pathophysiology/causes/signs and symptoms associated with the various types of shock.
2249.2.7	Discuss client/patient assessment and the emergency care of the client/patient with signs and symptoms of shock.
2249.2.8	Discuss and distinguish the causes and variations between the emergency medical care of the infant, child, adult, and geriatric client/patient experiencing shock.
2249.2.9	Review the anatomy, physiology, and pathophysiology of the brain and spinal cord.
2249.3	Display competency in identifying and managing neurological emergencies.
2249.3.1	Discuss and identify the causes of ischemic strokes, hemorrhagic strokes, and transient ischemic attacks, including similarities and differences.
2249.3.2	Discuss the various types of automated external defibrillators.
2249.3.3	Differentiate between the fully automated and the semi-automated defibrillator.
2249.3.4	Understand the importance of maintenance and the operator's checklist for AEDs.
2249.3.5	Demonstrate the ability to use an AED according to the latest guidelines.
2249.3.6	Explain the role medical direction plays in the use of automated external defibrillation.
2249.4	Demonstrate the ability to recognize and manage endocrine and metabolic emergencies.
2249.4.1	Review the anatomy, physiology, and pathophysiology of the endocrine system and its main function in the body.
2249.4.2	Define diabetes (Type I and II), hypoglycemia, hyperglycemia, and diabetic ketoacidosis.
2249.4.3	Identify and demonstrate the steps in the emergency medical care of a client/patient taking diabetic medicine with an altered mental status and a history of diabetes.
2249.4.4	State the generic and trade names, medication forms, dose, administration, action, and contraindications for oral glucose.
2249.4.5	Demonstrate the steps of using a glucometer device and administering oral glucose.
2249.4.6	Distinguish between the emergency medical care of the infant, child, adult, and geriatric client/patient experiencing a diabetic emergency.
2249.5	Exhibit proficiency in assessing and managing psychiatric and behavioral emergencies.
2249.5.1	Define behavior, psychiatric disorders, and behavioral emergencies.
2249.5.2	Discuss the general factors that may cause an alteration in a client/patient's behavior.
2249.5.3	Discuss the risk factors/signs or symptoms of various psychiatric emergencies.
2249.5.4	Discuss special medical/legal considerations for managing behavioral emergencies.
2249.5.5	Distinguish between the emergency medical care of the infant, child, adult, and geriatric client/patient experiencing a behavioral or psychiatric emergency.
2249.6	Illustrate competence in evaluating and managing emergencies related to the gastrointestinal, genitourinary, and reproductive systems.
2249.6.1	Review the basic anatomy, physiology, and pathophysiology of the gastrointestinal, genital, and urinary systems.
2249.6.2	Define the term "acute abdomen."
2249.6.3	Identify the signs, symptoms, and common causes of an acute abdomen.
2249.6.4	Describe and demonstrate the assessment and medical care of the client/patient with gastrointestinal emergencies.
2249.6.5	Describe and demonstrate the emergency medical care of the client/patient experiencing an allergic reaction.
2249.6.6	State the generic and trade names, medication forms, dose, administration, action, and contraindications for the epinephrine auto-injector.

2249.6.7	Demonstrate the use of an epinephrine auto-injector.
2249.6.8	List the causes of infectious diseases.
2249.6.9	Describe and demonstrate the emergency medical care of the client/patient experiencing an infectious disease.
2249.6.10	Discuss mandatory notification to state or federal agencies of various diseases.
2249.6.11	Distinguish between the emergency medical care of the infant, child, adult, and geriatric client/patient experiencing a female reproductive system emergency.
2249.6.12	Explain the general management of a gynecologic emergency in relation to client/patient privacy and communication.
2249.7	Demonstrate proficiency in recognizing and managing toxicological and environmental emergencies.
2249.7.1	Define toxicology, poisoning, and overdose.
2249.7.2	List various ways that poisons enter the body.
2249.7.3	List signs/symptoms associated with poisoning.
2249.7.4	Discuss and demonstrate emergency medical care for the client/patient with poisoning or overdose.
2249.7.5	State the generic and trade names, indications, contraindications, medication form, dose, administration, actions, side effects, and reassessment strategies for activated charcoal.
2249.7.6	Perform the necessary steps required to provide a client/patient with activated charcoal.
2249.8	Explore special considerations for sexual assault/rape victims.
2249.8.1	Discuss the special considerations and precautions an EMT must observe when arriving at the scene of a suspected case of sexual assault or rape.
2249.8.2	Explain special considerations related to a client/patient who has experienced an injury by sexual assault/abuse.
2249.9	Explain musculoskeletal emergencies.
2249.9.1	Describe and demonstrate the emergency medical care of a client/patient with a non-traumatic musculoskeletal emergency.
2249.9.2	Differentiate between internal and external bleeding; arterial, venous, and capillary bleeding.
2249.9.3	Explain and demonstrate emergency medical care of the client/patient with external and internal bleeding.
2249.9.4	Describe the different types of musculoskeletal injuries, including fractures, amputations, sprains, and strains.
2249.9.5	Describe and demonstrate the assessment and management of a client/patient with a suspected orthopedic injury.
2249.9.6	Discuss MOI for orthopedic injury (blunt and penetrating, energy, and injury).
2249.9.7	Differentiate between an open and a closed painful, swollen, and deformed extremity.
2249.10	Explain trauma management (chest, abdominal, head, and spinal injuries).
2249.10.1	Discuss MOI for chest injury (blunt and penetrating, energy, and injury).
2249.10.2	Differentiate between a pneumothorax (open, simple and tension) and a hemothorax.
2249.10.3	Describe and demonstrate the assessment and management of a client/patient with a suspected chest (open and closed) injury.
2249.10.4	Discuss MOI for abdominal injury (blunt and penetrating, energy, and injury).
2249.10.5	Describe the abdominal quadrants.
2249.10.6	Describe the differences between hollow and solid organs.
2249.10.7	Describe and demonstrate the assessment and management of a client/patient with a suspected abdominal (penetrating or blunt) or genitourinary injury.
2249.10.8	Discuss MOI for head, face, and neck (non-spinal) (blunt and penetrating, energy, and injury).

2249.10.9	Describe and demonstrate the assessment and management of a client/patient with an injury to the head, face, and neck (non-spinal).
2249.10.10	Discuss MOI for head (brain) and spinal (blunt and penetrating, energy, and injury).
2249.10.11	Discuss the different types of brain injuries and their corresponding signs and symptoms, including increased intracranial pressure (ICP), concussion, contusion and injuries caused by medical conditions.
2249.11	Explain shock and bleeding management.
2249.11.1	List signs and symptoms of shock (hypoperfusion).
2249.11.2	Discuss MOI for chest injury (blunt and penetrating, energy, and injury).
2249.11.3	Differentiate between internal and external bleeding; arterial, venous, and capillary bleeding.
2249.11.4	Explain and demonstrate emergency medical care of the client/patient with external and internal bleeding.
2249.11.5	Define and list characteristics of superficial, partial-thickness and full-thickness burns.
2249.11.6	Explain how the seriousness of a burn is related to its depth and extent (percent of body surface area (BSA) involved or rule of nine's) for adult and pediatric clients/patients.
2249.11.7	Describe and demonstrate the assessment and management of a client/patient with a soft tissue injury.
2249.11.8	Discuss anatomy, physiology, and pathophysiology of the pediatric trauma client/patient.
2249.11.9	Discuss and demonstrate unique assessment and management considerations for the pediatric trauma client/patient.

Treatment Planning and Implementation

2249.12	Identify and discuss medical, legal, and ethical issues related to the provision of emergency care.
2249.12.1	Differentiate between expressed, implied, and involuntary consent.
2249.12.2	Discuss the methods of obtaining consent and procedures for minors.
2249.12.3	Discuss the implications for the EMT in client/patient refusal of care and/or transport.
2249.12.4	Explain the importance, necessity, and legality of client/patient confidentiality.
2249.12.5	Discuss the implications of a DNR (Do Not Resuscitate) order regarding EMS application.
2249.12.6	Discuss the state of West Virginia and federal special reporting situations such as abuse, sexual assault, gunshots and knife wounds, communicable disease, etc.
2249.12.7	Differentiate between civil tort and criminal actions.
2249.12.8	Discuss the elements of negligence and defenses/protections from liability.
2249.12.9	Discuss the role of the EMT at crime scenes and in the preservation of evidence.
2249.12.10	Define ethics and morality and discuss their implications for the EMT.
2249.13	Explain principles of pharmacology as they are related to emergency care.
2249.13.1	Explain the "Six Rights" of medication administration and describe how each one is related to EMS care.
2249.13.2	Discuss the forms of medications and provide examples of each.
2249.13.3	Discuss how the form of a medication dictates its route of administration.
2249.13.4	Describe the difference between a generic medication name and a trade name and provide an example of each.
2249.13.5	Discuss the components and elements of a drug profile, including actions, contraindications, side effects, dose, and route.
2249.13.6	Describe the role of medical direction in medication administration and explain the difference between direct orders (online) and standing orders (offline).

2249.13.7	Give the generic and trade names, actions, indications, contraindications, routes of administration, side effects, interactions, and doses of medications that may be administered by an EMT in an emergency, as dictated by the state of WV.
2249.13.8	Demonstrate how to administer medication in the following routes: oral, sublingual, and auto-injector.
2249.14	Define and discuss trauma management.
2249.14.1	Define and discuss the term "pathophysiology of the trauma client/patient."
2249.14.2	Discuss and demonstrate assessment and management of the trauma client/patient.
2249.14.3	Discuss and describe significant and non-significant mechanisms of injury (MOI) and provide examples of each.
2249.14.4	Discuss the National Trauma Triage Protocol of injured clients/patients
2249.15	Discuss emergency care in obstetrics and pediatrics.
2249.15.1	Review the anatomy, physiology, and pathophysiology of the female reproductive system.
2249.15.2	Explain the normal changes that occur during pregnancy.
2249.15.3	Differentiate between the stages of labor and delivery.
2249.15.4	Discuss and demonstrate assessment and management considerations of a pregnancy.
2249.15.5	Discuss assessment and management considerations of complications of pregnancy.
2249.15.6	Discuss and demonstrate assessment and management considerations of a neonate.
2249.15.7	Describe the anatomy, physiology, and pathophysiology of the pediatric client/patient.
2249.15.8	Describe the differences in anatomy when compared to the adult client/patient.
2249.15.9	Discuss and demonstrate assessment and management considerations of a pediatric emergency.
2249.15.10	Discuss and demonstrate assessment and management considerations for sudden infant death syndrome (SIDS).
2249.15.11	Define and discuss the term "geriatrics."
2249.15.12	Discuss the anatomy, physiology, and pathophysiology of the geriatric client/patient.
2249.15.13	Discuss and demonstrate assessment and management considerations of a geriatric emergency.
2249.15.14	Define and discuss child and elder abuse and neglect, including possible indicators of each.
2249.15.15	Discuss assessment and management considerations of a client/patient with special needs, to include child and elder abuse and neglect, homelessness/poverty, etc.

Monitoring Client/Patient Status

2249.16	Demonstrate knowledge of primary client/patient assessment procedures for all client/patient age levels.
2249.16.1	Summarize the elements of a general impression of the client/patient.
2249.16.2	Discuss and demonstrate methods of assessing altered mental status using alert, voice, pain, and unresponsive (AVPU).
2249.16.3	Discuss and demonstrate methods of assessing the airway and providing airway care.
2249.16.4	Describe and demonstrate methods used for assessing if a client/patient is breathing.
2249.16.5	Differentiate between a client/patient with adequate and inadequate breathing.
2249.16.6	Distinguish between methods of assessing breathing.
2249.16.7	Describe and demonstrate the methods used to obtain a pulse.
2249.16.8	Discuss and demonstrate the need for assessing the client/patient for external bleeding.
2249.16.9	Describe and demonstrate normal and abnormal findings when assessing skin color, temperature, moisture, and capillary refill in adult, child, and infant.
2249.16.10	Explain the reason for and demonstrate prioritizing a client/patient for care and transport.
2249.17	Demonstrate knowledge of the procedure for taking a client/patient history and effective communication.

2249.17.1	Discuss the process of taking a history, its key components, and its relationship to the primary assessment process.
2249.17.2	Explain the importance of obtaining a sample and an OPQRST history.
2249.17.3	Recognize and respond to the feelings clients/patients experience during assessment.
2249.17.4	Describe examples of different techniques the EMT may use to obtain information from patients/clients, family, or bystanders during the history-taking process.
2249.17.5	Describe the unique needs and demonstrate assessing an individual with a specific chief complaint with no known prior history.
2249.18	Demonstrate knowledge of physical examination and assessment skills.
2249.18.1	Discuss the components of the physical exam and skills involved.
2249.18.2	Differentiate between the history and physical exam performed for responsive patients/clients with no known prior history, responsive patients/clients with a known prior history, and unresponsive patients/clients.
2249.18.3	Explain and demonstrate the use/interpretation of pulse oximetry device readings.

Client/Patient Status Evaluation

2249.19	Demonstrate knowledge of reassessment and its significance in client/patient assessment.
2249.19.1	Describe the components of reassessment and demonstrate the skills involved.
2249.19.2	Discuss the reasons for repeating the initial assessment as part of the reassessment.
2249.19.3	Explain trending assessment components and their value to other health professionals who assume care of the client/patient.

This course provides a comprehensive understanding of advanced firefighting techniques and industrial fire protection standards. Students will learn about Incident Command Systems (ICS), communication protocols, radio systems, record-keeping procedures, and industrial-specific adaptations of firefighting strategies. Additionally, the course covers the selection, maintenance, and proper use of protective equipment, gas detectors, and oxygen meters in industrial settings.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Basics of Incident Command for Industrial Manufacturing and Petrochemical Plants

2250.1	Apply Advanced Principles of Incident Command Systems (ICS).
2250.1.1	Utilize advanced principles of ICS to effectively organize and execute emergency response efforts during firefighting operations.
2250.1.2	Demonstrate the ability to apply ICS concepts to manage resources, coordinate response activities, and achieve incident objectives in various firefighting scenarios.
2250.2	Describe the Function and Operational Procedures of a Communications Center.
2250.2.1	Explain the importance of effective communication in coordinating firefighting efforts and ensuring the safety of responders and the public.
2250.2.2	Explain the function and operational procedures of a communications center within industrial contexts, utilizing knowledge recall and comprehension.
2250.3	Evaluate and Critique Operational Procedures of Communications Centers.
2250.3.1	Evaluate and analyze the operational procedures of communications centers in industrial emergency response scenarios, utilizing critical thinking and analysis skills.
2250.3.2	Identify areas for improvement in communication center operations and propose constructive solutions to enhance efficiency and effectiveness.
2250.4	Explain the Intricate Functionality of Radio Systems Used in Firefighting.
2250.4.1	Break down complex concepts related to radio technologies and protocols, demonstrating understanding and proficiency in explaining their application in industrial emergency response contexts.
2250.5	Discuss and Implement Robust Systems for Records Management and Reporting in Industrial Incidents
2250.5.1	Design and implement efficient protocols and procedures for recording incident data, maintaining records, and generating reports to support post-incident analysis and regulatory compliance in industrial settings.
2250.6	Trace the Comprehensive Historical Development of the Incident Command System (ICS) in Industrial Settings.
2250.6.1	Trace and categorize the comprehensive historical development of the Incident Command System (ICS) and its adaptations for industrial manufacturing and petrochemical plants.
2250.6.2	Analyze historical trends and events shaping the evolution of ICS in industrial contexts, demonstrating understanding of the historical context and implications for current practices.
2250.7	Analyze the Unique Characteristics of ICS in Industrial Settings.
2250.7.1	Evaluate the unique characteristics of ICS in industrial settings, including jurisdictional authority, all-risk and all-hazard approaches, and the principle of unity of command.
2250.7.2	Synthesize information to identify the implications of these characteristics for emergency response management in industrial environments.

2250.8	Define Common Terms and Terminology Related to ICS in the Industrial Environment.
2250.8.1	Define common terms and terminology related to ICS, utilizing knowledge recall, comprehension, and application.
2250.8.2	Provide examples and real-world scenarios to illustrate the application of ICS terminology.
2250.9	Examine and Appraise Consolidated Incident Action Plans.
2250.9.1	Examine and appraise consolidated incident action plans tailored for firefighting scenarios.
2250.9.2	Assess the effectiveness and feasibility of incident action plans, identifying areas for improvement and suggesting revisions as needed.
2250.10	Review and Refine Consolidated Incident Action Plans.
2250.10.1	Review and refine consolidated incident action plans through practical exercises and case studies
2250.10.2	Collaborate with stakeholders to validate plans, incorporate lessons learned, and refine strategies for enhancing effectiveness and adaptability.
2250.11	Describe and Implement Industrial-Specific ICS Models.
2250.11.1	Describe and implement industrial-specific ICS models, highlighting their nuances in industrial manufacturing and petrochemical plants, utilizing comprehension and application skills.
2250.11.2	Adapt and customize industrial-specific ICS models to address the unique challenges and requirements of specific industrial sectors, processes, and hazards.
2250.12	Compare and Contrast Industrial-Specific ICS Models with Other Variants of ICS.
2250.12.1	Identify key differentiators and best practices, analyze strengths and weaknesses, and draw conclusions regarding the suitability of different ICS models for various industrial contexts.

Industrial Fire Protection

2250.13	Describe various standards for industrial fire protection systems.
2250.13.1	Recall and identify different standards governing industrial fire protection systems, including NFPA, OSHA, and local regulations.
2250.13.2	Explain the purpose and requirements of each standard, highlighting key elements such as fire suppression systems, fire alarms, and emergency exits.
2250.14	Explain selection, care, use and limitation of protective equipment.
2250.14.1	Understand the selection criteria for various types of protective equipment used in firefighting, such as turnout gear, helmets, gloves, and boots.
2250.14.2	Demonstrate knowledge of proper care, maintenance, and storage practices to prolong the lifespan of protective gear and ensure its effectiveness.
2250.14.3	Identify limitations and potential hazards associated with specific types of protective equipment and apply this understanding to make informed decisions in real-world scenarios.
2250.15	Demonstrate inspection and maintenance of protective equipment.
2250.15.1	Apply proper inspection procedures to assess the condition of protective equipment, including visual inspections and functional tests.
2250.15.2	Perform routine maintenance tasks, such as cleaning, repairing, and replacing damaged components, to ensure the operational readiness of protective gear.
2250.15.3	Demonstrate the correct donning and doffing techniques for personal protective equipment (PPE) and explain the importance of proper fit and adjustment.
2250.16	Describe selection, care, use and limitations of combustible gas detectors.
2250.16.1	Understand the principles of operation behind combustible gas detectors and their role in detecting flammable gases and vapors.
2250.16.2	Explain factors to consider when selecting gas detectors, including sensor types, detection range, and calibration requirements.

2250.16.3	Identify proper care and maintenance procedures for gas detectors, including sensor cleaning, battery replacement, and calibration checks.
2250.16.4	Discuss limitations and potential interferences that may affect the accuracy and reliability of gas detectors in different environments.
2250.17	Demonstrate inspection and maintenance of gas detectors.
2250.17.1	Perform functional checks and calibration procedures on combustible gas detectors to ensure accurate readings and proper operation.
2250.17.2	Conduct routine inspections of gas detector components, such as sensors, batteries, and alarms, to identify and address any issues or malfunctions.
2250.17.3	Demonstrate proficiency in troubleshooting common problems with gas detectors and implementing corrective actions as needed.
2250.18	Explain selection, care, use and limitation of oxygen meters.
2250.18.1	Understand the function and importance of oxygen meters in assessing atmospheric oxygen levels and ensuring a safe work environment.
2250.18.2	Explain factors to consider when selecting oxygen meters, including sensor types, measurement range, and environmental conditions.
2250.18.3	Discuss proper care and maintenance procedures for oxygen meters, including sensor calibration, battery replacement, and storage guidelines.
2250.18.4	Identify limitations and potential sources of error in oxygen meter readings, such as altitude, temperature, and humidity variations.
2250.19	Demonstrate inspection and maintenance of oxygen meters.
2250.19.1	Perform functional checks and calibration procedures on oxygen meters to verify accuracy and reliability of oxygen level measurements.
2250.19.2	Conduct regular inspections of oxygen meter components, such as sensors, displays, and alarms, to ensure proper functioning and compliance with safety standards.
2250.19.3	Demonstrate proficiency in troubleshooting common issues with oxygen meters and implementing corrective measures to maintain equipment integrity and performance.

This course is designed to provide knowledge and skills related to the use of hazardous materials in an industrial setting. Topics include OSHA General Industry Standards and other consensus and proprietary standards relating to the use of hazardous materials; flammable and combustible liquids; compressed gases; LP-gases; cryogenic liquids; processes such as spraying and dipping; and use of electrical equipment in hazardous locations.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Industrial Safety Management

2251.1	Recognize and evaluate hazards within industrial settings.
2251.1.1	Identify potential hazards commonly found in industrial environments, such as chemical, electrical, and structural hazards.
2251.1.2	Demonstrate understanding of how specific industrial processes and equipment can contribute to the presence of hazards.
2251.1.3	Describe methods for assessing and evaluating hazards, including hazard identification techniques and risk assessment tools.
2251.2	Conduct risk analysis and risk management activities.
2251.2.1	Understand the principles of risk analysis and risk management in industrial settings, including risk assessment methodologies and risk control measures.
2251.2.2	Analyze potential risks associated with specific industrial activities or processes, considering factors such as severity, likelihood, and potential consequences.
2251.2.3	Formulate risk management strategies to mitigate or control identified risks, prioritizing actions based on the level of risk and available resources.
2251.3	Formulate control and mitigation strategies.
2251.3.1	Apply knowledge of hazard identification and risk analysis to develop effective control and mitigation strategies for industrial hazards.
2251.3.2	Develop comprehensive plans and procedures to minimize or eliminate hazards, incorporating engineering controls, administrative controls, and personal protective equipment (PPE).
2251.3.3	Synthesize information from risk assessments, regulatory requirements, and best practices to design tailored strategies that address specific hazards and operational challenges.
2251.4	Maintain program/system effectiveness.
2251.4.1	Establish systems for ongoing monitoring and evaluation of hazard control measures and risk management programs in industrial settings.
2251.4.2	Continuously assess the effectiveness of control strategies and procedures, identifying areas for improvement and implementing corrective actions as needed.
2251.4.3	Ensure compliance with relevant regulations and standards and adapt programs/systems to changes in industry practices or emerging hazards.
2251.5	Discuss probable hazards.
2251.5.1	Analyze and discuss potential hazards associated with various industrial processes, materials, and equipment.
2251.5.2	Evaluate the likelihood and severity of potential hazards, considering factors such as frequency of exposure, consequences of failure, and existing control measures.

2251.5.3	Engage in critical discussions on hazard recognition and risk assessment, fostering a deeper understanding of industrial safety principles among peers.
2251.6	Apply and interpret applicable codes and standards.
2251.6.1	Apply knowledge of relevant codes, regulations, and industry standards to assess compliance and identify gaps in industrial safety practices.
2251.6.2	Interpret and apply specific provisions of codes and standards to address regulatory requirements and ensure safe work practices in industrial settings.
2251.6.3	Demonstrate the ability to navigate and interpret complex regulatory documents and technical standards related to industrial safety and fire management.
2251.7	Demonstrate understanding of the conduct of industrial incidental investigations.
2251.7.1	Apply investigative techniques and protocols to conduct thorough and objective investigations of industrial incidents.
2251.7.2	Demonstrate proficiency in gathering and analyzing evidence, interviewing witnesses, and documenting findings in incident reports.
2251.7.3	Present findings and recommendations effectively, communicating investigative results to stakeholders and facilitating continuous improvement in safety practices.
2251.8	Demonstrate an understanding of associated legal responsibilities and recordkeeping.
2251.8.1	Understand legal obligations and responsibilities related to industrial fire management, including reporting requirements, liability, and recordkeeping.
2251.8.2	Describe the importance of accurate and timely reporting of hazardous materials incidents, and the implications of non-compliance with regulatory requirements.
2251.8.3	Demonstrate knowledge of recordkeeping practices and systems for maintaining compliance records, incident reports, and other documentation related to industrial fire management.
2251.9	Describe methods of implementing various emergency response plans.
2251.9.1	Understand the components and objectives of emergency response plans, including preparedness, response, and recovery phases.
2251.9.2	Describe strategies and protocols for implementing emergency response plans in industrial settings, including incident command structures, communication procedures, and resource management.
2251.9.3	Discuss the importance of training, drills, and exercises in preparing personnel to effectively implement emergency response plans and respond to industrial emergencies.
2251.10	Identify employee training requirements.
2251.10.1	Identify and assess training needs for employees involved in industrial fire management, considering job roles, responsibilities, and skill levels.
2251.10.2	Recommend appropriate training programs and resources to address identified training gaps and ensure competency in hazard recognition, response procedures, and safety practices.
2251.10.3	Collaborate with stakeholders to develop and implement training plans that meet regulatory requirements and organizational objectives.
2251.11	Describe health and safety requirements for medical monitoring and exposure records.
2251.11.1	Understand the importance of medical monitoring and exposure records in protecting the health and safety of personnel working in industrial environments.
2251.11.2	Describe legal and regulatory requirements for medical surveillance programs, including pre-employment screenings, periodic health assessments, and exposure monitoring.
2251.11.3	Analyze potential health hazards and exposure risks associated with industrial activities and discuss strategies for mitigating risks and ensuring compliance with health and safety regulations.

Industrial Hazardous Materials

2251.12	Describe various types of hazardous materials found in industrial settings.
2251.12.1	Identify and classify different types of hazardous materials commonly encountered in industrial environments, including chemicals, gases, flammable liquids, and radioactive substances.
2251.12.2	Explain the properties, characteristics, and potential hazards associated with each type of hazardous material, including their physical and chemical properties, toxicity levels, and reactivity.
2251.13	Describe risks associated with various types of hazardous materials.
2251.13.1	Analyze and assess the risks and hazards posed by different types of hazardous materials in industrial settings, considering factors such as flammability, toxicity, corrosiveness, and environmental impact.
2251.13.2	Discuss the potential consequences of exposure to hazardous materials, including health effects on individuals, environmental contamination, and property damage.
2251.14	Discuss notification processes and identify situations when notifications are required.
2251.14.1	Apply knowledge of regulatory requirements and industry best practices to discuss notification processes for hazardous materials incidents in industrial settings.
2251.14.2	Identify situations and criteria that trigger notifications to relevant authorities, such as spills, releases, exposures, or emergencies, and explain the importance of timely and accurate reporting.
2251.15	Discuss specific procedures for handling hazardous materials incidents (SOPs).
2251.15.1	Synthesize information from standard operating procedures (SOPs) and protocols to discuss specific procedures for responding to hazardous materials incidents in industrial settings.
2251.15.2	Describe step-by-step procedures for assessing the situation, establishing incident command, evaluating hazards, and implementing appropriate response actions to mitigate risks and protect personnel and the environment.
2251.16	Discuss methods of performing control and containment operations.
2251.16.1	Apply knowledge of control and containment techniques to discuss methods for managing hazardous materials incidents and preventing further spread or exposure.
2251.16.2	Analyze strategies for establishing exclusion zones, controlling access to the incident scene, deploying containment barriers, and implementing source control measures to minimize the release of hazardous materials.
2251.17	Describe implementation of decontamination procedures.
2251.17.1	Understand the principles and objectives of decontamination procedures in hazardous materials incidents, including primary, secondary, and technical decontamination.
2251.17.2	Describe the steps and protocols for setting up decontamination stations, conducting decontamination processes, and ensuring the safety and effectiveness of decontamination operations for personnel and equipment.
2251.18	Describe SOPs for handling hazardous materials incidents and termination procedures.
2251.18.1	Utilize knowledge of standard operating procedures (SOPs) to describe protocols for handling hazardous materials incidents from initial response through termination and recovery phases.
2251.18.2	Evaluate the effectiveness of SOPs in guiding personnel through incident management tasks, coordinating resources, and ensuring safe and efficient resolution of hazardous materials incidents.

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2406.1.2	Establish goals for career development and achievement.
2406.1.3	Develop attitudes and work habits that support career retention and advancement.
2406.1.4	Communicate in varied contexts.
2406.1.5	Relate skills and abilities to possible career pathways.
2406.1.6	Explain methods of goal development.
2406.1.7	Discuss methods of time management and task coordination.
2406.1.8	Practice professionalism in punctuality, appropriate dress, task completion, etc.
2406.1.9	Investigate methods of supervision such as giving and receiving feedback and instruction.
2406.1.10	Develop and present a statement of their personal work ethic beliefs.
2406.1.11	Prepare an application, cover letter, resume and thank you letter.
2406.1.12	Create a personal portfolio for use when applying for employment.
2406.1.13	Practice simulated job interviews.

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2406.2.3	Identify Personal Protective Equipment (PPE).
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2406.2.5	Research agencies that are responsible for emergencies in the workplace.
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2406.2.7	Demonstrate operating instructions before using any equipment.
2406.2.8	Establish procedures for safe evacuation of the worksite in an emergency.
2406.2.9	Follow safety and security procedures.
2406.2.10	Wear PPE as required for specified tasks.

Leadership Development

2406.3	Leadership Development.
2406.3.1	Practice public speaking.
2406.3.2	Explore Parliamentary law.
2406.3.3	Understand leadership concepts.

2406.3.4	Identify characteristics of effective teams and organizations.
2406.3.5	Develop and deliver speeches.
2406.3.6	Participate in meetings using parliamentary procedures.
2406.3.7	Attend leadership conferences and trainings (local, state and/or national).

Customer and Personal Service

2406.4	Customer and Personal Service.
2406.4.1	Examine customer needs assessment.
2406.4.2	Understand quality standards for services.
2406.4.3	Examine evaluation of customer satisfaction.
2406.4.4	Confer with customers by telephone or in person to provide information about products or services, take or enter orders, cancel accounts, or obtain details of complaints.
2406.4.5	Keep records of customer interactions or transactions, recording details of inquiries, complaints, or comments, and actions taken.
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2406.4.8	Refer unresolved customer grievances to designated departments for further investigation.

The Nature of Technology

2406.5	The Nature of Technology.
2406.5.1	Analyze characteristics and scope of technology.
2406.5.2	Evaluate the usefulness of technology.
2406.5.3	Research the development of technology.
2406.5.4	Explore human creativity and motivation.
2406.5.5	Review product demand.
2406.5.6	Understand the core concepts of technology.
2406.5.7	Analyze the relationships among technologies and the connections between technology and other fields.
2406.5.8	Examine the interaction of systems.
2406.5.9	Discover the interrelation of technological environments.
2406.5.10	Gain knowledge from other fields of study and technology.

Technology and Society

2406.5	Technology and Society.
2406.5.1	Research the cultural, social, economic and political effects of technology.
2406.5.2	Understand attitudes toward development and use.
2406.5.3	Explore impacts and consequences of technology.
2406.5.4	Examine ethical issues.
2406.5.5	Analyze influences on economy, politics and culture.
2406.5.6	Research the effects of technology on the environment.
2406.5.7	Explore the management of waste.
2406.5.8	Analyze how technologies repair damage.
2406.5.9	Compare environmental vs. economic concerns.
2406.5.10	Identify the role of society in the development and use of technology.
2406.5.11	Recognize development driven by demands, values and interests.
2406.5.12	Research inventions and innovations.

2406.5.13	Understand social and cultural priorities.
2406.5.14	Explore acceptance and use of products and systems.
2406.5.15	Research the influence of technology on society.
2406.5.16	Understand processes of inventions and innovations.
2406.5.17	Research specialization of labor.
2406.5.18	Explore the evolution of techniques, measurement and resources.
2406.5.19	Gain technological and scientific knowledge.

Design

2406.6	Design.
2406.6.1	Identify the attributes of design.
2406.6.2	Explore how design leads to useful products and systems.
2406.6.3	Understand the concept that there is no perfect design.
2406.6.4	Discover design requirements.
2406.6.5	Explore engineering design.
2406.6.6	Practice brainstorming.
2406.6.7	Practice modeling, testing, evaluating and modifying.
2406.6.8	Explore the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
2406.6.9	Describe troubleshooting.
2406.6.10	Research invention and innovation.
2406.6.11	Conduct experimentation.

Abilities for a Technological World

2406.7	Abilities for a Technological World.
2406.7.1	Explore the design process.
2406.7.2	Apply the design process.
2406.7.3	Identify criteria and constraints.
2406.7.4	Model a solution to a problem.
2406.7.5	Test and evaluate.
2406.7.6	Make a product or system.
2406.7.7	Understand the use and maintenance of technological products and systems.
2406.7.8	Use information to see how things work.
2406.7.9	Safely use tools to diagnose, adjust and repair.
2406.7.10	Use computers and calculators.
2406.7.11	Operate systems.
2406.7.12	Assess the impact of products and systems.
2406.7.13	Design and use instruments to collect data.
2406.7.14	Use collected data to find trends.
2406.7.15	Identify trends.
2406.7.16	Interpret and evaluate accuracy of information.

The Designed World

2406.8	The Designed World.
2406.8.1	Examine medical technologies.
2406.8.2	Research advances and innovations in medical technologies.

2406.8.3	Identify sanitation processes.
2406.8.4	Research immunology.
2406.8.5	Gain awareness about genetic engineering.
2406.8.6	Explore agricultural and related biotechnologies.
2406.8.7	Research technological advances in agriculture.
2406.8.8	Discover specialized equipment and practices.
2406.8.9	Connect biotechnology and agriculture.
2406.8.10	Analyze artificial ecosystems and management.
2406.8.11	Understand the development of refrigeration, freezing, dehydration, preservation and irradiation.
2406.8.12	Explore energy and power technologies.
2406.8.13	Understand energy is the capacity to do work.
2406.8.14	Understand energy can be used to do work using many processes.
2406.8.15	Understand power is the rate at which energy is converted from one form to another.
2406.8.16	Explore power systems.
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2406.8.21	Discover factors influencing the design of a message.
2406.8.22	Recognize language of technology.
2406.8.23	Explore transportation technologies.
2406.8.24	Explore design and operation of transportation systems.
2406.8.25	Research subsystems of transportation system.
2406.8.26	Discover governmental regulations.
2406.8.27	Identify transportation processes.
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2406.8.29	Explore manufacturing systems
2406.8.30	Identify manufacturing goods.
2406.8.31	Identify manufacturing processes.
2406.8.32	Examine chemical technologies.
2406.8.33	Describe materials use.
2406.8.34	Identify marketing products.
2406.8.35	Research construction technologies.

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2408.7.13	Design and use instruments to collect data.
2408.7.14	Use collected data to find trends.
2408.7.15	Identify trends.
2408.7.16	Interpret and evaluate accuracy of information.

The Designed World

2408.8	The Designed World.
2408.8.1	Examine medical technologies.
2408.8.2	Research advances and innovations in medical technologies.

2408.8.3	Identify sanitation processes.
2408.8.4	Research immunology.
2408.8.5	Gain awareness about genetic engineering.
2408.8.6	Explore agricultural and related biotechnologies.
2408.8.7	Research technological advances in agriculture.
2408.8.8	Discover specialized equipment and practices.
2408.8.9	Connect biotechnology and agriculture.
2408.8.10	Analyze artificial ecosystems and management.
2408.8.11	Understand the development of refrigeration, freezing, dehydration, preservation and irradiation.
2408.8.12	Explore energy and power technologies.
2408.8.13	Understand energy is the capacity to do work.
2408.8.14	Understand energy can be used to do work using many processes.
2408.8.15	Understand power is the rate at which energy is converted from one form to another.
2408.8.16	Explore power systems.
2408.8.17	Discuss efficiency and conservation.
2408.8.18	Explore information and communication technologies.
2408.8.19	Explore information and communications systems.
2408.8.20	Research how communication systems encode, transmit and receive information.
2408.8.21	Discover factors influencing the design of a message.
2408.8.22	Recognize language of technology.
2408.8.23	Explore transportation technologies.
2408.8.24	Explore design and operation of transportation systems.
2408.8.25	Research subsystems of transportation system.
2408.8.26	Discover governmental regulations.
2408.8.27	Identify transportation processes.
2408.8.28	Explore manufacturing technologies.
2408.8.29	Explore manufacturing systems
2408.8.30	Identify manufacturing goods.
2408.8.31	Identify manufacturing processes.
2408.8.32	Examine chemical technologies.
2408.8.33	Describe materials use.
2408.8.34	Identify marketing products.
2408.8.35	Research construction technologies.

Engineering Capstone

Course #: 2457

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 1803, 7181, 7441, 7442, 7443, 7444, 7465, 7466, 7467, 7468, 7550, 7560, 7561, 7562, 7563, 7564, 7565, 7590

Engineering Capstone provides students an opportunity to apply the skills they have acquired in previous courses to undertake an open-ended engineering project. This capstone course encourages creativity, teamwork, and problem-solving as students design, prototype, and present their solutions to real-world challenges.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Innovative Mindset

2461.1	Demonstrate independent thinking and self-direction to accomplish goals.
2461.1.1	List and prioritize goals with clear success criteria.
2461.1.2	Plan and manage time effectively without direct supervision.
2461.1.3	Develop a plan to acquire additional knowledge needed to achieve goals.
2461.2	Demonstrate flexibility and adaptability in varied work roles and environments.
2461.2.1	Adapt to changing roles, responsibilities, schedules, and contexts.
2461.3	Persevere to solve a problem and achieve goals.
2461.3.1	Explain the importance of persistence in problem-solving.
2461.3.2	Recognize failure as part of growth and professional development.
2461.3.3	Reflect critically on past experiences to improve future efforts.

Design Process

2461.4	Explain and justify the engineering design process.
2461.4.1	Describe multiple versions of the design process that share core steps.
2461.4.2	Identify major steps and typical tasks in a design process.
2461.4.3	Assign engineering tasks to appropriate design steps.
2461.4.4	Explain how iteration improves design solutions and informs decisions.
2461.4.5	Document design activities accurately in an engineering notebook.
2461.5	Collect, analyze, and interpret relevant information for design decisions.
2461.5.1	Explain the role of research in design.
2461.5.2	Locate credible data from reliable sources.
2461.5.3	Recognize the roles of stakeholders and experts in the design process.
2461.5.4	Evaluate reliability and credibility of information sources.
2461.6	Define and frame engineering problems effectively.
2461.6.1	Explain the importance of clear problem/opportunity definitions with criteria and constraints.
2461.6.2	Identify design requirements and realistic constraints (visual, functional, structural).
2461.6.3	List common constraints affecting design success (economic, environmental, ethical, manufacturability, etc.).
2461.7	Generate multiple solution concepts using appropriate techniques.
2461.7.1	Use idea generation techniques and guidelines.
2461.7.2	Communicate concepts visually with sketches, graphs, charts, etc.
2461.8	Develop and use models to test and demonstrate design solutions.

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 1803, 7181, 7441, 7442, 7443, 7444, 7465, 7466, 7467, 7468, 7550, 7560, 7561, 7562, 7563, 7564, 7565, 7590

2461.8.1	Explain the purpose and constraints of models representing physical systems.
2461.8.2	Identify types of models: physical, mathematical, virtual, and their appropriate use.
2461.9	Evaluate and select optimal solutions from alternatives.
2461.9.1	Understand trade-offs and multiple viable solutions in design.
2461.9.2	Use decision-making tools such as decision matrices to compare options.
2461.10	Make informed engineering judgments based on evidence.
2461.10.1	Recognize validity of conclusions supported by evidence with consideration of limitations and biases.
2461.10.2	Critically evaluate evidence and identify next steps to improve solutions.

Engineering Tools and Technology

2461.11	Accurately measure and report engineering quantities.
2461.11.1	Understand measurement approximations and uncertainty.
2461.11.2	Differentiate accuracy vs. precision.
2461.11.3	Apply dimensional analysis and unit conversions.
2461.12	Interpret and analyze engineering data.
2461.12.1	Use appropriate graphical representations (dot plots, histograms).
2461.12.1	Apply descriptive statistics (mean, median, standard deviation).
2461.12.3	Use normal distribution concepts and empirical rule.
2461.13	Apply mathematical and graphical models to solve engineering problems.
2461.13.1	Analyze scatter plots to describe relationships between variables.
2461.13.2	Fit and use functions (linear, quadratic, exponential) for predictions.
2461.13.3	Interpret slope and intercept in real-world context.
2461.13.4	Distinguish sample vs. population statistics and appropriate applications.

Communication

2461.14	Communicate engineering information effectively for varied audiences.
2461.14.1	Follow conventions of grammar, spelling, and mechanics in written, oral, and electronic forms.
2461.14.2	Use accepted technical writing and presentation formats.
2461.14.3	Adjust content and style based on audience size and characteristics.
2461.14.4	Modify the content, format, level of technical detail, and length of communications to meet the needs of the audience.
2461.14.5	Cite sources using accepted referencing formats.
2461.14.6	Label tables and figures clearly and explain their context.
2461.14.7	Apply effective oral delivery techniques (volume, tempo, eye contact, articulation, energy).

Collaboration

2461.15	Facilitate and contribute to effective teamwork.
2461.15.1	Describe team roles and interdependencies.
2461.15	Contribute individually to overall collaborative efforts.
2461.15.2	Self-evaluate contributions and team collaboration effectiveness.
2461.15	Analyze and evaluate the work of others to provide helpful and effective feedback.
2461.15.1	Describe the purpose and positive outcomes of a peer review process.
2461.15.2	Provide constructive feedback and understand peer review benefits.
2461.15	Manage engineering projects collaboratively.
2461.15.1	Explain project management principles: timelines, schedules, risk mitigation.

Engineering Capstone**Course #: 2457****Allowable Teacher Endorsement:** 0608, 1800, 1801, 1802, 1803, 7181, 7441, 7442, 7443, 7444, 7465, 7466, 7467, 7468, 7550, 7560, 7561, 7562, 7563, 7564, 7565, 7590

2461.15.2	Develop project plans using tools like Gantt charts.
2461.15.3	Use collaborative digital tools for communication and document sharing.

Allowable Teacher Endorsement: 0608, 1800, 1801, 1802, 1803, 7181, 7441, 7442, 7443, 7444, 7465, 7466, 7467, 7468, 7550, 7560, 7561, 7562, 7563, 7564, 7565, 7590

Engineering Essentials (EES) is a foundational course introducing students to engineering through hands-on, project-based learning. Students explore engineering disciplines, learn the design process, develop technical skills, and practice teamwork and communication.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Design Foundations

2461.1	Explore engineers and engineering.
2461.1.1	Brainstorm and record ideas to solve engineering problems.
2461.1.1	Describe traits that help engineers succeed.
2461.1.1	Identify qualities that match engineering careers.
2461.1.1	Research global engineering challenges.
2461.1.1	Collect evidence to create a persuasive presentation about a chosen challenge.
2461.2	Apply systems thinking and the engineering design process.
2461.2.1	Explain what systems are and how systems thinking works.
2461.2.2	Investigate natural and human-made systems using GIS tools.
2461.2.3	Use systems information to make better design decisions.
2461.3	Apply project management skills
2461.3.1	Create a project schedule with key steps and milestones.
2461.3.2	Use critical path analysis to plan project timelines.
2461.3.3	Track progress and adjust plans to meet project goals.
2461.4	Apply measurement tools and techniques to technical drawings.
2461.4.1	Measure dimensions using appropriate tools.
2461.4.1	Interpret dimensions on drawings.
2461.4.1	Create sketches that convey technical ideas.
2461.4.1	Sketch orthographic views of objects.
2461.4.1	Create isometric sketches to represent three-dimensional shapes.

CAD Modeling

2461.5	Develop computer-aided design (CAD) models that meet design specifications.
2461.5.1	Produce accurate 2D drawings using CAD software.
2461.5.2	Construct 3D models with appropriate constraints and features.
2461.5.3	Modify CAD models to reflect design changes.

Mechanical Design and Motion

2461.6	Explore mechanical motion concepts.
2461.6.1	Calculate gear ratios and mechanical advantage.
2461.6.2	Identify and describe different types of motion.
2461.6.3	Convert one type of motion to another using mechanical systems.
2461.7	Design and test mechanical systems.

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2461.7.1	Apply the design process to create a mechanical solution.
2461.7.2	Use models, conceptual, computer, math, and physical, to guide designs.
2461.7.3	Test and improve a prototype to meet design goals.

Energy, Circuits, and Electromechanical Systems

2461.8	Apply energy conversion concepts.
2461.8.1	Explain how energy is changed into electricity.
2461.8.2	Model electrical circuits using diagrams, simulations, and hands-on setups.
2461.8.3	Measure voltage, current, and resistance, in a circuit.
2461.8.4	Describe the relationships among voltage, current, and resistance.
2461.9	Apply logic and digital circuit concepts.
2461.9.1	Create truth tables and logic expressions for circuits.
2461.9.2	Build simple circuits models using integrated chips.
2461.9.3	Program microcontrollers to collect data and control devices.
2461.9.4	Design a device that uses sensor data to perform a task.
2461.10	Develop electromechanical systems.
2461.10.1	Work in teams to design and prototype an electromechanical system.
2461.10.2	Identify and discuss ethical considerations in engineering projects.

Sustainable Urban Design and GIS Applications

2461.11	Apply urban design and planning concepts.
2461.11.1	Predict population growth and trends.
2461.11.2	Analyze the effect of population growth and urban development.
2461.11.3	Identify urban systems needed for high-density cities.
2461.11.4	Consider risks and trade-offs in infrastructure solutions.
2461.11.5	Design a city plan that considers environmental, social, and economic factors.
2461.12	Use GIS tools in urban planning.
2461.12.1	Use GIS to study environmental and infrastructure conditions.
2461.12.2	Collect geospatial data and create maps to help make design decisions.
2461.13	Design sustainable urban environments.
2461.13.1	Apply GIS to propose sustainable solutions for urban challenges.
2461.13.2	Implement low-impact development strategies to reduce stormwater runoff.
2461.14	Improve local community safety and well-being.
2461.14.1	Use the engineering design process to create community improvement projects.
2461.14.2	Work together to produce and present a prototype solution for the community.

New Age Engineering I serves as an introductory course to the field of engineering, focusing on fundamental principles, design processes, and sustainability concepts. Students explore various engineering disciplines through hands-on projects, case studies, and collaborative problem-solving activities. Topics covered include electrical principles, energy conversion technologies, engineering tools and technology, control systems, and the economics of sustainability. Students are challenged to view the role of engineering in addressing global challenges and advancing sustainability.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Engineering Fundamentals and Design Process

2459.1	Design Process.
2459.1.1	Explain and justify a systematic design process for engineering projects.
2459.1.2	Collect, analyze, and interpret relevant information to support decision-making in the design process.
2459.1.3	Synthesis complex problems into well-defined design challenges.
2459.1.4	Generate multiple potential solutions and evaluate them based on established criteria.
2459.1.5	Select and justify a solution path that effectively addresses the problem or opportunity at hand.
2459.2	Introduction to Sustainability.
2459.2.1	Define sustainability and its significance in engineering and society.
2459.2.2	Explain the concept of triple bottom line (Social, Environmental, Financial) and its relevance to sustainable development.
2459.2.3	Recognize common myths and misconceptions about sustainability and its applications in engineering practices.
2459.3	Electricity and Energy Conversion.
2459.3.1	Identify and apply the principles of electricity and circuit analysis to engineering problems.
2459.3.2	Analyze mechanical systems and calculate mechanical advantage, work, power, and efficiency.
2459.3.3	Understand energy conversion processes and technologies such as fuel cells and solar cells.
2459.3.4	Differentiate between modes of heat transfer and their implications for insulation design and thermal management.
2459.4	Engineering Tools and Technology.
2459.4.1	Utilize various measuring devices accurately and precisely for engineering measurements.
2459.4.2	Apply spreadsheet applications for problem-solving and data analysis in engineering contexts.
2459.4.3	Employ systems thinking to understand the interconnectedness of engineering problems within broader systems.
2459.4.4	Use mathematical models to test ideas, make predictions, and interpret experimental data.
2459.4.5	Construct physical prototypes and models using hand tools and shop tools for testing and validation.
2459.5	Control Systems and Automation.
2459.5.1	Understand the principles of digital and analog data and their relevance to control systems.
2459.5.2	Describe open- and closed-loop control systems and their advantages in engineering applications.
2459.5.3	Develop algorithms using flowcharts, pseudocode, and programming languages to implement control strategies.
2459.5.4	Predict and analyze the behavior of control systems, identify bugs, and troubleshoot programs effectively.
2459.6	Sustainability and Economics

2459.6.1	Explore new technologies and innovative approaches to sustainability, such as green building and biomimicry.
2459.6.2	Understand economic concepts related to sustainability
2459.6.3	Explore the role of economics in shaping sustainable development and addressing global environmental challenges.

New Age Engineering II builds upon the foundational knowledge and skills acquired in New Age Engineering I, progressing into advanced sustainability principles and engineering practices. Students will explore primary sustainability issues such as energy, water, and pollution, and examine their implications for sustainable development. Topics covered include sustainable building design, indoor environment quality, materials and resources management, social challenges in development, government policies, and professional practices in engineering.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advanced Sustainability and Engineering Practices

2460.1	Primary Sustainability Issues.
2460.1.2	Describe the central role of energy in sustainable development and identify primary energy sources and their impacts.
2460.1.3	Recognize and analyze industrial pollution and toxic sustainability issues, including their environmental and social implications.
2460.1.4	Understand sustainable water systems and their importance in addressing water scarcity and pollution.
2460.2	Sustainability Building Design.
2460.2.1	Explain key sustainability terms and concepts in building design and construction.
2460.2.2	Identify and implement green building best practices to enhance sustainability and reduce environmental impact.
2460.2.3	Evaluate the costs and benefits of sustainable building practices and their long-term impact on the environment and society.
2460.2.4	Analyze case studies to understand and apply sustainable design principles in real-world scenarios.
2460.2.5	Familiarize with protocols and systems for incorporating sustainability into building projects.
2460.3	Indoor Environment Quality.
2460.3.1	Assess and improve indoor air quality, acoustics, and water quality in building environments.
2460.3.2	Identify and mitigate common issues related to water leaks and domestic comfortability in building design.
2460.3.3	Explore strategies for optimizing daylighting while managing heat and comfort levels in indoor spaces.
2460.4	Materials and Resources Management.
2460.4.1	Understand the principles of reduce, reuse, recycle (3R) and their significance in sustainable materials and resource management.
2460.4.2	Evaluate the characteristics of sustainable materials and their applications in building construction.
2460.4.3	Implement waste management strategies to minimize material usage and environmental impact in building projects.
2460.5	Development Social Challenges.
2460.5.1	Describe the concept of sustainable development and its implications for addressing global inequalities and social challenges.
2460.5.2	Recognize the interconnectedness between sustainability, society, and social change.
2460.5.3	Analyze factors such as population growth and energy use in the context of sustainable development and global social challenges.
2460.6	Government Policies and Sustainability.

2460.6.1	Evaluate the successes and challenges of government regulations and policies in promoting sustainability.
2460.6.2	Recognize the impact of political constraints on government action and environmental enforcement efforts.
2460.7	Professional Practices and Communication.
2460.7.1	Communicate effectively with diverse audiences, both orally and in writing, based on audience characteristics.
2460.7.2	Collaborate and function effectively on multidisciplinary teams to solve complex engineering and sustainability challenges.
2460.7.3	Demonstrate flexibility, adaptability, leadership, and teamwork skills in professional settings.
2460.7.4	Recognize and appreciate the contributions of others.

Introduction to Engineering Design is a foundational course designed to introduce students to the engineering design process, focusing on problem-solving and innovation. Students explore concepts such as sketching, computer-aided design (CAD), and prototyping to develop solutions to real-world problems.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Engineering Mindset

2461.1	Demonstrate independent thinking and self-direction in pursuit of accomplishing a goal.
2461.1.1	Plan and manage time effectively to accomplish goals with minimal supervision.
2461.2	Demonstrate flexibility and adaptability in changing environments.
2461.2.1	Adjust to varied roles, responsibilities, schedules, and contexts in professional settings.
2461.2.2	Use feedback, praise, and setbacks to foster ongoing professional growth.
2461.3	Persevere through challenges to solve problems and achieve goals.
2461.3.1	Reflect critically on past experiences to improve future outcomes.
2461.4	Utilize spatial visualization skills to create and interpret graphical representations of 2D and 3D objects.
2461.4.1	Match orthographic projections with corresponding pictorial views of 3D objects.
2461.4.2	Recognize different pictorial views representing the same 3D object from multiple perspectives.
2461.4.3	Identify shapes of 2D cross-sections derived from 3D objects.
2461.4.4	Identify 3D objects formed by rotating 2D shapes.
2461.4.5	Create and interpret flat patterns that are folded into specific 3D shapes.

Design Process

2461.5	Explain and justify the steps of an engineering design process.
2461.5.1	Recognize various versions of the engineering design process and their essential similarities.
2461.5.2	Describe key steps and typical tasks within a design process.
2461.5.3	Identify where specific engineering tasks fit within the design process.
2461.5.4	Explain how iterative design improves solutions and inspires innovation.
2461.5.5	Maintain an engineering notebook documenting design processes following best practices.
2461.6	Collect, analyze, and interpret relevant information to support engineering decisions.
2461.6.1	Explain the role of research during design.
2461.6.2	Locate and evaluate credible data sources such as literature, databases, and policies.
2461.7	Synthesize ill-defined problems into well-defined engineering challenges.
2461.7.1	Emphasize the importance of defining problems, design criteria, and constraints clearly.
2461.7.2	Define visual, functional, and structural requirements with realistic constraints for solution evaluation.
2461.7.3	List common constraints affecting designs, including cost, environment, social, political, ethical, health, manufacturability, feasibility, and sustainability.
2461.8	Generate multiple solution concepts.
2461.8.1	Employ various techniques to ideate solutions effectively.
2461.8.2	Use visual tools (sketches, graphs, charts) to communicate ideas.
2461.9	Develop models to represent design alternatives and gather data to inform decisions.

2461.9.1	Identify types of models (physical, mathematical, virtual) and their purposes.
2461.9.2	Construct physical models using hand tools and basic techniques.
2461.10	Select and justify an optimal solution from multiple options.
2461.10.1	Understand that multiple viable solutions exist and trade-offs require evaluation.
2461.10.2	Use decision matrices or similar methods to compare and evaluate alternatives.
2461.11	Make evidence-based judgments and decisions.
2461.11.1	Recognize valid conclusions that are supported by evidence and acknowledge limitations and opposing views.
2461.11.2	Critically evaluate evidence and arguments for deficiencies or biases.

Engineering Tools and Technology

2461.12	Use measuring devices accurately and with appropriate precision.
2461.12.1	Understand measurements approximate true values.
2461.12.2	Differentiate accuracy and precision in measurements.
2461.12.3	Perform dimensional analysis and unit conversions for data consistency.
2461.13	Use spreadsheet applications to analyze and solve problems.
2461.13.1	Enter and organize data effectively in spreadsheets.
2461.13.2	Apply spreadsheet functions for data manipulation, regression, and statistics.
2461.14	Interpret and analyze data from single variables.
2461.14.1	Represent data using dot plots and histograms.
2461.14.2	Calculate measures of center (median, mean) and spread (interquartile range, standard deviation) appropriate to data distribution.
2461.14.3	Apply the Empirical Rule using mean and standard deviation for normal distributions.
2461.15	Apply mathematical and graphical models to test ideas and make predictions.
2461.15.1	Create scatter plots and describe variable relationships.
2461.15.2	Fit linear functions to data and solve related problems.
2461.15.3	Interpret slope and intercept in linear models.
2461.15.4	Distinguish sample from population statistics and their applications.
2461.15.5	Use free-body diagrams and mathematical models to analyze static equilibrium.

Technical Sketching and Drawing

2461.16	Read and interpret technical drawings.
2461.16.1	Identify line types and their purposes (construction, object, hidden, center).
2461.16.2	Recognize and use isometric, orthographic, oblique, section, and auxiliary views.
2461.16.3	Use scale drawings to compute lengths, areas, and volumes.
2461.17	Create technical drawings that fully detail objects or parts.
2461.17.1	Sketch isometric views at scale from various references.
2461.17.2	Sketch 1-point and 2-point perspective views from multiple references.
2461.17.3	Select the best orthographic front view for technical drawings.
2461.17.4	Determine minimum views needed to fully detail parts.
2461.17.5	Sketch orthographic projections at scale and correct orientation.
2461.17.6	Sketch full or half-section views to detail parts.
2461.18	Apply standard dimensioning practices to technical drawings.
2461.18.1	Identify general dimensioning rules in engineering practice.
2461.18.2	Detect and correct dimensioning errors and omissions.

2461.18.3	Apply chain dimensioning methods correctly.
2461.18.4	Apply datum dimensioning methods correctly.
2461.18.5	Compare effects of chain vs. datum dimensioning on tolerances.
2461.18.6	Interpret hole notes for size and type specifications.
2461.19	Specify engineering tolerances for features and assemblies.
2461.19.1	Differentiate limit dimensions, unilateral, and bilateral tolerances.
2461.19.2	Determine specified dimension, tolerance, upper and lower limits from drawings.
2461.19.3	Differentiate between clearance and interference fits.
2461.19.4	Calculate allowances between mating parts.

Computer-Aided Design (CAD) Software

2461.20	Create solid part models using 3D CAD software.
2461.20.1	Identify geometric constructions and constraints (e.g., horizontal, vertical, tangent).
2461.20.2	Differentiate additive vs. subtractive 3D modeling techniques.
2461.20.3	Compare efficiency of different modeling approaches.
2461.20.4	Apply geometric and dimensional constraints in CAD models.
2461.20.5	Model various hole types (through, clearance, blind, counterbore, countersink).
2461.20.6	Assign materials from CAD libraries and calculate mass, volume, surface area.
2461.20.7	Create custom materials with assigned density values.
2461.20.8	Use parametric formulas to create relationships between features.
2461.21	Create assembly models in CAD.
2461.21.1	Explain assembly constraints (mate, flush, insert, tangent) and degrees of freedom affected.
2461.21.2	Apply assembly constraints to simulate realistic part interactions.
2461.22	Produce working drawings with CAD.
2461.22.1	Generate annotated multiview technical drawings per engineering standards.
2461.22.2	Create assembly drawings of parts.
2461.22.3	Label assembly components with identification numbers and parts lists.

Physical Properties

2461.23	Determine physical properties related to engineering objects.
2461.23.1	Define physical properties: length, volume, mass, weight, density, surface area.
2461.23.2	Measure mass accurately and report with precision.
2461.23.3	Differentiate weight and mass.
2461.23.4	Measure volume accurately and report with precision.
2461.23.5	Calculate physical properties indirectly from measurements.
2461.24	Apply physical properties in design calculations.
2461.24.1	Solve problems involving area and surface area of 2D and 3D shapes.
2461.24.2	Solve volume problems involving solids like cylinders, cones, pyramids, spheres.
2461.24.3	Solve problems involving density, weight, and mass.
2461.24.4	Analyze center of gravity and static equilibrium related to tipping.

Reverse Engineering

2461.25	Analyze consumer products via reverse engineering.

2461.25.1	Describe reverse engineering processes and purposes.
2461.25.2	Identify visual design principles in objects.
2461.25.3	Explain how design affects product aesthetics and market success.
2461.25.4	Perform visual analysis of products with simple machines.
2461.25.5	Conduct functional analysis of products using simple machines.
2461.25.6	Perform structural analysis of materials, parts, and assembly configurations.

Career Awareness

2461.26	Understand skills required for professional engineering practice.
2461.26.1	Identify technical and non-technical skills common to engineering disciplines.
2461.27	Describe the role of engineers in society.
2461.27.1	Define engineering as creating solutions that meet societal needs.
2461.28	Differentiate engineering disciplines.
2461.28.1	Describe traditional disciplines: civil, electrical, mechanical, chemical.
2461.29	Analyze global engineering challenges.
2461.29.1	Identify "Grand Challenges" defined by National Academy of Engineering.
2461.30	Assess engineering ethical dilemmas.
2461.30.1	Recognize varied impacts of engineering solutions on individuals, society, and the environment.
2461.31	Promote sustainable engineering solutions.
2461.31.1	Describe product/service life cycles and sustainability considerations.

Collaboration

2461.32	Facilitate effective teamwork to achieve goals.
2461.32.1	Develop and uphold team norms.
2461.32.2	Justify diverse engineering and interdisciplinary team compositions.
2461.33	Contribute effectively as an individual team member.
2461.33.1	Clarify individual roles and performance expectations.
2461.33.2	Conduct realistic self-evaluations of team contributions.
2461.34	Evaluate peer work and provide constructive feedback.
2461.34.1	Describe purposes and benefits of peer review.
2461.35	Manage project timelines and resources in design projects.
2461.36.1	Create project plans using tools such as Gantt charts.

Digital Electronics (DE) investigates the world of digital circuits and systems. Students learn about logic gates, binary numbers, and digital design while working on projects that involve programming and simulating electronic circuits.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundations in Mathematics and Science

2462.1	Solve complex calculations using appropriate mathematical notation.
2462.1.1	Select the most appropriate notation for calculations.
2462.1.2	Convert numbers to and from engineering notation.
2462.1.3	Convert numbers between SI unit prefixes.
2462.2	Convert values between number systems relevant to digital electronics.
2462.2.1	Count in binary from 0 to 15.
2462.2.2	Convert between binary and decimal number systems.
2462.2.3	Convert numbers between decimal, binary, octal, and hexadecimal systems.
2462.2.4	Convert between binary coded decimal and decimal number systems.
2462.3	Analyze circuits by converting voltage, current, and resistance values.
2462.3.1	Identify parts and characteristics of series circuits.
2462.3.2	Identify parts and characteristics of parallel circuits.
2462.3.3	Calculate total resistance using Kirchhoff's Voltage and Current Laws.
2462.3.4	Apply Ohm's Law to solve for unknown circuit values.
2462.4	Simplify algebraic expressions for digital logic.
2462.4.1	Apply Boolean algebra and De Morgan's theorems to simplify expressions.
2462.4.2	Use Karnaugh maps to simplify Boolean expressions.
2462.5	Perform arithmetic operations in binary systems.
2462.5.1	Describe and apply two's complement arithmetic related to unsigned decimal numbers.

Foundations of Electronics

2462.6	Demonstrate safe practices working with electronic components.
2462.6.1	Identify electrical hazards and their effects on the human body.
2462.7	Identify and describe characteristics of common electronic components and logic gates.
2462.7.1	Explain the transistor as the fundamental digital logic component.
2462.7.2	Demonstrate how transistors and analog components form logic gates.
2462.7.3	Read resistor color codes to determine values.
2462.7.4	Interpret capacitor nominal values from labels.
2462.7.5	Recognize Small Scale Integration (SSI) and Medium Scale Integration (MSI) IC packages.
2462.7.6	Identify IC properties from part numbers, schematics, and datasheets.
2462.7.7	Interpret wiring diagrams for integrated circuits.
2462.7.8	Identify logic gates from truth tables and vice versa.
2462.7.9	Integrate seven-segment displays using appropriate drivers.
2462.7.10	Select and wire current-limiting resistors for common cathode and anode seven-segment displays.

2462.7.11	Describe how Programmable Logic Devices (PLDs) like FPGAs reduce breadboarding time.
2462.8	Select and use tools and components to design and troubleshoot electronic circuits.
2462.8.1	Troubleshoot mechanical and logical issues in circuits.
2462.8.2	Perform soldering and desoldering on PCBs following best practices.
2462.8.3	Measure current, voltage, and resistance with a digital multimeter (DMM).
2462.8.4	Measure frequency, period, and duty cycle of signals using an oscilloscope.
2462.8.5	Design, simulate, and verify circuits using circuit design software.
2462.9	Understand and apply clock signals in circuit design.
2462.9.1	Select components to produce desired waveform frequency, period, and duty cycle.
2462.9.2	Analyze analog and digital signals based on measurements and calculations.
2462.9.3	Modify 555 timer oscillator circuits to affect waveform characteristics.
2462.10	Interpret and modify adder circuits for binary arithmetic operations.
2462.10.1	Explain two's complement arithmetic in relation to decimal numbers.
2462.10.2	Predict outputs for given inputs in addition and subtraction.
2462.10.3	Describe adder/subtractor circuit design, including carry out and XOR/XNOR gates.
2462.11	Create and optimize multiplexed and demultiplexed circuits.
2462.11.1	Interpret and modify multiplexers and demultiplexers for improved efficiency.

Combinational Logic

2462.12	Design, interpret, and modify AND-OR-INVERT (AOI) combinational logic circuits.
2462.12.1	Convert design requirements to Boolean expressions and truth tables.
2462.12.2	Translate Boolean expressions to truth tables and vice versa.
2462.12.3	Interpret circuit schematics to/from Boolean expressions and truth tables.
2462.12.4	Modify AOI circuits per design needs.
2462.12.5	Construct AOI circuits on breadboards from schematics.
2462.13	Simplify AOI circuit designs using mathematical techniques.
2462.13.1	Apply Boolean algebra and De Morgan's theorems to simplify circuits.
2462.13.2	Use Karnaugh maps for simplification.
2462.13.3	Implement NAND-only or NOR-only logic circuits effectively.

Sequential Logic

2462.14	Design, interpret, and modify common sequential logic circuits using flip-flops.
2462.14.1	Analyze timing diagrams for D and J/K flip-flop outputs.
2462.14.2	Design flip-flop applications like latches, event detectors, data synchronizers, shift registers, and frequency dividers.
2462.14.3	Compare asynchronous and synchronous counters, including advantages and disadvantages.
2462.15	Design and analyze asynchronous counter circuits.
2462.15.1	Describe the ripple effect in asynchronous counters.
2462.15.2	Design up/down/modulus counters with discrete D and J/K flip-flops.
2462.15.3	Design counters using medium-scale integrated (MSI) circuits.
2462.15.4	Define counting start and stop points in modulus counters.

State Machines

2462.16	Design, interpret, and modify state machines according to design specifications.
2462.16.1	Create and modify state machine designs systematically.
2462.16.2	Describe components and structure of state machines.

2462.16.3	Draw and interpret state graphs and transition tables.
2462.16.4	Derive Boolean equations from state transition tables.

Programming Logic

2462.17	Develop and modify programs to manage microcontroller inputs and outputs.
2462.17.1	Select hardware and translate design requirements into functional programs.
2462.18	Create, interpret, and modify control logic using programming languages.
2462.18.1	Write programs to control microcontroller inputs and outputs.
2462.18.2	Program control for servo speed and position.

Principles of Engineering (POE) builds on foundational engineering concepts, exposing students to various engineering disciplines. Students engage in hands-on projects, exploring topics like mechanics, thermodynamics, and electrical circuits to gain a broad understanding of engineering principles.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Engineering and Technology

2463.1	Understand the role of engineering and technology in society.
2463.1.1	Define engineering and technology and their societal relevance.
2463.1.2	Explore different engineering fields and their societal contributions.
2463.1.3	Discuss the historical evolution of technology and engineering and its impact on modern life.
2463.2	Analyze the interdisciplinary nature of engineering.
2463.2.1	Examine how engineering integrates with mathematics, physics, and computer science.
2463.2.2	Understand collaborative skills needed for interdisciplinary engineering projects.
2463.2.3	Discuss engineers’ roles in solving global challenges using interdisciplinary approaches.

Engineering Design Process

2463.3	Apply stages of the engineering design process to real-world problems.
2463.3.1	Define and apply design process stages (problem definition, research, brainstorming, prototyping, testing, iteration).
2463.3.2	Use design thinking and creative problem-solving to generate innovative solutions.
2463.3.3	Apply feedback and iterative design to refine solutions.
2463.4	Utilize design tools and methods in engineering projects.
2463.4.1	Use CAD software, 3D printing, and other digital tools for prototyping and modeling.
2463.4.2	Understand physical prototyping techniques and structural testing.
2463.4.3	Apply simulation tools to optimize designs prior to production.

Mechanics and Materials Properties

2463.5	Understand and apply basic mechanical principles.
2463.5.1	Apply Newton’s Laws of Motion in engineering systems.
2463.5.2	Explore forces, work, energy, and power relationships in mechanical systems.
2463.5.3	Apply motion principles to mechanical systems such as levers, pulleys, and gears.
2463.6	Understand material properties and their impact on design.
2463.6.1	Identify materials (metals, plastics, composites) and key properties (strength, flexibility, thermal conductivity).
2463.6.2	Discuss material selection impacts on sustainability, cost, and performance.
2463.6.3	Analyze how material properties influence product durability and manufacturing.

Energy Systems and Power Transfer

2463.7	Understand energy forms and conversions.
2463.7.1	Identify and describe kinetic, potential, thermal, and electrical energy.

2463.7.2	Understand energy conservation and thermodynamics laws.
2463.7.3	Analyze applications of energy conversion (electric motors, turbines).
2463.8	Explore renewable and non-renewable energy sources.
2463.8.1	Investigate renewable energy sources and their engineering applications.
2463.8.2	Compare renewable vs. non-renewable systems on sustainability, efficiency, and impact.
2463.8.3	Discuss energy's role in addressing global challenges like climate change.

Robotics and Automation

2463.9	Understand components and principles of robotic systems.
2463.9.1	Differentiate digital and analog signals; understand computational inputs/outputs.
2463.9.2	Explain open-loop vs. closed-loop systems and evaluate system suitability.
2463.9.3	Design flowcharts, pseudocode, and software with decisions and loops.
2463.9.4	Develop control systems, predict behavior, and debug programs.
2463.9.5	Compare hydraulic and pneumatic systems and their device applications.
2463.9.6	Design and test fluid-powered devices applying Pascal's Law and related calculations.
2463.10	Apply robotics in practical engineering scenarios.
2463.10.1	Use problem-solving by breaking down complex issues into components.
2463.10.2	Develop detailed instruction sequences with conditional logic.
2463.10.3	Design and refine microcontroller programs incrementally.
2463.10.4	Use abstraction to simplify problems by focusing on essentials.

Manufacturing and Production Systems

2463.11	Understand manufacturing processes and systems.
2463.11.1	Learn manufacturing processes such as casting, machining, and additive manufacturing.
2463.11.2	Explore design/manufacturing relationships including cost and efficiency.
2463.11.3	Investigate quality control and testing methods.
2463.12	Apply systems thinking in manufacturing
2463.12.1	Understand design of manufacturing systems for efficiency, scalability, and sustainability.
2463.12.2	Discuss lean manufacturing and process improvements like Six Sigma.
2463.12.3	Evaluate automation and robotics impact on manufacturing's future.

Engineering Design and Development (EDD), provides students an opportunity to apply the skills they have acquired in previous courses to undertake an open-ended engineering project. This capstone course encourages creativity, teamwork, and problem-solving as students design, prototype, and present their solutions to real-world challenges.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Engineering Mindset

2464.1	Demonstrate independent thinking and self-direction in pursuit of accomplishing a goal.
2464.1.1	List and prioritize goals with tangible success criteria.
2464.1.2	Plan and use time to accomplish goals without direct oversight.
2464.1.3	Plan how to gain additional knowledge to accomplish goals.
2464.2	Demonstrate flexibility and adaptability to change.
2464.2.1	Adapt to varied roles, job responsibilities, schedules, and contexts.
2464.3	Persevere to solve a problem or achieve a goal.
2464.3.1	Describe the importance of persistence in problem solving and goal achievement.
2464.3.2	Accept failure as part of growth and the engineering profession.
2464.3.3	Reflect critically on past experiences to inform future progress.

Design Process

2464.6	Explain and justify an engineering design process.
2464.6.1	Explain the existence of multiple versions of the design process describing the same core steps.
2464.6.2	Describe major steps and typical tasks of a design process.
2464.6.3	Identify where an engineering task fits within a design process.
2464.6.4	Outline how iterative processes improve engineering decisions and solutions.
2464.6.5	Document the design process in an engineering notebook using best practices.
2464.7	Collect, analyze, and interpret information to support engineering decisions.
2464.7.1	Explain research’s role in design.
2464.7.2	Locate credible data from literature, databases, and policies.
2464.7.3	Explain stakeholders’ and experts’ roles in design.
2464.7.4	Describe criteria to assess reliability and credibility of information.
2464.8	Synthesize ill-formed problems into well-defined problems.
2464.8.1	Explain importance of defining problem/opportunity, criteria, and constraints.
2464.8.2	Identify and define visual, functional, and structural design requirements with constraints.
2464.8.3	List potential constraints (economic, environmental, social, political, ethical, health/safety, manufacturability, technical feasibility, sustainability).
2464.9	Generate multiple potential solution concepts.
2464.9.1	Describe techniques and guidelines for idea generation.
2464.9.2	Use sketches, graphs, charts, and other visuals to represent concepts.
2464.10	Develop models to represent design alternatives and inform decisions.
2464.10.1	Describe use of models representing physical systems and constraints influencing model choice.
2464.10.2	Define physical prototypes, mathematical models, and virtual representations and their purposes.

2464.11	Select a solution path from multiple options.
2464.11.1	Explain trade-offs and multiple viable solutions in design processes.
2464.11.2	Develop and use decision matrices or schemes to compare and evaluate solutions.
2464.12	Make judgments and decisions based on evidence.
2464.12.1	Explain validity of conclusions supported by evidence, considering limitations and biases.
2464.12.2	Evaluate evidence and arguments to identify deficiencies and next steps.

Engineering Tools and Technology

2464.13	Measure and report quantities accurately using various devices.
2464.13.1	Explain measurements approximate true values.
2464.13.2	Differentiate accuracy and precision in measurements.
2464.13.3	Use dimensional analysis and unit conversions for consistent data.
2464.14	Interpret and analyze data for single measurement variables.
2464.14.1	Represent data using dot plots, histograms, box plots.
2464.14.2	Use statistics (mean, median, interquartile range, standard deviation) to describe data.
2464.14.3	Fit data to normal distributions and estimate populations when appropriate.
2464.15	Apply mathematical and graphical models to test ideas and make predictions.
2464.15.1	Use scatter plots to describe relationships between two variables.
2464.15.2	Fit functions (linear, quadratic, exponential) to data for problem solving.
2464.15.3	Interpret slope and intercept in context of data.
2464.15.4	Distinguish between sample and population statistics and their uses.

Collaboration

2464.16	Facilitate effective team environments for goal attainment.
2464.16.1	Describe individual roles and interdependencies in teams.
2464.17	Contribute individually to team collaboration.
2464.17.1	Self-evaluate personal contribution and collaboration effectiveness.
2464.18	Analyze and evaluate others' work to provide effective feedback.
2464.18.1	Describe peer review purpose and positive outcomes.
2464.18.2	Describe characteristics of effective feedback.
2464.19	Manage project timelines and resources within the design process.
2464.19.1	Explain project management elements: timelines, task assignments, risk mitigation.
2464.19.2	Develop project plans using tools like Gantt charts.
2464.19.3	Use collaborative tools (cloud, document sharing, video/text) to complete projects.

Communication

2464.20	Communicate effectively to diverse audiences.
2464.20.1	Follow conventions of grammar, spelling, usage, and mechanics in communication.
2464.20.2	Use accepted formats for technical writing and presentations.
2464.20.3	Understand how audience size and characteristics affect communication.
2464.20.4	Modify communication content and style to audience needs.
2464.20.5	Properly cite references in accepted formats.
2464.20.6	Label tables and figures with units and contextual explanations.
2464.20.7	Use effective oral delivery traits (volume, tempo, eye contact, articulation, energy) to engage audiences.

Computer Integrated Manufacturing (CIM) focuses on the integration of computer-aided design and manufacturing processes. Students gain hands-on experience with automated systems, robotics, and production techniques used in modern manufacturing.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor’s Guide](#) for more information.

Role of Manufacturing

2465.1	Interpret how developments in manufacturing impact society and address future manufacturing needs.
2465.1.1	Describe manufacturing’s impact on society.
2465.1.2	Describe cause-and-effect relationships leading to manufacturing developments.
2465.1.3	Describe future needs of the manufacturing industry.
2465.2	Analyze cause-and-effect relationships of advancements in manufacturing processes and systems.
2465.2.1	Identify sequence and dates of major advancements.
2465.2.2	Describe causes of advances in processes and systems.
2465.2.3	Describe the impact of advances in techniques and technology on modern manufacturing.

Manufacturing Processes

2465.3	Analyze common material properties.
2465.3.1	Describe properties of common materials.
2465.3.2	Explain how material selection affects product function and manufacturing.
2465.4	Analyze common manufacturing processes.
2465.4.1	Explain additive vs. subtractive processes.
2465.4.2	Explain primary vs. secondary processing.
2465.4.3	Explain how processes transform material geometry and properties.
2465.4.4	Describe common metallic processes (casting, powder metallurgy, hot/cold working, heat treatment, shearing, forming).
2465.4.5	Describe non-metallic processes (plastics, ceramics, composites).
2465.4.6	Describe surface finishing processes.
2465.4.7	Describe additive processes (welding, fastening, joining).
2465.4.8	Describe subtractive processes (sawing, cutting, drilling, broaching, threading, grinding, turning, milling).
2465.5	Design a manufacturing process for a product.
2465.5.1	Identify machine process capabilities.
2465.5.2	Analyze product production through process series.

Manufacturing Systems

2465.6	Analyze common manufacturing systems.
2465.6.1	Explain manufacturing system organization (customer needs, finance, processes).
2465.6.2	Describe systems: homemade, mass, Lean, Flexible, Just-In-Time, Small-scale manufacturing.
2465.6.3	Explain advantages and disadvantages of techniques/processes.
2465.6.4	Describe system support functions (Automated Storage/Retrieval, Automated Guided Vehicles).
2465.7	Design a manufacturing system to produce a product.

2465.7.1	Recognize symbols for manufacturing process representation.
2465.7.2	Construct symbol sequences representing manufacturing processes.
2465.8	Analyze economic factors of manufacturing systems.
2465.8.1	Explain how part physical properties affect financial decisions.
2465.8.2	Calculate volume, mass, surface area of parts.
2465.8.3	Explain cost categorizations: fixed, variable, direct, indirect, long-term, short-term.
2465.8.4	Compare system efficiencies (time, material, labor, safety).
2465.9	Analyze ethical considerations in manufacturing systems.
2465.9.1	Describe ethics, environmental health, and safety impacts.

Product Design for Manufacturability

2465.10	Design products considering manufacturability.
2465.10.1	Explain the effects of geometry, material, and components on manufacturing systems.
2465.10.2	Explain design alterations to improve manufacturability.
2465.10.3	Describe CAD/CAM use from concept to physical part.
2465.10.4	Describe common prototyping techniques.
2465.10.5	Explain prototype use for evaluation and improvement.
2465.10.6	Create a prototype.
2465.11	Create products using CNC milling machines.
2465.11.1	Describe CNC milling machine parts/functions.
2465.11.2	Describe milling tools and applications.
2465.11.3	Describe CNC autonomous operation.
2465.11.4	Calculate milling machine settings.
2465.11.5	Describe common G&M codes.
2465.11.6	Describe milling machine operation procedures.
2465.11.7	Manually create CNC machine code.
2465.11.8	Interpret machine code actions.
2465.11.9	Create CNC machine code using CAM software.
2465.11.10	Verify machine code via simulation software.
2465.11.11	Describe use of jigs and fixtures for quality control.

Automation and Control

2465.12	Design manufacturing control systems.
2465.12.1	Describe flowchart/pseudocode use in control programming.
2465.12.2	Describe open- and closed-loop systems.
2465.12.3	Explain input/output devices in open/closed-loop systems.
2465.12.4	Explain inter-communication between separate control systems.
2465.12.5	Create flowcharts or pseudocode for task sequences.
2465.12.6	Interpret control program actions.
2465.12.7	Interpret sensor inputs.
2465.12.8	Create control programs for manufacturing systems.
2465.13	Create a program to control a robot.
2465.13.1	Describe robot development's impact on manufacturing.
2465.13.2	Describe common industrial robot types and applications.
2465.13.3	Describe robot accuracy and repeatability.
2465.13.4	Describe robot geometry and work envelope.

2465.14.5	Calculate robotic arm position from actuator movement.
2465.15.6	Explain inter-communication between robot control systems.
2465.16.7	Recognize symbols representing robot movements.
2465.17.8	Construct sequences of robot movement symbols.
2465.18.9	Interpret control program robot actions.
2465.19.10	Create robot control programs for tasks.
2465.20	Analyze power use in manufacturing systems.
2465.20.1	Describe energy and power applications in manufacturing.
2465.20.2	Define torque, pressure, work, and power.
2465.20.3	Apply equations for torque, pressure, work, and power to solve problems.
2465.20.4	Design fluid power systems for operations.

Civil Engineering and Architecture (CEA) introduces students to the fields of civil engineering and architecture. Through hands-on projects, students learn about structural design, site planning, and the principles of sustainable building.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Building Design and Construction Documentation

2466.1	Use Architectural 3D modeling software to document building design and specify construction.
2466.1.1	Identify and describe typical components of architectural views or drawings (schedule, site plan, floor plan, building section, elevations).
2466.1.2	Read and interpret design and construction drawings.

Building Design and Analysis

2466.3	Create building designs reflecting function, location, community, and aesthetics.
2466.3.1	Explain historical innovations in civil engineering and architecture.
2466.3.2	Identify and describe principles and elements of architectural design.
2466.3.3	Determine architectural style via building features, components, and materials.
2466.3.4	Identify common roof styles and their pros and cons.
2466.3.5	Investigate legal, physical, financial requirements and community needs to assess project viability.
2466.4	Develop sustainable, affordable single-family residential designs meeting codes, universal design, and client needs.
2466.4.1	Identify local building regulations and codes for development.
2466.4.2	Identify components of wood residential framing systems.
2466.4.3	Identify guidelines for affordable residential design (e.g., Habitat for Humanity).
2466.4.4	Describe universal design concepts and purposes in residential design.
2466.4.5	Explain LEED certification program and purpose.
2466.4.6	Identify LEED for Homes credits applicable to projects.
2466.5	Create commercial building designs incorporating sustainability and code compliance.
2466.5.1	Classify commercial buildings by use, occupancy, construction type per IBC.
2466.5.2	Use Land Use and Development regulations for zoning and allowable uses.
2466.5.3	Identify common commercial framing systems.
2466.5.4	Compare commercial wall systems; select by materials, strength, durability, cost, aesthetics.
2466.5.5	Compare commercial low-slope roof systems; select by materials, strength, durability, cost.
2466.5.6	Identify pros and cons of green roofs in commercial designs.
2466.5.7	Identify sustainable building practices suitable for commercial facilities.
2466.6	Estimate costs for small building projects.
2466.6.1	Use math skills to calculate material quantities.
2466.7	Select building components and techniques to improve energy performance and reduce energy cost.
2466.7.1	Use energy codes to determine building envelope minimum requirements.
2466.7.2	Describe R-value and U-factor and their relationship.
2466.7.3	Calculate overall R-value for multi-component walls or roofs.
2466.7.4	Compare thermal resistance and select components meeting criteria.

2466.7.5	Calculate heat loss for building envelopes using site environmental data.
2466.7.6	Identify energy conservation requirements per International Energy Conservation Code.

Site Design

2466.8	Complete control survey to establish known elevation point on site.
2466.8.1	Describe types and purposes of land surveys.
2466.8.2	Use auto level to find elevations from known points.
2466.8.3	Document level loop completion per survey protocol.
2466.9	Locate buildings strategically based on site orientation, characteristics, and regulations.
2466.9.1	List considerations (environmental, codes, zoning, infrastructure) for residential site location.
2466.9.2	Identify site characteristics affecting building orientation.
2466.9.3	Create site opportunities map highlighting positive/negative site features.
2466.10	Analyze site soil sample using Unified Soil Classification System to predict site development impact.
2466.10.1	Explain soil classification impact on site development.
2466.10.2	Perform sieve analysis on soil samples.
2466.10.3	Describe soil composition by type, gradation, plasticity.
2466.11	Develop commercial site plans complying with codes and Low Impact Development (LID) practices.
2466.11.1	Identify property boundaries by legal description.
2466.11.2	Design pedestrian, vehicular access and parking lots.
2466.11.3	Explain site development impact on storm water runoff.
2466.11.4	Calculate storm water runoff before and after development.
2466.11.5	Design preliminary storm water storage facilities.
2466.11.6	Identify and explain LID techniques in site development.

Structural Design

2466.12	Determine building loads and transfer through structure.
2466.12.1	Describe load resistance and transfer for structural forms.
2466.12.2	Identify design loads: dead, live, snow, wind, earthquake, flood, earth pressure.
2466.12.3	Use codes to determine load and deflection limits.
2466.12.4	Calculate structural efficiency.
2466.13	Select beams to support loads in commercial applications.
2466.13.1	Determine reaction forces and max moments on simply supported beams.
2466.13.2	Sketch shear and moment diagrams.
2466.13.3	Calculate beam deflection.
2466.13.4	Use structural analysis software.
2466.13.5	Use load-span tables for metal decks, composite floors, steel joists.
2466.14	Size spread footings for safe support.
2466.14.1	Identify and describe foundation types.
2466.14.2	Determine loads transferred from steel frames to foundations.

Utilities and Services

2466.15	Size and locate utility service connections.
2466.15.1	Identify typical utilities, transmission/distribution, and usage measurement.
2466.15.2	Apply code requirements for utility installation.
2466.15.3	Calculate water system head loss and pressure.
2466.15.4	Describe wastewater management systems (public, onsite, decentralized).

2466.15.5	Design sewer laterals per codes.
2466.16	Create preliminary plumbing and electrical system designs.
2466.16.1	Identify plumbing components, usage, and plan symbols.
2466.16.2	Identify electrical components, usage, and plan symbols.
2466.16.3	Use building codes to design plumbing, electrical, and waste systems.

This course explores the principles of aerospace engineering, covering topics like aerodynamics, astronautics, and the design of aircraft and spacecraft. Students engage in projects that simulate real-world challenges faced by aerospace engineers.

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Aerospace Industry Knowledge

2468.1	Analyze cause and effect of aerospace events
2468.1.1	Identify the correct sequence and approximate dates of major aerospace engineering events.
2468.1.2	Describe the cause-and-effect relationships in aerospace developments.
2468.2	Predict future aerospace engineering developments
2468.2.1	Describe future trends in aerospace engineering.
2468.2.2	Describe future aerospace industry needs.
2468.2.3	Relate past cause-and-effect to future events.

Algorithms and Programming

2468.3	Design unmanned systems.
2468.3.1	Describe applications of unmanned systems.
2468.3.2	Describe the application of control systems in unmanned systems.
2468.3.3	Describe the application of mechanical design applications in unmanned systems.
2468.4	Construct control programs.
2468.4.1	Explain the purpose of pseudocode.
2468.4.2	Create pseudocode for simple tasks.
2468.4.3	Describe the role of inputs and outputs in system design.

Engineering Tools and Technology

2468.5	Use measuring devices with appropriate accuracy and precision
2468.5.1	Explain that all measurements approximate true values.
2468.6	Use spreadsheet applications for problem-solving.
2468.6.1	Populate and organize data in spreadsheets.
2468.6.2	Use spreadsheet functions to analyze and present data.
2468.7	Construct physical objects using tools.
2468.7.1	Identify and describe hand and shop tools.
2468.7.2	Build physical objects from drawings or descriptions.
2468.7.3	Demonstrate tool use.
2468.8	Apply computational thinking.
2468.8.1	Use models and simulation for research and learning.
2468.8.2	Model natural phenomena.
2468.8.3	Develop step-by-step algorithms.
2468.8.4	Test and implement solutions using computers.

2468.8.5	Automate solutions with algorithms.

Fundamentals of Flight

2468.9	Analyze the four forces of flight and aircraft axes.
2468.9.1	Identify three aircraft axes.
2468.9.2	Describe the motion about each axis.
2468.9.3	Describe lift, weight, thrust, and drag.
2468.10	Analyze aircraft stability and control.
2468.10.1	Identify aircraft components.
2468.10.2	Explain fixed and movable components' effect on stability and control.
2468.10.3	Describe pilot control inputs.
2468.11	Analyze aircraft weight effects.
2468.11.1	Explain the importance of weight and balance.
2468.11.2	Calculate center of gravity (CG) for shapes and aircraft.
2468.11.4	Design safe weight distribution plans.
2468.12	Design an airfoil.
2468.12.1	Label airfoil components.
2468.12.2	Explain lift and drag generation.
2468.12.3	Apply atmospheric calculations.
2468.12.4	Use lift and drag equations.
2468.13	Design propulsion systems.
2468.13.1	Identify aircraft/spacecraft propulsion systems.
2468.13.2	Predict effects of engine variable changes.
2468.13.3	Apply propulsion calculations.
2468.14	Design stable rockets.
2468.14.1	Use rocket engine performance charts.
2468.14.2	Effect of center of pressure and CG on stability.
2468.14.3	Predict rocket flight stability.
2468.15	Apply aerospace concepts beyond aerospace.
2468.15.1	Apply aerospace engineering concepts to other systems.
2468.15.2	Identify relevant aerospace equations for non-aerospace use.
2468.16	Design aircraft and spacecraft for human systems.
2468.16.1	Effects of flight on human physiology.
2468.16.2	Design aircraft systems adapted to human needs.
2468.16.3	Measure human reaction and sensory acuity.
2468.16.4	Impact of human factors on design.

Flight Operations

2468.17	Interpret navigation systems.
2468.17.1	Describe the function of and use of navigation systems.
2468.17.2	Interpret navigation data.
2468.18	Solve aircraft traffic dilemmas.
2468.18.1	Describe the purpose and function of air traffic control (ATC).
2468.18.2	Predict aircraft positions.

2468.18.3	Analyze aircraft interactions.
2468.19	Analyze aircraft accidents
2468.19.1	Describe typical accident contributing factors.
2468.19.2	Research aviation accident info.
2468.20	Operate aircraft in virtual environments.
2468.20.1	Explain flight control interactions.
2468.20.2	Demonstrate simulated aircraft control.

Materials and Structures

2468.21	Analyze mechanical properties of materials.
2468.21.1	Explain the importance of mechanical properties for aircraft structures.
2468.21.2	Describe the procedures for mechanical testing.
2468.21.3	Identify equations linking deflection, moment of inertia, modulus of elasticity.
2468.21.4	Measure material mechanical properties.
2468.22	Design aircraft structures.
2468.22.1	Describe common aerospace materials and applications.
2468.22.2	Recognize the impact of loading on structure.

Space Flight

2468.23	Analyze issues covered by space law.
2468.23.1	Explain how global governance applies to space activities.
2468.23.2	Describe the role of commercial organizations.
2468.23.3	Identify the impact of space junk on space activities.
2468.24	Apply orbital mechanics equations.
2468.24.1	Describe six Keplerian orbital elements.
2468.24.2	Identify orbital mechanics equations.
2468.24.3	Identify orbital energy forms.
2468.25	Model orbital system.
2468.25.1	Describe satellite orbital patterns and applications.
2468.25.2	Use orbital mechanics software for satellite design.

Environmental Sustainability is a course that allows students to tackle pressing global challenges such as clean drinking water, food security, and renewable energy. Through hand-on activities and simulations, participants engage in the engineering design process to develop innovative solutions to real-world problems.

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Foundations In Math and Engineering Sciences

2469.1	Analyze environmental and physical factors related to safe drinking water.
2469.1.1	Analyze population growth and water resource relationships.
2469.1.2	Describe the effects of water quality on human health.
2469.1.3	Explain the characteristics of clean water.
2469.1.4	Explain the importance of clean water for survival.
2469.1.5	Describe common sources of drinking water contamination.
2469.1.6	Explain how contaminant cycling through ecosystems.
2469.1.7	Describe the types of water on Earth and relative amounts.
2469.2	Describe infrastructure of private wells and public drinking water systems.
2469.2.1	Describe the most common sources of drinking water in the US vs. worldwide.
2469.2.1	Describe the infrastructure components of wells and water systems.
2469.3	Use chemical and biological assays to detect water contaminants.
2469.3.1	Explain quantitative water quality measurement methods.
2469.3.1	Perform and analyze culture assays for coliform and E. coli.
2469.4	Identify wastewater treatment processes for common contaminants.
2469.4.1	Explain the role of bacteria in water treatment.
2469.4.1	Outline the stages of modern sewage treatment plants.
2469.5	Apply water remediation techniques.
2469.5.1	Describe the roles of bacteria, protozoa, rotifers in wastewater ecosystems
2469.5.1	Describe and provide examples of physical, chemical, and biological water purification processes.
2469.5.1	Explain plant-based nitrate removal (phytoremediation).
2469.5.1	Design, build, test water filtration systems.
2469.5.1	Conduct experiments on phytoremediation and bacterial oil decomposition.

Biotechnology and Sustainable Food Systems

2469.6	Analyze sustainable vs. unsustainable food production methods.
2469.6.1	Analyze the advantages/disadvantages of genetically modified crops.
2469.6.1	List and explain genetic improvements in crops.
2469.6.1	Explain the environmental and ecosystem impacts of transgenic plants.
2469.6.1	Describe the economic and socio-political issues of GM crops.
2469.6.1	Investigate the ethical considerations of genetic engineering.
2469.7	Understand and explain food security.
2469.7.1	Define and explain the importance of food security.
2469.8	Understand structure and function of DNA.

2469.8.1	Recognize DNA structure, chromosome/gene/protein relationships.
2469.8.1	Illustrate the process of DNA replication, transcription, translation processes.
2469.8.1	Use genetic code for protein determination.
2469.8.1	Illustrate transcription and translation.
2469.8.1	Analyze resulting DNA fragments on a gel.
2469.9	Apply molecular biology techniques.
2469.9.1	Perform ligation of DNA and create plasmids.
2469.9.1	Isolate and analyze plasmid DNA.
2469.9.1	Execute the gene cloning process.
2469.9.1	Map plasmids and apply restriction enzymes.
2469.9.1	Extract DNA from food while following safety protocols.
2469.9.1	Use PCR to amplify DNA.
2469.9.1	Perform bacterial transformation techniques.
2469.9.1	Conduct gel electrophoresis to separate DNA.
2469.9.1	Confirm ligation results via electrophoresis.
2469.10	Argue for/against genetic recombination to improve food security.
2469.10.1	Develop factual arguments for or against GMOs.
2469.10.1	Evaluate ethical concerns related to GMOs.
2469.10.1	Calculate transformation efficiency.
2469.10.1	Apply methods for producing transgenic plants.

Renewable Energy and Biofuels in Environmental Biotechnology

2469.11	Demonstrate knowledge of energy sources and impacts.
2469.11.1	Measure daily energy use.
2469.11.1	Compare fossil fuels and biofuels for their impact on the carbon cycle.
2469.11.1	Distinguish between renewable and nonrenewable energy sources.
2469.12	Apply stoichiometry to photosynthesis.
2469.12.1	Explain how photosynthesis captures and stores energy.
2469.12.1	Describe the relationship between photosynthesis and respiration.
2469.12.1	Interpret biological growth curves.
2469.13	Use simulations for energy predictions.
2469.13.1	Analyze simulation results to identify energy usage trends.
2469.14	Debate algae and bio-feedstocks as fuel sources.
2469.14.1	Explain the role of algae in the origins of fossil fuels.
2469.14.1	Identify characteristics needed for algae and feedstocks to be viable fuels.
2469.15	Demonstrate biofuel production efficiency.
2469.15.1	Conduct a life cycle analysis of biofuel production.
2469.15.1	Identify variables in a biomanufacturing life cycle analysis.
2469.15.1	Scale biomanufacturing processes to commercial production levels.
2469.15.1	Explain the role of enzymes in chemical reactions.
2469.15.1	Design algae cultivation systems.
2469.15.1	Perform fermentation processes and identify their products.
2469.16	Plan biofuels processing plants.
2469.16.1	Identify the main types of algae used in biofuels.
2469.16.1	Design downstream separation processes using simulations.
2469.16.1	Explain separation and purification methods.

2469.16.1	Describe the phases of the biomanufacturing process.
2469.16.1	Analyze chromatography results to identify pigments.

Energy and Power Foundations is a course on the origins of production of renewable and nonrenewable energy. Students will discover cutting-edge job opportunities while directly testing and evaluating energy system theories. In this foundational course, students will explore career fields and apply their knowledge to hands-on projects, designing motors, pumps, heat exchangers, and more. They will be immersed in the technologies of large power plants, where they will learn to optimize efficiency and prepare for a dynamic future in energy and power.

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Engineering Design Process (EDP)

2485.1	Apply the engineering design process to develop, test, and improve prototypes.
2485.1.1	Define project goals and constraints using an essential question.
2485.1.2	Conduct background research on energy and power principles relevant to the project.
2485.1.3	Brainstorm and sketch initial designs using team collaboration strategies.
2485.1.4	Select a final design using a decision matrix that weighs efficiency, cost, and feasibility.
2485.1.5	Build a functional prototype for testing.
2485.1.6	Test and evaluate the prototype using quantitative data.
2485.1.7	Reflect and improve the prototype based on findings.
2485.2	Maintain a complete engineering notebook documenting research, design, and testing.
2485.2.1	Record daily reflections and observations during project work.
2485.2.2	Document technical vocabulary, formulas, and sketches.
2485.2.3	Include data tables, graphs, and analysis results from testing.
2485.2.4	Summarize project progress and identify improvements or next steps.

Energy Generation and Conversion Systems

2485.3	Explain the principles of electric motors and generators.
2485.3.1	Identify components of electric motors (armature, stator, commutator, brushes).
2485.3.2	Explain electromagnetic conduction and its role in generating electricity.
2485.3.3	Compare AC and DC motor function and applications.
2485.3.4	Calculate torque, horsepower, and efficiency using collected data.
2485.3.5	Evaluate motor efficiency improvements based on testing data.
2485.4	Demonstrate understanding of hydroelectric and hydraulic systems.
2485.4.1	Describe the function of water turbines and hydraulic lifts in power generation.
2485.4.2	Apply Pascal's Law to calculate force and pressure in hydraulic systems.
2485.4.3	Apply Bernoulli's Equation to determine flow and pressure in hydro systems.
2485.4.4	Analyze factors affecting hydraulic efficiency (friction, viscosity, flow rate).
2485.4.5	Build and test a mini-hydroelectric hydraulic system prototype.
2485.5	Identify components of basic power generation systems.
2485.5.1	Recognize power plant systems: pumps, pipelines, heat exchangers.
2485.5.2	Explain the role of each system in moving and converting energy.
2485.5.3	Interpret simplified schematics of energy and power plant layouts.
2485.5.4	Relate classroom systems to industrial energy production scenarios.

Analysis and Optimization of Power System Components

2485.6	Design, build, and test hydraulic lifts and centrifugal pumps.
2485.6.1	Assemble simple pumps and hydraulic systems.
2485.6.2	Measure flow rate, pressure, and lift force.
2485.6.3	Compare impeller types or piston sizes for performance differences.
2485.6.4	Analyze system efficiency and potential improvements.
2485.7	Design and evaluate heat exchangers for efficiency improvements.
2485.7.1	Explain conduction, convection, and radiation.
2485.7.2	Apply basic thermodynamics to heat transfer.
2485.7.3	Measure temperature differentials across prototype exchangers.
2485.7.4	Calculate and improve thermal efficiency using design modifications.
2485.8	Minimize pressure loss and energy loss in pipeline flow systems.
2485.8.1	Explain factors affecting pressure loss (pipe diameter, bends, friction).
2485.8.2	Use fluid mechanics calculations to predict flow behavior.
2485.8.3	Measure real vs predicted pressure loss in prototype pipelines.
2485.8.4	Redesign pipelines to optimize flow efficiency.

Informed Design Decisions

2485.9	Use LabVIEW and other software to monitor and analyze system performance.
2485.9.1	Utilize sensors to measure torque, flow, temperature, and pressure.
2485.9.2	Collect real-time data and log results within spreadsheet software.
2485.9.3	Create graphs and charts to visualize performance trends.
2485.9.4	Identify anomalies and opportunities for improvement.
2485.10	Apply mathematical models to evaluate and improve energy systems.
2485.10.1	Solve problems using algebra, functions, and inequalities.
2485.10.2	Apply Bernoulli's and Pascal's equations to project scenarios.
2485.10.3	Calculate efficiency, flow rates, and pressure differentials.
2485.10.4	Incorporate mathematical analysis into design decisions.

Professional Skills and Workplace Readiness

2485.11	Collaborate effectively in team-based project environments.
2485.11.1	Define roles and responsibilities within a team.
2485.11.2	Maintain a team project plan and timeline.
2485.11.3	Practice conflict resolution and peer feedback.
2485.12	Deliver oral presentations and technical reports to professional audiences.
2485.12.1	Organize findings using a technical report format.
2485.12.2	Use visual aids, charts, and prototypes to communicate solutions.
2485.12.3	Practice professional speaking and field questions from an audience.
2485.13	Apply safety and quality assurance procedures to all energy projects.
2485.13.1	Identify shop and lab safety hazards.
2485.13.2	Use personal protective equipment (PPE) correctly.
2485.13.3	Follow industry-standard quality and safety procedures.

Energy Transmission and Distribution extends the foundational knowledge from energy generation to consumer usage. Through hands-on projects, students explore AC/DC power, transformers, the electrical grid, Smart Grid, and the impact of consumer load, applying principles such as Ohm's law and Joule's law to understand energy transmission and conversion in power systems. Gain practical skills by designing transformers, capacitors, inverters, and power supplies, preparing for a future in optimizing the efficiency and reliability of energy distribution.

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Engineering Design Process for Transmission and Distribution

2486.1	Design, build, and test electrical transmission and distribution prototypes.
2486.1.1	Define project requirements for voltage, current, and load needs.
2486.1.2	Research power line configurations and transformer applications.
2486.1.3	Develop schematics and layouts for small-scale power distribution.
2486.1.4	Construct and test prototypes using transformers, capacitors, and inverters.
2486.1.5	Collect and analyze voltage, current, and load data.
2486.1.6	Iterate design to optimize efficiency and reliability.
2486.2	Maintain an engineering notebook documenting research, schematics, and data.
2486.2.1	Record daily project notes, wiring diagrams, and calculations.
2486.2.2	Include tables, graphs, and Root Mean Square voltage/current measurements.
2486.2.3	Document prototype testing results and reflections.
2486.2.4	Summarize lessons learned and potential improvements.

AC and DC Power Transmission

2486.3	Explain the principles of AC and DC power.
2486.3.1	Define direct current (DC) and alternating current (AC).
2486.3.2	Explain voltage, current, resistance, and power relationships.
2486.3.3	Apply Ohm's Law to electrical systems.
2486.3.4	Compare applications and efficiency of AC vs. DC power transmission.
2486.4	Describe how electrical power is transmitted and distributed.
2486.4.1	Identify major components of transmission and distribution systems (i.e., generators, transformers, substations, and feeders).
2486.4.2	Explain the concept of stepping voltage up and down using transformers.
2486.4.3	Trace power flow from generation to consumer loads.
2486.4.4	Describe losses in transmission lines and methods to reduce them.
2486.4.5	Discuss Smart Grid technology and its role in modern energy systems.

Load Management Systems

2486.5	Design and test protective systems using fuses, breakers, and surge protection.
2486.5.1	Explain the purpose and function of circuit breakers and fuses.
2486.5.2	Calculate current limits for safe operation of circuits and transformers.
2486.5.3	Select and install appropriate protection devices for a circuit.

2486.5.4	Test circuits for overload and fault conditions.
2486.5.5	Verify system safety and compliance with electrical standards.
2486.6	Analyze and optimize consumer energy usage.
2486.6.1	Measure real and reactive power in AC systems.
2486.6.2	Calculate power factor and energy consumption.
2486.6.3	Identify sources of energy inefficiency in consumer or industrial loads.
2486.6.4	Propose and test load-balancing or energy-saving solutions.

Power Conversion and Conditioning Systems

2486.7	Design and construct transformers and capacitors for system efficiency.
2486.7.1	Explain electromagnetic induction and transformer operation.
2486.7.2	Wind or assemble small-scale transformers and measure output.
2486.7.3	Calculate turns ratio, efficiency, and expected voltage changes.
2486.7.4	Test capacitance and its effect on power factor correction.
2486.7.5	Optimize circuit efficiency using reactive components.
2486.8	Build and test inverters and power supply prototypes.
2486.8.1	Explain rectification, inversion, and power supply principles.
2486.8.2	Assemble a DC to AC inverter using standard components.
2486.8.3	Test voltage stability and output waveforms.
2486.8.4	Apply load conditions and analyze performance.
2486.8.5	Implement improvements to reduce ripple or inefficiency.

Professionalism and 21st-Century Skills

2486.9	Collaborate effectively on team-based energy transmission projects.
2486.9.1	Define team roles and responsibilities for each project.
2486.9.2	Manage timelines, task lists, and shared resources.
2486.9.3	Reflect on team performance and peer contributions.
2486.10	Deliver professional technical presentations and reports.
2486.10.1	Document methods, data, schematics, and calculations in technical reports.
2486.10.2	Create visual aids (i.e., wiring diagrams, graphs, and prototype photos).
2486.10.3	Deliver professional presentations to authentic audiences.
2486.11	Apply safety and ethical practices in energy transmission and distribution work.
2486.11.1	Identify electrical hazards including shock, arc, and overload risks.
2486.11.2	Follow lockout/tagout and PPE protocols.
2486.11.3	Maintain accurate and ethical data collection and reporting.

Electronics and Control Systems elevate students' understanding of energy control systems. Building on foundational knowledge, students apply their skills to advanced systems, learning about transformers, switches (electrical, pneumatic, hydraulic, and mechanical), breakers, panel boards, switchboards, and programmable logic controllers. Through projects, students explore the intricacies of smart-home automation, plant-level process control, natural gas pipeline monitoring, energy storage, and wind power. This course not only challenges students to design and build prototypes but also requires them to develop software programs for testing, ensuring a comprehensive grasp of energy and power principles.

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Electronic and Control Systems Design

2487.1	Design, build, and test automated control systems and prototypes.
2487.1.1	Define project requirements and constraints based on the Essential Question (e.g., smart home, plant automation).
2487.1.2	Conduct research on control system applications in residential and industrial energy systems.
2487.1.3	Create block diagrams and initial wiring schematics for the control system.
2487.1.4	Build a prototype including sensors, actuators, and control hardware.
2487.1.5	Test system performance and document failures and inefficiencies.
2487.1.6	Iterate the design based on quantitative performance data.
2487.2	Maintain an engineering notebook with technical data, calculations, and reflections.
2487.2.1	Record daily notes on research, wiring, coding, and test results.
2487.2.2	Include labeled schematics, flowcharts, and calculations.
2487.2.3	Document troubleshooting steps and solutions.
2487.2.4	Summarize project milestones and team contributions.

Control and Monitoring Systems

2487.3	Explain principles of industrial and residential automation.
2487.3.1	Identify automation components (e.g., sensors, relays, actuators, and controllers).
2487.3.2	Compare residential vs. industrial automation applications.
2487.3.3	Describe how automation improves safety, efficiency, and reliability.
2487.3.4	Explain open-loop vs. closed-loop systems.
2487.4	Implement monitoring systems for pipelines, plant boilers, and wind turbines.
2487.4.1	Identify sensors and monitoring devices for pressure, flow, temperature, and position.
2487.4.2	Wire sensors into a data collection or PLC system.
2487.4.3	Interpret real-time monitoring data to determine system status.
2487.4.4	Recognize abnormal trends or safety risks in system data.
2487.5	Analyze and troubleshoot programmable logic controller (PLC) systems.
2487.5.1	Understand basic ladder logic and control sequences.
2487.5.2	Program PLCs to respond to sensor input and trigger actuators.
2487.5.3	Identify and resolve wiring, code, or logic errors.
2487.5.4	Verify proper operation of the full control loop.

Electrical and Electronic Principles in Energy Systems

2487.6	Calculate energy use and efficiency in electrical systems.
2487.6.1	Review Ohm's Law and power equations ($V=IR$)
2487.6.2	Calculate current draw and total energy consumption for devices.
2487.6.3	Compare theoretical vs. measured performance to identify losses.
2487.6.4	Analyze how design changes impact energy efficiency.
2487.7	Analyze and optimize battery chemistries for energy storage.
2487.7.1	Investigate battery chemistry (alkaline, lithium-ion, lead-acid).
2487.7.2	Calculate voltage potential.
2487.7.3	Recommend improvements for capacity, cost, or sustainability.
2487.8	Implement control systems to improve power efficiency.
2487.8.1	Analyze system inefficiencies (e.g., standby losses, unregulated loads).
2487.8.2	Configure timers, sensors, and logic controls to reduce energy waste.
2487.8.3	Measure and document efficiency improvements after control implementation.
2487.8.4	Compare ROI or energy savings for the improved system.

Optimize System Performance

2487.9	Use tools to collect and visualize performance data.
2487.9.1	Collect real-time voltage, current, pressure, or flow data.
2487.9.2	Generate graphs and dashboards for visual interpretation.
2487.9.3	Compare expected vs. actual performance metrics.
2487.10	Develop and calibrate sensor-based monitoring systems.
2487.10.1	Wire and connect sensors for flow, pressure, and temperature.
2487.10.2	Perform sensor calibration using known reference values.
2487.10.3	Verify accuracy and repeatability of sensor data.
2487.10.4	Troubleshoot signal and measurement errors.
2487.11	Adjust control logic based on data trends to improve efficiency.
2487.11.1	Analyze collected system performance data to identify issues.
2487.11.2	Adjust PLC programming or sensor placement based on findings.
2487.11.3	Document before-and-after efficiency results.
2487.11.4	Present data-driven recommendations for further improvement.

Professionalism and 21st Century Skills in Energy Projects

2487.12	Collaborate with mentors and team members to meet project objectives.
2487.12.1	Set team goals, roles, and timelines.
2487.12.2	Communicate with industry mentors for feedback and guidance.
2487.12.3	Participate in peer evaluations and team reflections.
2487.13	Prepare and deliver technical reports and presentations to authentic audiences.
2487.13.1	Organize a technical report with abstract, methods, data, and conclusions.
2487.13.2	Use visuals (schematics, data charts, dashboards) in reports and slides.
2487.13.3	Deliver a professional presentation and field technical questions.
2487.14	Apply safety and ethical standards in monitoring and control activities.
2487.14.1	Identify electrical, chemical, and mechanical hazards in control system labs.
2487.14.2	Apply lockout/tagout and PPE requirements.
2487.14.3	Follow ethical data reporting and industry safety practices.

Advanced Science and Engineered Systems, propels students into roles such as building technicians, design engineers, and CEOs while addressing real-world energy and power issues. This advanced course integrates hands-on projects that allow students to independently tackle scenarios with industry mentors, offering flexibility in determining final project outcomes. Explore multiple sources of energy, engineered systems, societal impact, and the business aspects of energy through engaging projects involving magnetic levitation trains, advanced steam energy concepts, carbon sequestration, hydraulic fracturing, alternative fuels in transportation, and environmental compliance.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Advanced Science and Engineered Systems

2488.1	Analyze and improve steam-electric power plan efficiency.
2488.1.1	Describe how steam is generated, expanded, and condensed in a power plant cycle.
2488.1.2	Explain Rankine cycle and thermodynamics efficiency concepts.
2488.1.3	Calculate energy input vs. electrical output to determine efficiency.
2488.1.4	Identify losses due to heat transfer, friction, and condensation.
2488.1.5	Propose modifications to improve plant efficiency (e.g., preheating or insulation).
2488.2	Design and evaluate high-voltage transmission and three-phase power systems.
2488.2.1	Explain three-phase vs. single-phase distribution systems for projects.
2488.2.2	Interpret high-voltage transmission line diagrams and safety standards.
2488.2.3	Calculate voltage drop, power loss, and load balancing in circuits.
2488.2.4	Simulate or build mini three-phase distribution systems for lab projects.
2488.2.5	Propose cost-effective, safe and reliable designs for energy delivery.
2488.3	Develop and test carbon capture or emissions reduction solutions.
2488.3.1	Explain sources of carbon emissions.
2488.3.2	Research carbon capture technologies (e.g., absorption, adsorption, membranes).
2488.3.3	Model gas flow and absorption rates using lab-scale systems.
2488.3.4	Evaluate efficacy and cost implications of proposed solutions.
2488.3.5	Relate carbon capture to environmental regulations and sustainable energy goals.

Capstone Energy Project

2488.4	Lead project teams in advanced energy system design and prototyping.
2488.4.1	Identify capstone project scope and deliverables based on authentic industry problems.
2488.4.2	Assign team role and create a detailed Gantt chart or timeline.
2488.4.3	Oversee integration of subsystems.
2488.4.4	Ensure team follows Engineering Design Process (EDP) with iteration and testing.
2488.5	Conduct testing and data collection to validate system performance.
2488.5.1	Establish testing protocols and safety procedures.
2488.5.2	Collect voltage, current, thermal, and flow data using a graphical programming environment.
2488.5.3	Compare measured vs. predicted performance metrics.
2488.5.4	Document system weaknesses and propose adjustments.
2488.6	Prepare capstone presentations and reports for industry mentors.

2488.6.1	Write a formal engineering report including abstract, methods, results, and analysis.
2488.6.2	Develop visuals: schematics, 3D CAD, graphs, and dashboards.
2488.6.3	Deliver a professional oral presentation to an authentic industry audience.
2488.6.4	Respond to technical questions and defend design decisions.

Business and Environmental Considerations for Energy Solutions

2488.7	Analyze the economic and societal impact of energy technologies.
2488.7.1	Perform basic cost analysis and ROI calculations for energy systems.
2488.7.2	Evaluate trade-offs between cost, performance, and sustainability.
2488.7.3	Assess community, environmental, and economic impacts of energy projects.
2488.7.4	Compare renewable vs. nonrenewable strategies for local energy needs.
2488.8	Recommend sustainable energy solutions based on research findings.
2488.8.1	Research alternative energy technologies (solar, wind, geothermal, biofuels, etc).
2488.8.2	Evaluate suitability of energy solutions based on site conditions.
2488.8.3	Align proposals to environmental regulations and sustainable practices.
2488.8.4	Recommend optimized solutions balancing performance, cost, and impact.

Demonstrate Leadership and Workplace Readiness

2488.9	Function as a team leader in multidisciplinary project environments.
2488.9.1	Apply leadership delegation skills in team projects.
2488.9.2	Facilitate team decision-making and conflict resolution.
2488.9.3	Monitor project progress and ensure deadlines are met.
2488.10	Engage with industry mentors and apply feedback to improve project outcomes.
2488.10.1	Prepare regular progress updates and draft submissions for mentor review.
2488.10.2	Incorporate industry feedback into design iterations.
2488.10.3	Maintain professional communication practices (email, meetings, presentations).
2488.11	Exhibit ethical, safe, and professional conduct in all project phases.
2488.11.1	Follow OSHA, electrical, and environmental safety standards.
2488.11.2	Use PPE and lab procedures consistently.
2488.11.3	Maintain honest data reporting and professional behavior.

This specialization course covers topics in land management and surveying to prepare students for land management careers in the vast natural resources industry. Topics include geophysical data, surveying, mapping, and title examination and searching. Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide each student with real world learning opportunities and instruction. Students are encouraged to become active members of the student organization, FFA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundation of Agriculture, Food, and Natural Resources

2494.1	Demonstrate understanding of natural resources (e.g., renewable resources).
2494.1.1	Discuss advanced geology principles.
2494.1.2	Explain the formation of oil and natural gas deposits.
2494.1.3	Identify equipment used to prospect and sample oil and gas.
2494.1.4	Prepare notes, sketches, geological maps, or cross-sections.
2494.1.5	Read and study reports to compile information and data for geological and geophysical prospecting.
2494.1.6	Interview individuals and research public databases to obtain information.
2494.1.7	Assemble, maintain, or distribute information for libraries or record systems.
2494.1.8	Operate or adjust equipment or apparatus used to obtain geological data.
2494.1.9	Set-up or direct set-up of instruments used to collect geological data.
2494.1.10	Record readings to compile data used in prospecting for oil and gas.
2494.1.11	Observe oil, water, or gas well-drilling activities.
2494.1.12	Collect samples or cuttings using equipment or hand tools.
2494.1.13	Evaluate and interpret core samples and cuttings and other geological data used in prospecting for oil and gas.
2494.1.14	Students will demonstrate knowledge of property titles and institutions involved in title examination and searching.
2494.1.15	Prepare lists of all legal instruments applying to a specific piece of land and the buildings on it.
2494.1.16	Examine documentation such as mortgages, liens, judgments, easements, plat books, maps, contracts, and agreements to verify factors such as properties' legal descriptions, ownership, or restrictions.
2494.1.17	Read search requests to ascertain types of title evidence required and to obtain descriptions of properties and names of involved parties.
2494.1.18	Copy or summarize recorded documents, such as mortgages, trust deeds, and contracts that affect property titles.
2494.1.19	Examine individual titles to determine if restrictions, such as delinquent taxes, will affect titles and limit property use.
2494.1.20	Prepare reports describing any title encumbrances encountered during searching activities and outlining actions needed to clear titles.
2494.1.21	Confer with realtors, lending institution personnel, buyers, sellers, contractors, surveyors, and courthouse personnel to exchange title-related information or to resolve problems.

2494.1.22	Enter into the record keeping system the appropriate data needed to create new title records or update existing ones.
2494.1.23	Obtain maps or drawings delineating properties from company title plants, county surveyors, and/or assessor's offices.

Soil and Land Management

2494.2	Exhibit knowledge of spatial tools such as Geographic Information Systems (GIS) and Global Positioning Systems (GPS) and their use in resource management (e.g., satellite links, waypoint).
2494.2.1	Utilize surveying equipment and instruments.
2494.2.2	Interpret data and maps used in surveying.
2494.2.3	Explain mathematical equations used in surveying.
2494.2.4	Verify the accuracy of survey data including measurements and calculations at survey sites.
2494.2.5	Search legal records, survey records, and land titles to obtain information about property boundaries in areas to be surveyed.
2494.2.6	Prepare maps of land management sites.
2494.2.7	Enter global positioning system (GPS) data, legal deeds, field notes, or land survey reports into geographic information system (GIS) workstations so that information can be transformed into graphic land description such as maps or drawings.
2494.3	Display knowledge of topographic and aerial maps, soil surveys, and soil test results (e.g., benchmark elevation, pH, slope).
2494.3.1	Calculate heights, depths, relative positions, property lines, and other characteristics of terrain.
2494.3.2	Prepare and maintain sketches, maps, reports, and legal descriptions of surveys to describe, certify, and assume liability for work performed.
2494.3.3	Direct or conduct surveys to establish legal boundaries for properties based on legal deeds and titles.
2494.3.4	Prepare or supervise preparation of all data, charts, plots, maps, records, and documents related to surveys.
2494.3.5	Write descriptions of property boundary surveys for use in deeds, leases, or other legal documents.
2494.3.6	Compute geodetic measurements and interpret survey data to determine positions, shapes, and elevations or geomorphic and topographic features.
2494.3.7	Determine longitudes and latitudes of important features and boundaries in survey areas using theodolites, transits, levels, and GPS.
2494.3.8	Record the results of surveys including the shape, contour, location, elevation, and dimensions of land or land features.
2494.3.9	Establish fixed points for use in making maps using geodetic and engineering instruments.
2494.3.10	Adjust surveying instruments to maintain their accuracy.
2494.3.11	Interpret topographical maps and their use in land management.
2494.3.12	Interpret aerial photographs and their use in land management.
2494.3.13	Compare topographical features or contour lines with images from aerial photographs, old maps, or other reference materials to verify the accuracy of their identification.
2494.3.14	Research resources such as survey maps or legal descriptions to verify property lines or to obtain information needed for mapping.
2494.3.15	Analyze aerial photographs to detect and interpret significant military, industrial, resource, or topographical data.

Foundations of Agriculture, Food, and Natural Resources

2494.4	Demonstrate knowledge of leadership development through FFA.
2494.4.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
2494.4.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
2494.4.3	Participate in community service and career awareness activities at the local, state, and national level.

The Arboriculture and Urban Forestry course is a specialization course designed for students to gain understanding of the management of trees in urban forest environments. The performance skill sets are written so students will identify, select, plant, prune and maintain trees and monitor tree health.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Foundations of Agriculture, Food, and Natural Resources

2498.1	Demonstrate understanding of power, structural, and technical systems in forest management.
2498.1.1	Outline basic laws and regulations in forest industries.
2498.1.2	Explain methods of communication within forest industries.
2498.1.3	Identify electrical hazards when working in forest industries.
2498.1.4	Demonstrate chainsaw safety.
2498.1.5	Explain safe tree felling and removal.
2498.1.6	Describe arborists' rope types and rope usages.
2498.1.7	Identify climbing gear and conduct safety inspections of equipment.
2498.1.8	Explain rescue techniques.
2498.1.9	Identify climbing and rigging equipment.
2498.1.10	Explain rigging and cutting techniques.
2498.1.11	List all personal protective equipment required for forestry work.
2498.1.12	Demonstrate hand signals and vocal communications.
2498.1.13	Safely start and run a chainsaw.
2498.1.14	Safely buck a log.
2498.1.15	Identify types of tree support systems.
2498.1.16	Properly use tree stabilization equipment.
2498.1.17	Identify cabling hardware and tools and explain the steps of cabling a tree.
2498.1.18	Explain techniques for installing cables and conduct inspections of cable support systems.

Soil and Land Management

2498.2	Demonstrate understanding of soil erosion and conservation (e.g., horizon, contour planting).
2498.2.1	Discuss soil structure, properties, and pore space and the effect on tree growth.
2498.2.2	Identify and describe soil horizons.
2498.2.3	Explain the impact of soil moisture on tree growth.
2498.2.4	Describe urban soils.
2498.2.5	Discuss the relationship between water and trees.
2498.2.6	Name factors that affect urban soils.

Forest Management

2498.3	Define basic forestry concepts (e.g., site index, tree biology, forest measurements, tolerant tree species).

2498.3.1	Identify the parts of cells and tissues of woody plants.
2498.3.2	Explain the parts/functions of woody stems.
2498.3.3	Explain the parts/functions of buds and branches.
2498.3.4	Explain the parts/functions of leaves.
2498.3.5	Explain the parts/functions of roots.
2498.3.6	Discuss the photosynthesis process.
2498.3.7	Explain the cycle of tree respiration and transpiration.
2498.3.8	Explain the growth and development of a tree.
2498.3.9	Discuss the defense systems of a tree.
2498.3.10	Diagram parts of woody stems, buds, branches, leaves, and roots.
2498.3.11	Take a core sample from a tree and analyze the growth rings and internal parts.
2498.3.12	Observe trees and identify various stages of tree growth.
2498.3.13	Discuss pruning specifications and determine the timing of when and how much to prune.
2498.3.14	Select limbs to prune on young trees.
2498.3.15	Safely use the tools used for proper pruning.
2498.3.16	Discuss specialty pruning.
2498.3.17	Identify trees that would need the different types of pruning.
2498.3.18	Identify tools used in pruning.
2498.3.19	Properly write tree specific pruning specifications including early pruning practices.
2498.4	Display knowledge of dendrology (e.g., simple and compound leaves, samara).
2498.4.1	Discuss basic dendrology.
2498.4.2	Define tree taxonomy.
2498.4.3	Use tree features to identify species.
2498.4.4	Utilize identification keys.
2498.4.5	Identify different types of branch attachments.
2498.4.6	Display knowledge of how to select trees of the site.
2498.4.7	Display a knowledge of tree selection, site considerations, and planting specifications.
2498.4.8	Select nursery trees appropriate for the planting site.
2498.4.9	Make a tree identification key.
2498.4.10	Identify trees based on leaf characteristics.
2498.4.11	Determine common name of common tree species.
2498.4.12	Determine if a nursery tree is good nursery stock and select species appropriate for planting site.
2498.4.13	List some considerations of both trees and site.
2498.4.14	Display knowledge of different planting techniques, early care watering, stabilization, and mulching needs.
2498.4.15	Read and understand basic planting specifications.
2498.5	Recognize and define best management practices in forestry and state BMP regulations (e.g., prescribed burns).
2498.5.1	Perform a basic tree inspection.
2498.5.2	Conduct systematic diagnosis of tree disorders including decay and risk factors.
2498.5.3	Identify symptoms and signs of problems.
2498.5.4	Identify and describe abiotic disorders.
2498.5.5	Identify and describe biotic disorders.
2498.5.6	Find assistance in diagnosis.
2498.5.7	Diagram the system to diagnose problems.
2498.5.8	List both abiotic and biotic disorders.

2498.5.9	Name some agencies to assist with a diagnosis.
2498.5.10	Discuss plant defense mechanisms.
2498.5.11	Explain integrated pest management, definition, and basics.
2498.5.12	Identify cultural, biological, and chemical controls of tree diseases and pests.
2498.5.13	Explain alternative pesticide options.
2498.5.14	Name the damaging effects of improper construction on trees and proper treatment.
2498.5.15	Identify practices to mitigate the effect of improper construction practices on trees.
2498.5.16	Discuss risk management.
2498.5.17	Explain liability and negligence.
2498.5.18	Grade changes that affect tree health.
2498.5.19	Identify tree decay and rot.
2498.5.20	Identify tree fertilization needs and select appropriate fertilization methods.
2498.5.21	List trees that may be susceptible to lightning strikes and prescribe lightning protection.
2498.5.22	Name the different tree support systems.

Foundations of Agriculture, Food, and Natural Resources

2498.6	Demonstrate knowledge of leadership development through FFA.
2498.6.1	Participate in FFA leadership opportunities offered at the local, state, and national level.
2498.6.2	Participate in FFA intracurricular competitive opportunities at the local, state, and national level.
2498.6.3	Participate in community service and career awareness activities at the local, state, and national level.

AP Computer Science Applications

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

Advanced Placement (AP) courses are a nationwide recognized curriculum available through the College Board.

For more information, visit Course & Exam Pages – AP Central | College Board at [Course & Exam Pages – AP Central | College Board](#)

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

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Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

This introductory course provides students with fundamental knowledge and skills necessary for effective computer use in both personal and professional settings. Participants will learn essential concepts such as computer hardware and software, file management, internet navigation, and basic troubleshooting techniques. Emphasis will be placed on practical application through hands-on exercises and real-world scenarios. By the end of the course, students will gain confidence in utilizing computers confidently and responsibly.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Digital Literacy

2811.1	Demonstrate an understanding of basic computer concepts and terminology.
2811.1.1	Define and identify key computer components, peripherals, and common technology terms.
2811.1.2	Learn about CPU, RAM, storage devices, input/output peripherals, and operating systems.
2811.1.3	Understand how data is processed in a computer by tracing the execution of a simple program.
2811.1.4	Describe the function of a motherboard, CPU, and RAM in a computer system and how they interact to execute tasks.
2811.2	Identify and describe the functions of CPU, RAM, storage devices, input, and output devices.
2811.2.1	Understand how the CPU processes instructions, RAM stores data, and input/output devices enable user interaction.
2811.2.2	Describe how storage devices retain data and input devices transmit commands to the CPU.
2811.2.3	Discuss how RAM temporarily holds data for processing and output devices display results to users.
2811.3	Define and identify key computer components, peripherals, and common technology terms.
2811.3.1	Learn about components like CPU, motherboard, peripherals like keyboard and mouse, and terms like operating system and software.
2811.3.2	Point out and describe the functions of components like CPU, GPU, and peripherals like printer and scanner in a computer system.
2811.3.3	Explain the difference between hardware and software and describe the role of peripherals in computer functionality.

Operating Systems and Software

2811.4	Navigate and utilize common operating systems and software applications.
2811.4.1	Learn to navigate Windows or macOS environments and use software like Microsoft Office or Adobe Photoshop.
2811.4.2	Create documents and presentations using Microsoft Word and PowerPoint or edit images with Adobe Photoshop.
2811.4.3	Explore advanced features like file management, customization options, and keyboard shortcuts to improve productivity.
2811.5	Interact with different operating systems, install software, and perform basic operations in word processing, spreadsheet, and presentation software.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

2811.5.1	Engage with various operating systems, installing software and performing basic tasks in productivity software.
2811.5.2	Write documents, create spreadsheets, and design presentations using Microsoft Word, Excel, and PowerPoint or Google Docs, Sheets, and Slides.
2811.5.3	Explore formatting options, formulas, and slide transitions to enhance documents, spreadsheets, and presentations.
2811.6	Differentiate between system software and application software; understand the concept of open-source software.
2811.6.1	Distinguish between system software and application software through basic learning resources.
2811.6.2	Explore the concept of open-source software and its benefits in software development.
2811.6.3	Apply knowledge by identifying examples of system software, application software, and open-source software.

Internet and Communication

2811.7	Effectively use the internet for research, communication, and collaboration.
2811.7.1	Familiarize yourself with features of various browsers.
2811.7.2	Conduct research on a topic using search engines, compose and send emails and engage in discussions on forums or social media platforms.
2811.7.3	Collaborate on a document using share files through cloud storage services and participate in group discussions using communication tools.
2811.7.4	Navigate websites, use search engines, send, and receive emails, and understand online communication etiquette.
2811.8	Explain the structure of the internet; understand URLs, browsers, and search engines.
2811.8.1	Understand how URLs lead to web addresses, browsers display web pages, and search engines find information.
2811.8.2	Explore how URLs, browsers, and search engines function together in internet navigation.
2811.8.3	Describe how browsers interpret URLs to load web pages and how search engines help find relevant content.

File Management

2811.9	Organize and manage files and folders efficiently.
2811.9.1	Understand how to create, rename, move, and delete files and folders in operating systems
2811.9.2	Sort documents into folders by project or subject and use descriptive file names for easy identification.
2811.9.3	Backup important files to cloud storage services and periodically review and delete unnecessary files and folders.
2811.10	Create, save, copy, move, and delete files and folders; understand file formats.
2811.10.1	Practice creating a new document, saving it to a specific location, copying it to another folder, moving it to a different directory, and then deleting it.
2811.10.2	Learn that text files (.txt) contain plain text, while image files (.jpg, .png) store visual data, and document files (.docx, .pdf) hold formatted text and images.
2811.10.3	Save a text document as a .txt file for plain text, an image as a .jpg for photographs, and a report as a .pdf for easy sharing and printing.
2811.11	Understand file paths, file extensions, and the importance of file organization.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

2811.11.1	Learn that file paths specify the location of a file within the file system, and file extensions indicate the type of file and its associated program.
2811.11.2	Navigate through file directories using file paths, and associate file extensions with corresponding software applications for easy access and editing.
2811.11.3	Organize files into folders based on logical categories or projects to facilitate quick retrieval and avoid cluttering the file system.

Troubleshooting

2811.12	Diagnose and resolve common computer issues.
2811.12.1	Recognize symptoms such as slow performance, freezes, or error messages indicating potential problems.
2811.12.2	Check hardware connections, scan for malware, and update drivers or software to resolve performance issues.
2811.12.3	Document solutions for common issues, stay informed about updates and patches, and implement regular maintenance tasks like disk cleanup and software updates.
2811.13	Identify and troubleshoot hardware and software problems; seek help effectively.
2811.13.1	Recognize hardware problems like overheating and software issues like crashes.
2811.13.2	Check connections and update drivers for hardware issues and reinstall or update software for software issues.
2811.13.3	Seek effective help from online resources or professionals when encountering challenging issues.
2811.14	Recognize common hardware and software issues; follow systematic troubleshooting steps.
2811.14.1	Check hardware connections and update drivers for hardware issues and reinstall or update software for software issues.
2811.14.2	Recognize software troubleshooting issues such as crashes, slow performance, or compatibility problems by observing system behavior and error messages.
2811.14.3	Identify hardware troubleshooting issues by checking for signs of component failure, connectivity problems, or overheating.
2811.14.4	Resolve software issues by updating applications, reinstalling problematic software, or adjusting system settings to improve performance and compatibility.
2811.14.5	Develop a checklist or flowchart for systematic troubleshooting, enabling efficient problem-solving in future instances.

Cybersecurity

2811.15	Practice safe and secure computing habits.
2811.15.1	Implement strong passwords and enable two-factor authentication for online accounts to enhance security.
2811.15.2	Regularly update antivirus software and perform malware scans to safeguard against cyber threats.
2811.15.3	Practice caution when clicking on links or downloading files from unknown sources to prevent malware infections.
2811.16	Understand the importance of passwords, recognize online threats, and implement basic cybersecurity measures.
2811.16.1	Explain the critical role of passwords in protecting personal information and online accounts.
2811.16.2	Learn to identify common online threats like phishing scams and malware attacks.
2811.16.3	Take proactive steps to enhance cybersecurity, such as creating strong passwords, staying vigilant against suspicious emails, and using antivirus software.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

2811.17	Identify common cybersecurity threats; understand the importance of regular software updates and antivirus programs.
2811.17.1	Recognize common cybersecurity threats like phishing, malware, and ransomware.
2811.17.2	Install updates for operating systems and applications to patch known vulnerabilities and enhance security.
2811.17.3	Utilize antivirus software to scan for and remove viruses, trojans, and other malware threats.

Ethical and Responsible Computer Use

2811.18	Exhibit ethical and responsible behavior in the digital world.
2811.18.1	Respect digital privacy and refrain from sharing sensitive information online.
2811.18.2	Adhere to copyright laws by obtaining proper permissions for copyrighted materials.
2811.18.3	Practice positive digital citizenship by promoting respectful interactions online.
2811.19	Understand digital citizenship, respect copyright, and practice responsible use of technology.
2811.19.1	Promote digital citizenship by engaging in respectful and positive online interactions.
2811.19.2	Seek permission before using images, videos, or text from copyrighted sources in creative projects.
2811.19.3	Practice responsible technology use by protecting personal data and respecting others' privacy.
2811.20	Grasp the concept of digital rights and responsibilities; understand plagiarism and intellectual property.
2811.20.1	Understand digital rights and responsibilities by learning about online privacy, freedom of speech, and ethical behavior.
2811.20.2	Cite sources properly when using information from websites or publications and seek permission before using someone else's creative work.
2811.20.3	Refrain from downloading pirated software, movies, or music, and support creators by purchasing or licensing their work legally.

This course serves as an introduction to the fundamental concepts and principles of programming for beginners. Students will learn the basics of algorithmic thinking, problem-solving techniques, and programming fundamentals using a high-level programming language. Through hands-on exercises and coding projects, participants will develop essential programming skills and gain confidence in writing and understanding code. By the end of the course, students will be equipped with a solid foundation in programming that will prepare them for further study in computer science or related fields.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Programming Fundamentals

2816.1	Demonstrate understanding of basic programming concepts.
2816.1.1	Write simple programs using variables, data types, control structures (if statements, loops), and basic input/output operations.
2816.1.2	Understand how variables store data, data types define the type of data, and control structures like if statements and loops control the flow of execution.
2816.1.3	Write a program that calculates the average of a list of numbers or a program that iterates through a list to find the maximum value.
2816.2	Grasp variables and data types.
2816.2.1	Understand the concept of variables and different data types (integers, floats, strings).
2816.2.2	Learn how variables store data and data types define the type of data they can hold, such as integers, strings, and Booleans.
2816.2.3	Declare variables to store numbers, text, and Boolean values, and perform operations or manipulations on them.
2816.3	Utilize functions and procedures.
2816.3.1	Understand the concept of functions and procedures; write and call functions.
2816.3.2	Practice defining and calling functions and procedures in coding exercises.
2816.3.3	Invoke a function to calculate the square root of a number or call a procedure to display a menu on the screen.

Problem Solving and Algorithm Development

2816.4	Develop algorithms to solve programming problems.
2816.4.1	Decompose problems into smaller, manageable tasks; design and implement algorithms using pseudocode or flowcharts.
2816.4.2	Learn to analyze programming problems and devise algorithms to solve them.
2816.4.3	Debug and optimize algorithms based on test cases and feedback to improve efficiency and accuracy.
2816.5	Learning loops.
2816.5.1	Master the use of loops for repetitive tasks.
2816.5.2	Practice implementing loops to automate repetitive tasks in coding exercises.

2816.5.3	Use nested loops to traverse multi-dimensional arrays or simulate complex behaviors in simulations or games.
2816.6	Acquire basic algorithmic concept knowledge.
2816.6.1	Understand basic algorithms such as linear search, binary search, and sorting algorithms.
2816.6.2	Learn how sequences of instructions, conditional statements (selection), and loops (iteration) form the basis of algorithms.
2816.6.3	Explore algorithmic efficiency and complexity by analyzing algorithms in terms of time and space requirements.

Programming Language Proficiency

2816.7	Use a programming language to create functional programs.
2816.7.1	Write, test, and debug programs using a specific programming language (e.g., Python, Java, JavaScript).
2816.7.2	Learn the syntax and basic constructs of a programming language.
2816.7.3	Practice writing code to implement specific functionalities.
2816.8	Using conditional statements.
2816.8.1	Understand and use conditional statements to control program flow.
2816.8.2	Learn how/ if statements, else statements, and elif statements are used to execute different code blocks based on certain conditions.
2816.8.3	Explore advanced conditional constructs such as nested if statements and ternary operators.
2816.9	Comprehending arrays and lists.
2816.9.1	Understand and use arrays and lists to store and manipulate data.
2816.9.2	Create an array of integers and perform tasks like accessing elements, adding, or removing items, and iterating through the array.
2816.9.3	Implement algorithms like bubble sort or binary search to sort and search elements within arrays or lists efficiently.

Code Documentation and Readability

2816.10	Create well-documented and readable code.
2816.10.1	Use comments and proper coding conventions to enhance code readability and maintainability.
2816.10.2	Follow coding conventions and style guidelines to maintain consistency and readability.
2816.10.3	Review and refactor code regularly to improve readability and maintainability.

Debugging and Troubleshooting

2816.11	Identify and fix errors in programs.
2816.11.1	Utilize debugging tools, identify, and resolve common programming errors, and understand error messages.
2816.11.2	Interpret error messages to understand the nature of the problem and examine program output to identify unexpected behavior.
2816.11.3	Modify code logic, correct syntax errors, or update variable values to resolve issues and achieve the desired program outcome.
2816.12	Exploring debugging techniques.
2816.12.1	Learn common debugging techniques, including using breakpoints and print statements.

2816.12.2	Use techniques like binary search debugging or divide and conquer to isolate and resolve errors efficiently.
2816.12.3	Share code snippets on programming forums or participate in pair programming sessions to gain insights and resolve complex bugs collaboratively.

Software Development Life Cycle

2816.13	Understand the phases of software development.
2816.13.1	Describe the software development life cycle stages (planning, analysis, design, implementation, testing, maintenance).
2816.13.2	Explore the importance of each phase and its role in ensuring successful software development.
2816.13.3	Apply knowledge of software development phases to manage projects effectively and deliver high-quality software products.
2816.14	Explore input/output operations.
2816.14.1	Learn how to take input from users and display output.
2816.14.2	Learn how to use functions like input() and print() in Python to receive input from users and display output to the screen.
2816.14.3	Explore advanced input/output techniques for file handling and data manipulation.

Basic Data Structures and Algorithms

2816.15	Demonstrate knowledge of basic data structures and algorithms.
2816.15.1	Implement and use arrays, lists, and basic searching and sorting algorithms.
2816.15.2	Understand algorithms like linear search, binary search, bubble sort, and insertion sort for efficient data manipulation and organization.
2816.15.3	Write code to implement a linked list, perform sorting algorithms on arrays, or search for elements in various data structures to reinforce understanding and proficiency.
2816.16	Explore control structures
2816.16.1	Grasp the use of if statements, loops (for, while), and switch statements.
2816.16.2	Write code using if-else statements to determine eligibility for a discount or use a for loop to iterate over elements in an array.
2816.16.3	Use nested if-else statements to manage multiple conditions or combine loops and conditionals to implement algorithms like bubble sort or binary search.

Version Control

2816.17	Use version control for code management.
2618.17.1	Understand the basics of version control systems (e.g., Git), clone repositories, commit changes, and collaborate with others.
2618.17.2	Create a new Git repository for a project, commit changes regularly, and push updates to a remote repository on platforms like GitHub or GitLab.
2618.17.3	Create feature branches for new developments, merge changes into the main branch using git merge, and resolve conflicts that may arise during merging.
2816.18	Collaboration and version control issues.

2816.18.1	Grasp the importance of version control; understand basic Git commands.
2816.18.2	Collaborate with team members by creating branches, making changes, and submitting pull requests for review and integration.
2816.18.3	Participate in code reviews to provide feedback on teammates' changes and set up continuous integration pipelines to automate testing and deployment processes.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

This course provides an overview of computer and information science, covering key concepts, principles, and applications in the field. Students will explore fundamental topics such as algorithms, programming, data structures, databases, computer architecture, and networking. Emphasis will be placed on understanding the role of computers in society, as well as developing problem-solving and critical thinking skills essential for success in the digital age. By the end of the course, students will have a solid foundation in computer and information science, enabling them to pursue further studies or careers in related fields.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Computational Thinking

2826.1	Apply computational thinking to solve problems.
2826.1.1	Decompose problems, design algorithms, and understand the role of abstraction in problem-solving.
2826.1.2	Develop efficient algorithms to optimize resource allocation in distributed computing systems.
2826.1.3	Analyze complex data structures using computational algorithms to identify patterns and trends.

Programming and Software Development

2826.2	Demonstrate proficiency in programming and software development.
2826.2.1	Design, implement, and test software solutions using various programming languages and development tools.
2826.2.2	Object-oriented programming, version control, debugging, and software architecture.
2826.2.3	Collaborate in software development teams to build scalable and maintainable software solutions.

Data Structures and Algorithms

2826.3	Understand and implement advanced data structures and algorithms.
2826.3.1	Utilize data structures such as trees, graphs, and hash tables; analyze algorithmic complexity.
2826.3.2	Trees, graphs, sorting algorithms, searching algorithms, and algorithmic complexity.
2826.3.3	Employ algorithms like dynamic programming and heuristic search to solve optimization problems.

Database Systems

2826.4	Design and manage database systems.
2826.4.1	Create and normalize databases, write SQL queries, and understand database management systems.
2826.4.2	Relational databases, normalization, SQL, and database management systems.
2826.4.3	Optimize database performance through indexing, query optimization, and database tuning.

Computer Networks and Security

2826.5	Understand computer networks and implement security measures.

2826.5.1	Explain network architectures, protocols, and security mechanisms; implement secure coding practices.
2826.5.2	Develop network protocols, encryption, firewalls, and intrusion detection systems.
2826.5.3	Monitor network traffic and employ intrusion detection systems to detect and respond to potential security threats in real-time.

Operating Systems

2826.6	Understand the principles of operating systems.
2826.6.1	Explain process management, memory management, file systems, and basic OS concepts.
2826.6.2	Process management, memory management, file systems, and virtualization.
2826.6.3	Implement file system structures and operations for data storage and retrieval, including directory management and file access permissions.

Human-Computer Interaction (HCI)

2826.7	Design user-friendly interfaces.
2826.7.1	Understand HCI principles, conduct usability testing, and design interfaces for diverse user experiences.
2826.7.2	Master usability principles, user-centered design, and accessibility.
2826.7.3	Utilize principles of user experience (UX) design, such as information architecture and interaction design, to create engaging and accessible interfaces.

Software Engineering

2826.8	Apply software engineering principles.
2826.8.1	Understand software development life cycle, conduct software testing, and work collaboratively in a development team.
2826.8.2	Software development life cycle, testing methodologies, and agile development.
2826.8.3	Implement automated testing practices, including unit testing and continuous integration, to ensure software reliability and maintainability.

Artificial Intelligence and Machine Learning

2826.9	Explore concepts of AI and machine learning.
2826.9.1	Understand basic AI algorithms, machine learning models, and ethical considerations in AI.
2826.9.2	Machine learning algorithms, neural networks, and ethical considerations in AI.
2826.9.3	Evaluate and interpret model performance metrics such as accuracy and precision to assess the effectiveness of AI solutions and iterate on improvements.

Cybersecurity and Ethical Hacking

2826.10	Implement cybersecurity measures and ethical hacking practices.
2826.10.1	Identify vulnerabilities, implement security protocols, and understand ethical hacking principles.
2826.10.2	Penetration testing, cryptography, and ethical hacking practices.
2826.10.3	Stay updated on emerging cybersecurity threats and security best practices through continuous monitoring and participation in security communities.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

Information Systems and Management

2826.11	Analyze and design information systems.
2826.11.1	Understand business processes, analyze information requirements, and design information systems.
2826.11.2	Business processes, information requirements, and systems analysis.
2826.11.3	Evaluate and select appropriate technologies and platforms to implement information systems.

This course introduces computer programming using the Python programming language. Students will learn the basics of programming concepts such as variables, data types, control structures, functions, and object-oriented programming. Through hands-on exercises and projects, students will develop problem-solving skills and learn to write clear, efficient code. By the end of the course, students will be able to design and implement simple programs, laying the foundation for further studies in computer science and software development.

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Programming Fundamentals

2831.1	Demonstrate proficiency in fundamental programming concepts.
2831.1.1	Write and debug programs using variables, data types, control structures, and functions.
2831.1.2	Variables, data types, control structures (if, loops), functions, and error handling.

Data Structures and Algorithms

2831.2	Apply knowledge of data structures and algorithms.
2831.2.1	Implement and analyze basic data structures (arrays, linked lists) and algorithms (sorting, searching).
2831.2.2	Arrays, linked lists, stacks, queues, and basic algorithms (sorting, searching).

Object-Oriented Programming (OOP)

2831.3	Understand and apply principles of object-oriented programming.
2831.3.1	Design and implement classes, encapsulation, inheritance, and polymorphism.
2831.3.2	Classes, objects, inheritance, encapsulation, polymorphism, and abstraction.

Software Development

2831.4	Demonstrate software development skills.
2831.4.1	Utilize software development methodologies, version control systems, and collaborative tools.
2831.4.2	Software development life cycle, agile methodologies, version control (e.g., Git).

Web Development

2832.5	Develop web applications.
2832.5.1	Create and deploy web applications using HTML, CSS, and JavaScript.
2832.5.2	HTML, CSS, JavaScript, client-server architecture, and web frameworks.

Database Management

2831.6	Understand and use database management systems.
2831.6.1	Design and implement databases, write SQL queries, and understand normalization.
2831.6.2	Relational databases, normalization, SQL, and database management systems.

Computer Architecture and Operating Systems

2831.7	Understand computer architecture and operating system concepts.
2831.7.1	Explain CPU architecture, memory management, file systems, and basic OS functions.
2831.7.2	CPU architecture, memory hierarchy, file systems, and basic operating system functions.

Networking and Security

2831.8	Understand computer networking and security.
2831.8.1	Explain network protocols, implement basic security measures, and understand encryption.

This course offers a comprehensive overview of essential computer applications commonly used in various professional and personal settings. Students will gain practical skills in utilizing productivity software such as word processing, spreadsheet management, presentation software, and email clients. Additionally, the course covers basic principles of file management, internet browsing, and online collaboration tools. Through hands-on exercises and practical assignments, students will develop proficiency in navigating and leveraging computer applications effectively to enhance productivity and communication. This course is designed to equip students with the necessary digital literacy skills required for success in academic, professional, and personal environments.

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Digital Literacy

2846.1	Demonstrate proficiency in basic computer skills.
2846.1.1	Navigate computer systems, use input devices, and understand basic terminology.
2846.1.2	Basic computer hardware, software, and operating system concepts.

Microsoft Office Suite

2846.2	Utilize Microsoft Office applications.
2846.2.1	Create, edit, and format documents in Word, create spreadsheets in Excel, and design presentations in PowerPoint.
2846.2.2	Word processing concepts, spreadsheet formulas, and presentation design.

Internet and Email

2846.3	Effectively use the internet and email.
2846.3.1	Browse websites, conduct online research, and use email for communication.
2846.3.2	Browser usage, search engine functionality, and email etiquette.

File Management Concepts

2846.4	Organize and manage files and folders.
2846.4.1	Create, save, copy, move, and delete files; understand file formats.
2846.4.2	File organization, file formats, and file permissions.

Collaboration Tools Concepts

2846.5	Use online collaboration tools.
2846.5.1	Collaborate on documents using tools like Google Drive or Microsoft OneDrive.

2846.5.2	Online collaboration principles, version control, and document sharing.

Basic Graphic Design

2846.6	Understand basic graphic design principles.
2846.6.1	Create and edit simple graphics using tools like Microsoft Paint or online graphic design tools.
2846.6.2	Understanding color, layout, and basic design elements.

Cloud Computing

2846.7	Utilize cloud computing services.
2846.7.1	Understand cloud storage, use cloud-based applications, and share documents online.
2846.7.2	Cloud storage, cloud-based applications, and advantages of cloud computing.

Computer Security Awareness

2846.8	Practice basic computer security.
2846.8.1	Understand the importance of passwords, recognize phishing attempts, and implement basic cybersecurity measures.
2846.8.2	Importance of strong passwords, recognizing online threats, and basic cybersecurity practices.

Troubleshooting and Problem-Solving

2846.9	Identify and resolve common computer issues.
2846.9.1	Troubleshoot hardware and software problems and seek help effectively.
2846.9.2	Identifying common hardware and software issues and applying basic troubleshooting steps.

This course introduces object-oriented programming (OOP) concepts and principles. Students will learn how to design and implement software systems using object-oriented languages such as Java or C++. Topics covered include classes, objects, inheritance, polymorphism, encapsulation, and abstraction. Through practical exercises and programming projects, students will develop a deep understanding of OOP principles and gain proficiency in applying them to solve real-world problems. By the end of the course, students will be equipped with the foundational knowledge and skills necessary to design and develop robust, scalable software applications using object-oriented languages.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Understanding Object-Oriented Programming (OOP)

2856.1	Demonstrate understanding of core OOP principles.
2856.1.1	Explain encapsulation, inheritance, and polymorphism; apply these principles in program design.
2856.1.2	Definition of classes and objects, instantiation, and relationships between classes.
2856.1.3	Describe the differences between structured programming and object-oriented programming (OOP).
2856.1.4	Describe the use of a main method in an application.
2856.1.5	Perform basic input and output using standard input and output streams.
2856.1.6	Evaluate the scope of a variable and declare a variable within a block, class, or method.

Language Proficiency

2856.2	Exhibit proficiency in an object-oriented programming language.
2856.2.1	Write, debug, and maintain code in an OOP language such as Java, C++, or Python.
2856.2.2	Define the inputs and outputs of a computer program.
2856.2.3	Declare and use primitive data type variables.
2856.2.4	Identify precision loss in primitive data types.
2856.2.5	Explain how primitives differ from wrapper object types.
2856.2.6	Outline and explain the logical steps necessary for the development of a computer program.
2856.2.7	Create a basic algorithm using plain language (pseudocode).
2856.2.8	Use flowcharts to represent logic graphically.
2856.2.9	Explain the basic functions of the integrated development environment (IDE).

Class Design and Implementation

2856.3	Design and implement classes and objects.
2856.3.1	Develop class hierarchies, define attributes and methods, and create instances of classes.
2856.3.2	Instantiate and use class objects in programs.

Inheritance and Polymorphism

2856.4	Apply inheritance and polymorphism effectively.
2856.4.1	Design and implement inheritance hierarchies; demonstrate polymorphic behavior.
2856.4.2	Subclassing, method overriding, and achieving polymorphic behavior.

Abstraction and Encapsulation

2856.5	Utilize abstraction and encapsulation in program design.
2856.5.1	Identify and implement abstraction layers; encapsulate data and behavior within classes.
2856.5.2	Abstract classes, interfaces, and the concept of hiding implementation details.

Exception Handling

2856.6	Implement exception handling mechanisms.
2856.6.1	Manage exceptions gracefully to improve program robustness.
2856.6.2	Try-catch blocks, throwing and catching exceptions, and creating custom exceptions.

Design Patterns

2856.7	Understand and apply common design patterns.
2856.7.1	Identify and implement design patterns such as singleton, factory, and observer patterns.
2856.7.2	Singleton, factory, observer, and other common design patterns.

GUI Programming

2856.8	Design graphical user interfaces using OOP principles.
2856.8.1	Create interactive and user-friendly GUI applications.
2856.8.2	Creating GUI components, event handling, and building interactive interfaces.

Testing and Debugging

2856.9	Demonstrate effective testing and debugging practices.
2856.9.1	Write unit tests, perform debugging, and use debugging tools efficiently.
2856.9.2	Unit testing, debugging tools, and best practices for identifying and fixing bugs.
2856.9.3	Troubleshoot syntax errors, logic errors, and runtime errors.
2856.9.4	Utilize debugging tools to suspend program execution and to examine, step through, and reset execution of code.
2856.9.5	Utilize common error recovery strategies to detect errors and write a strategy to implement and manage the error.
2856.9.6	Debug a program for errors.

Documentation

2856.10	Create clear and concise code documentation.
2856.10.1	Write inline comments, document class and method functionalities, and generate documentation using tools.
2856.10.2	Importance of code documentation, documenting classes and methods, and generating documentation using tools.

Computer Science in the Modern World is a course designed to expose all students to the interdisciplinary nature of computer science in today's dynamic and globally connected society. Students will have the opportunity to explore the uses of computer science as a tool in creating effective solutions to complex contemporary problems. The hands-on nature of the course is intended to provide students with the opportunity to explore conceptual understanding in a practical learning environment. This course is recommended for all students as it provides an overview of computer sciences and its applications in various disciplines, professions, and personal activities. In this course, students will learn to use computational thinking to develop algorithmic solutions to real-world problems. They will begin to understand the diverse levels of complexity in problem-solving and to determine when team projects might generate more effective problem solutions than individual efforts. Students will learn and use a programming language(s) and related tools, as well as appropriate collaboration tools, computing devices, and network environments. Finally, they will demonstrate an understanding of the social and ethical implications of their work and exhibit appropriate communication behavior when working as a team member.

Computer Science in the Modern World is a course designed for all students in grades 9-12 and is built around the essential skills that all high school students should have upon graduation. It also provides the necessary skills needed for more advanced computer science courses, including AP[®] Computer Science Principles, AP[®] Computer Science A and IB Computer Science. It is recommended that this course be required of all students.

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Computer Systems and Computational Thinking

2872.1	Understanding computer systems and computational thinking.
2872.1.1	Use predefined functions and parameters, classes, and methods to divide a complex problem into simpler parts.
2872.1.2	Describe a software development process used to solve software problems (e.g., design, coding, testing, verification).
2872.1.3	Explain how sequence, selection, iteration, and recursion are building blocks of algorithms.
2872.1.4	Compare techniques for analyzing massive data collections.
2872.1.5	Describe the relationship between binary and hexadecimal representations.
2872.1.6	Analyze the representation and trade-offs among various forms of digital information.
2872.1.7	Describe how distinct types of data are stored in a computer system.
2872.1.8	Use modeling and simulation to represent and understand natural phenomena.
2872.1.9	Discuss the value of abstraction to manage problem complexity.
2872.1.10	Describe the concept of parallel processing as a strategy to solve large problems.
2872.1.11	Describe how computation shares features with art and music by translating human intention into an artifact.

Collaboration

2872.2	Utilize collaboration.
2872.2.1	Work in a team to design and develop a software artifact.
2872.2.2	Use collaborative tools to communicate with project team members (e.g., discussion threads, wikis, blogs, version control, etc.).

2872.2.3	Describe how computing enhances traditional forms and enables new forms of experience, expression, communication, and collaboration.
2872.2.4	Identify how collaboration influences the design and development of software products.

Programming and Algorithms

2872.3	Create programming and algorithms.
2872.3.1	Create and organize Web pages through the use of a variety of web programming design tools.
2872.3.2	Use mobile devices/emulators to design, develop, and implement mobile computing applications.
2872.3.3	Use various debugging and testing methods to ensure program correctness (e.g., test cases, unit testing, white box, black box, integration testing).
2872.3.4	Apply analysis, design, and implementation techniques to solve problems (e.g., use one or more software lifecycle models).
2872.3.5	Use Application Program Interfaces (APIs) and libraries to facilitate programming solutions.
2872.3.6	Select appropriate file formats for distinct types and uses of data.
2872.3.7	Describe a variety of programming languages available to solve problems and develop systems.
2872.3.8	Explain the program execution process.
2872.3.9	Explain the principles of security by examining encryption, cryptography, and authentication techniques.
2872.3.10	Explore a variety of careers to which computing is central.
2872.3.11	Describe techniques for locating and collecting small and large-scale data sets.
2872.3.12	Describe how mathematical and statistical functions, sets, and logic are used in computation.

Computers and Communication Devices

2872.4	Explore computers and communication devices.
2872.4.1	Describe the unique features of computers embedded in mobile devices and vehicles (e.g., cell phones, automobiles, airplanes).
2872.4.2	Develop criteria for purchasing or upgrading computer system hardware.
2872.4.3	Describe the principal components of computer organization (e.g., input, output, processing, and storage).
2872.4.4	Compare various forms of input and output.
2872.4.5	Explain the multiple levels of hardware and software that support program execution (e.g., compilers, interpreters, operating systems, networks).
2872.4.6	Apply strategies for identifying and solving routine hardware and software problems that occur in everyday life.
2872.4.7	Compare and contrast client-server and peer-to-peer network strategies.
2872.4.8	Explain the basic components of computer networks (e.g., servers, file protection, routing, spoolers and queues, shared resources, and fault-tolerance).
2872.4.9	Describe how the Internet facilitates global communication.
2872.4.10	Explain the basic components of computer networks (e.g., servers, file protection, routing, spoolers and queues, shared resources, and fault-tolerance).
2872.4.11	Describe how the Internet facilitates global communication.
2872.4.12	Describe the major applications of artificial intelligence and robotics.

Impacts of Computing

2872.5	Define the impacts of computing.
2872.5.1	Compare appropriate and inappropriate social networking behaviors.

2872.5.2	Discuss the impact of computing technology on business and commerce (e.g., automated tracking of goods, automated financial transactions, e-commerce, cloud computing).
2872.5.3	Describe the role that adaptive technology can play in the lives of people with special needs.
2872.5.4	Compare the positive and negative impacts of technology on culture (e.g., social networking, delivery of news and other public media, and intercultural communication).
2872.5.5	Describe strategies for determining the reliability of information found on the Internet.
2872.5.6	Differentiate between information access and information distribution rights.
2872.5.7	Describe how various kinds of software licenses can be used to share and protect intellectual property.
2872.5.8	Discuss the social and economic implications associated with hacking and software piracy.
2872.5.9	Describe different ways in which software is created and shared and their benefits and drawbacks (commercial software, public domain software, open-source development).
2872.5.10	Describe security and privacy issues that relate to computer networks.
2872.5.11	Explain the impact of the digital divide on access to critical information.

Foundations of Programming Part 1 is an introductory course designed to provide students with a solid understanding of the fundamental concepts and principles of computer programming. Through a combination of theoretical lectures and hands-on programming exercises, students will learn key programming concepts such as variables, data types, control structures, functions, and basic algorithms. The course will focus on building problem-solving skills and developing logical thinking abilities essential for programming. By the end of the course, students will have gained proficiency in writing and debugging simple programs in a programming language such as Python, Java, or C++. This course serves as a prerequisite for more advanced programming courses and provides a solid foundation for further studies in computer science and software development.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Programming Fundamentals

2875.1	Demonstrate understanding of basic programming concepts.
2875.1.1	Write and debug programs using variables, data types, control structures, and basic algorithms.
2875.1.2	Understand the concept of variables and different data types (integers, floats, strings).
2875.1.3	Understand the concept of functions and procedures; write and call functions.
2875.1.4	Learn how to take input from users and display output.

Problem-Solving Skills

2875.2	Develop problem-solving skills.
2875.2.1	Decompose problems, design algorithms, and implement solutions using logical reasoning.

Programming Language Proficiency

2875.3	Exhibit proficiency in a programming language.
2875.3.1	Write, test, and debug code in a programming language such as Python, Java, or C++.
2875.3.2	Grasp the use of if statements, loops (for, while), and switch statements.
2875.3.3	Understand and use conditional statements to control program flow.

Code Readability and Style

2875.4	Write readable and well-styled code.
2875.4.1	Follow coding conventions, use meaningful variable names, and document code effectively.
2875.4.2	Master the use of loops for repetitive tasks.
2875.4.3	Understand and use arrays and lists to store and manipulate data.

Debugging Techniques

2875.5	Identify and fix errors in programs.
2875.5.1	Use debugging tools, understand error messages, and apply systematic debugging techniques.
2875.5.2	Learn common debugging techniques, including using breakpoints and print statements.

Algorithmic Thinking

2875.6	Apply algorithmic thinking to solve problems.
2875.6.1	Develop algorithms, understand time, and space complexity, and analyze algorithmic efficiency.
2875.6.2	Understand basic algorithmic concepts such as searching and sorting.

Version Control

2875.7	Use version control for code management.
2875.7.1	Understand version control concepts (e.g., Git), clone repositories, commit changes, and collaborate with others.
2875.7.2	Grasp the importance of version control; understand basic Git commands.

Software Development Life Cycle

2875.8	Understand the phases of software development.
2875.8.1	Describe the software development life cycle stages (planning, analysis, design, implementation, testing, maintenance).

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All West Virginia teachers are responsible for classroom instruction that integrates content standards, technology, and dispositions for student success. In grade 11, students should be immersed in a literacy-rich environment and have numerous opportunities to read, discuss, and write complex texts appropriate for eleventh grade in order to meet college- and career-readiness expectations. Over the course of the entire instructional day, students should be given opportunities to engage with a balance of literary and informational text and to write for a variety of purposes and audiences including an even distribution of argumentative, informative, and narrative writing. Students in eleventh grade will continue enhancing skills in a developmentally appropriate progression of standards. Following the skill progressions from tenth grade, the following chart highlights the college- and career-readiness indicators that will be developed in eleventh grade.

Reading

4011.1	Key Ideas and Details.
4011.1	Cite strong and thorough textual evidence to support analysis of what the literary text says explicitly as well as inferences drawn from the text, including determining where the text leaves matter uncertain.
4011.1.2	Determine two or more themes or central ideas of a literary text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.
4011.1.3	Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama.
4011.1.4	Cite strong and thorough textual evidence to support analysis of what the informational text says explicitly as well as inferences drawn from the text, including determining where the text leaves matter uncertain.
4011.1.5	Determine two or more central ideas of an informational text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.
4011.1.6	Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the informational text.
4011.2	Craft and Structure
4011.2.1	Determine the meaning of words and phrases as they are used in the literary text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful.
4011.2.2	Analyze how an author's choices concerning how to structure specific parts of a literary text contribute to its overall structure and meaning as well as its aesthetic impact.
4011.2.3	Analyze a case in which grasping a point of view requires distinguishing what is directly stated in a literary text from what is really meant.
4011.2.4	Determine the meaning of words and phrases as they are used in an informational text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text.
4011.2.5	In informational text, analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.
4011.2.6	Determine an author's point of view or purpose in an informational text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.
4011.3	Integration of Knowledge and Ideas

4011.3.1	Analyze multiple interpretations of a story, poem, or drama evaluating how each version interprets the source text.
4011.3.2	Demonstrate knowledge of eighteenth-, nineteenth-, and early-twentieth-century foundational works of American literature, including how two or more literary texts from the same period treat similar themes or topics.
4011.3.3	Integrate and evaluate multiple sources of information presented in different media or formats as well as in words in order to address a question or solve a problem.
4011.3.4	Delineate and evaluate the reasoning in influential U.S. informational texts, including the application of constitutional principles and the premises, purposes, and arguments in works of public advocacy.
4011.3.5	Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. informational documents of historical and literary significance for their themes, purposes, and rhetorical features.
4011.3.6	By the end of the year, read and comprehend literary texts in the grades 11–12 text complexity range proficiently, with scaffolding as needed at the high end of the range.
4011.3.7	By the end of the year, read and comprehend informational texts in the grades 11-12 text complexity range proficiently, with scaffolding as needed at the high end of the range.

Writing

4011.4	Text Types and Purposes
4011.4.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. *Introduce precise, knowledgeable claim(s); establish the significance of the claim(s); distinguish the claim(s) from alternate or opposing claims and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence. *Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and biases. *Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. *Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline. *Provide a concluding statement or section that follows from and supports the argument presented.
4011.4.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content. *Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting, graphics, and multimedia when useful to aid comprehension.

	*Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. *Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. *Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. *Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline. *Provide a concluding statement or section that follows from and supports the information or explanation presented.
4011.4.3	Write narratives to develop real or imagined experiences or events using effective techniques, well-chosen details, and well-structured event sequences. *Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view and introducing a narrator and/or characters; create a smooth progression of experiences or events. *Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters. *Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome. *Use precise words and phrases, effective details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters. *Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.
4011.5	Production and Distribution of Writing
4011.5.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
4011.5.2	Develop and strengthen writing as needed by planning, revising, trying a new approach, or editing to demonstrate command of all Language standards up to and including grade 12, focusing on addressing what is most significant for a specific purpose and audience.
4011.5.3	Use technology to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
4011.6	Research to Build and Present Knowledge
4011.6.1	Conduct short, as well as more sustained, research projects to answer a question, (including a self-generated question), or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
4011.6.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose,

	and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA).
4011.6.3	Draw evidence from literary or informational texts and apply grade-level Reading standards to support analysis, reflection, and research.
4011.7	Range of Writing
4011.7.1	Write routinely over extended time frames for research, reflection, and/or revision and shorter time frames for a range of tasks, purposes, and audiences.

Speaking and Listening

4011.8	Comprehension and Collaboration
4011.8.1	Initiate and effectively participate in a range of collaborative discussions with diverse partners including one-on-one, small groups, and teacher-led discussions on grade 11 topics, texts, and issues, building on others' ideas and expressing ideas clearly and persuasively. *Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. *Work with peers to promote civil, democratic discussions and decision-making; establish clear goals, deadlines, and individual roles as needed. *Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. *Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
4011.8.2	Integrate multiple sources of information presented in diverse formats and media in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
4011.8.3	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
4011.9	Presentation of Knowledge and Ideas
4011.9.1	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning; alternative or opposing perspectives are addressed and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
4011.9.2	Make strategic use of digital media in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
4011.9.3	Adapt speech to a variety of contexts and tasks, demonstrating command of Language standards up to and including grade 11, as well as formal English, when indicated or appropriate.

Language

4011.10	Conventions of Standard English
4011.10.1	Demonstrate command of the conventions of Standard English grammar and usage when writing or speaking. *Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested. *Resolve issues of complex or contested usage, consulting references as needed.
4011.10.2	Demonstrate command of the conventions of Standard English capitalization, punctuation, and spelling when writing. *Observe hyphenation conventions. *Spell correctly, using reference materials as needed.
4011.11	Knowledge of Language
4011.11.1	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening. *Vary syntax for effect by consulting references for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.
4011.12	Vocabulary Acquisition and Use
4011.12.1	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 11 reading and content, choosing flexibly from a range of strategies. *Use context as a clue to the meaning of a word or phrase. *Identify and correctly use patterns of word changes that indicate different meanings or parts of speech. *Consult general and specialized reference materials, both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, part of speech, etymology, or standard usage. *Verify the initial determination of the meaning of a word or phrase.
4011.12.2	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings. *Interpret figures of speech in context and analyze their role in the text. *Analyze nuances in the meaning of words with similar denotations.
4011.12.3	Acquire and accurately use general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

All West Virginia teachers are responsible for classroom instruction that integrates content standards, technology, and dispositions for student success. In grade 12, students should be immersed in a literacy-rich environment and have numerous opportunities to read, discuss, and write complex texts appropriate for twelfth grade in order to meet college- and career-readiness expectations. Over the course of the entire instructional day, students should be given opportunities to engage with a balance of literary and informational text and to write for a variety of purposes and audiences including an even distribution of argumentative, informative, and narrative writing. Students in twelfth grade will continue enhancing skills in a developmentally appropriate progression of standards. Following the skill progressions from eleventh grade, the following chart highlights the college- and career-readiness indicators that will be developed in twelfth grade:

Reading

4012.1	Key Ideas and Details.
4012.1.1	Cite strong and thorough textual evidence to support analysis of what the literary text says explicitly as well as inferences drawn from the text and a variety of other sources, including determining where and why the literary text leaves matters uncertain.
4012.1.2	Determine two or more themes or central ideas of a literary text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective and critical analysis of the literary text.
4012.1.3	Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama.
4012.1.4	Cite strong and thorough textual evidence to support analysis of what the informational text says explicitly as well as inferences drawn from the text, including determining where and why the informational text leaves matters uncertain.
4012.1.5	Determine two or more central ideas of an informational text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex and critical analysis; provide an objective summary of the informational text.
4012.1.6	Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the informational text and media.
4012.2	Craft and Structure.
4012.2.1	Determine the meaning of words and phrases as they are used in a variety of literary texts, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful.
4012.2.2	Analyze how an author's choices concerning how to structure specific parts of a literary text contribute to its overall structure and meaning as well as its aesthetic impact.
4012.2.3	Analyze and defend a case in which grasping a point of view requires distinguishing what is directly stated in a literary text from what is really meant.
4012.2.4	Determine the meaning of words and phrases as they are used in an informational text, including figurative, connotative, and technical meanings; analyze how and why an author uses and refines the meaning of a key term or terms over the course of an informational text.
4012.2.5	In informational text, analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including how the author uses structure to make points clear, convincing, and engaging.
4012.2.6	Determine an author's point of view, purpose, and tone in an informational text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.
4012.3	Integration of Knowledge and Ideas.

4012.3.1	Analyze multiple interpretations of a story, poem, or drama critically evaluating how each version interprets the source text.
4012.3.2	Demonstrate a deep knowledge of eighteenth-, nineteenth-, and early-twentieth-century foundational works of American literature, including how multiple literary texts from the same period treat similar themes or topics.
4012.3.3	Integrate, evaluate, and synthesize multiple sources of information presented in different media or formats as well as in words in order to address a question or solve a problem.
4012.3.4	Delineate and evaluate the reasoning in influential U.S. informational texts, including the application of constitutional principles and the premises, purposes, and arguments in works of public advocacy.
4012.3.5	Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. informational documents of historical and literary significance for their themes, purposes, rhetorical features, and current relevancy.
4012.4	Range of Reading and Text Complexity.
4012.4.1	By the end of the year, read and comprehend literary texts independently and proficiently at the high end of the grades 11–12 text complexity range.
4012.4.2	By the end of the year, read and comprehend informational texts independently and proficiently at the high end of the grades 11–12 text complexity range.

Writing

4012.5	Text Types and Purposes.
4012.5.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. *Introduce precise, knowledgeable claim(s); establish the significance of the claim(s); distinguish the claim(s) from alternate or opposing claims and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence. *Develop and justify claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases. *Analyze words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. *Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline. *Provide a concluding statement or section that follows from and supports the argument presented.
4012.5.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content. *Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting, graphics, and multimedia when useful to aid comprehension.

	*Evaluate the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. *Use and evaluate appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. *Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. *Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline. *Provide a concluding statement or section that follows from and supports the information or explanation presented.
4012.5.3	Write narratives to develop real or imagined experiences or events using effective techniques, well-chosen details, and well-structured event sequences. *Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing multiple point(s) of view and introducing a narrator and/or characters; create a smooth progression of experiences or events. *Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters. *Use and evaluate a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome. *Use precise words and phrases, effective details, and sensory language to convey a vivid picture of the experiences events, setting, and/or characters. *Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.
4012.6	Production and Distribution of Writing.
4012.6.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
4012.6.2	Develop and strengthen writing as needed by planning, revising, trying a new approach, or editing, demonstrating a command of Language standards up to and including grade 12 and focusing on addressing what is most significant for a specific purpose and audience.
4012.6.3	Use technology to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
4012.7	Research to Build and Present Knowledge..
4012.7.1	Conduct sustained research projects to answer a question, including a self-generated question, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
4012.7.2	Gather and synthesize relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task,

	purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA).
4012.7.3	Draw evidence from literary or informational texts and apply grade-level Reading standards to support analysis, reflection, and research.
4012.8	Range of Writing.
4012.8.1	Write routinely over extended time frames for research, reflection, and/or revision and shorter time frames for a range of tasks, purposes, and audiences.

Speaking and Listening

4012.9	Comprehension and Collaboration.
4012.9.1	Initiate and effectively participate in a range of collaborative discussions with diverse partners including one-on-one, small groups, and teacher-led on grade 12 topics, texts, and issues, building on others' ideas and expressing ideas clearly and persuasively. *Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. *Work with peers to promote civil, democratic discussions and decision-making; set clear goals and deadlines; establish norms and experience various individual roles. *Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. *Respond thoughtfully to diverse perspectives; synthesize and evaluate comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
4012.9.2	Integrate multiple sources of information presented in diverse formats and media in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and analyzing any discrepancies among the data.
4012.9.3	Evaluate a speaker's point of view, reasoning, and uses of evidence and rhetoric, in order to assess the stance, premises, links among ideas, word choice, points of emphasis, and tone used among multiple speakers.
4012.10	Presentation of Knowledge and Ideas.
4012.10.1	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning; address alternative or opposing perspectives and determine if the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
4012.10.2	Make strategic and engaging use of digital media in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
4012.10.3	Adapt speech to a variety of contexts and tasks, demonstrating command of Language standards up to and including grade 12 as well as formal English, when indicated or appropriate.

Language

4012.11	Conventions of Standard English.
4012.11.1	Demonstrate command of the conventions of Standard English grammar and usage when writing or speaking. *Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested. *Resolve issues of complex or contested usage, consulting references as needed.
4012.11.2	Demonstrate command of the conventions of Standard English capitalization, punctuation, and spelling when writing. *Observe hyphenation conventions. *Spell correctly, consulting reference materials as needed.
4012.12	Knowledge of Language.
4012.12.1	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening. *Vary syntax for effect, consulting references for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.
4012.13	Vocabulary Acquisition and Use.
4012.13.1	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 12 reading and content, choosing flexibly from a range of strategies. *Use context as a clue to the meaning of a word or phrase. *Identify and correctly use patterns of word changes that indicate different meanings or parts of speech. *Consult general and specialized reference materials, both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, part of speech, etymology, or standard usage. *Verify the initial determination of the meaning of a word or phrase.
4012.13.2	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings. *Interpret figures of speech in context and analyze their role in the text. *Analyze nuances in the meaning of words with similar denotations.
4012.13.3	Acquire and accurately use general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

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Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

The American Sign Language Level 1 Standards primarily focus on the acquisition and development of communication skills. Students will likely enter this course from various signing backgrounds. Students who are deaf, have a deaf parent, or have a close association with members of the Deaf community may enter the course with some proficiency in signing. Other students, particularly those with little association with deaf individuals, may enter with no prior knowledge or skills in ASL. Therefore, knowledge and skill acquisition may differ greatly between these two groups. These language skills are designed to provide real-world communication to the daily class and to aid the learner's progression to higher proficiency levels. Many of these skills and tasks are not isolated to a particular lesson but will be incorporated throughout the course of study.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Concepts

5691.1	Interactive (interpersonal) communication.
5691.1.1	Greet and leave people in a polite way. Sign hello and goodbye to a peer. Sign hello and goodbye to a teacher, supervisor, or stranger.
5691.1.2	Make and respond to introductions using appropriate spatial agreement. - Introduce self. - Introduce someone else. Respond to an introduction.
5691.1.3	Ask and answer a variety of simple questions. - Respond to yes/no questions. - Answer either/or questions. - Respond to <i>who</i>, <i>what</i>, <i>when</i>, and <i>where</i> questions. - Answer questions about likes and dislikes. - Answer questions about personal needs. Respond to courtesies.
5691.1.4	Make simple requests. Ask someone to repeat. Ask someone for help.
5691.1.5	Communicate basic information about self and familiar people. - Sign name and ask someone's name. - Sign something about family members and ask about someone's family. Sign something about friends, classmates, or co-workers.
5691.1.6	Communicate basic information about everyday life. - Give times, dates, and weather information. - Sign about foods eaten, topics learned, and actions taken. - Sign about familiar places. - Ask and understand how much something costs. Tell someone the time and location of an event.

5691.1.7	Communicate need for clarification of signed or written information on familiar topics. Ask for further details on a lecture. Ask the meaning of unfamiliar words.
5691.2	Expressive (presentational) communication ASL.
5691.2.1	Recite learned signs and phrases. - Recite numbers from 1-100. - Sign the date and day of the week. List the months and seasons.
5691.2.2	State the names of familiar people, places, and objects in pictures using words or memorized phrases. - Name famous landmarks and people. - Name countries on a map. List items seen every day.
5691.2.3	Introduce self to a group. State name, age, and location of home (e.g., town, region, state). Give phone number, home address, and e-mail address.

5691.3	Receptive ASL.
5691.3.1	Identify the parameters of a sign. - Recognize the handshape of some signs. - Recognize the palm orientation of some signs. - Recognize the movement of some signs. Recognize the location of some signs.
5691.3.2	Understand isolated, memorized signs in authentic language samples. - Understand greetings. - Recognize colors. - Understand numbers. Understand food items.
5691.3.3	Understand courtesy phrases. - Understand when people express thanks. - Understand when people introduce themselves. Understand when people ask for someone's name.
5691.3.4	Comprehend main ideas using basic vocabulary on familiar topics. Understand descriptions of people, places, and things. Identify characters in an authentic language narrative.
5691.3.5	Follow short simple directions, commands, and instructions. Follow classroom commands to complete a task. Follow directions to go to the school office, library, cafeteria, etc.
5691.3.6	Read, listen to, and comprehend simple texts on familiar topics. - Understand short stories. - Understand short poems. - Understand short informational texts.

5691.4	Investigation of products and practices.

5691.4.1	Identify beliefs, values, and customs of the deaf community.
5691.4.2	Demonstrate an awareness of deaf heritage and identify major historical events and persons from the deaf culture.
5691.4.3	Identify and discuss the contributions of linguists and pioneers of the language and culture.
5691.4.4	Explore the artistic, scientific, and philosophical contributions of ASL users to society (e.g., Alexander Graham Bell, Edward Minor Gallaudet, Laurent Clerc, National Theatre of the Deaf, Deaf Way).
5691.4.5	Identify and understand the significance of ASL, objects, images, products, and symbols of the deaf culture.
5691.5	Understanding cultural perspectives.
5691.5.1	Recognize themes, ideas, and/or perspectives of the deaf culture (e.g., folklore, deaf humor, ABC stories).
5691.5.2	Give examples of the various commonly held historical beliefs about the deaf culture (e.g., location and types of educational opportunities, impact of the various methodologies, listening devices).
5691.5.3	Recognize behaviors that are unique to the deaf culture (e.g., hugs, eye contact, personal space).

5691.6	Participation in cultural interaction.
5691.6.1	Locate resources for the deaf and recognize the potential of ASL (e.g., ASL clubs and organizations, Deaf education, deaf-related careers).
5691.6.2	Present information to people locally and around the world (e.g., Deaf Awareness, Deaf Heritage).
5691.6.3	Identify opportunities to use ASL for enjoyment (e.g., fingerspelling games, no-voice allowed class period, cultural/social activities, and interpreted performances).
5691.6.4	Locate and participate in activities in which the ability to communicate in ASL may be beneficial to schools and communities.

American Sign Language Level 2 Standards primarily focus on the continued acquisition of communication skills and refinement of proficiency in the three skill areas of receptive, expressive, and interactive communication. ASL Level II continues to introduce students to aspects of the American Deaf culture. The language skills listed below are designed to provide real-world communication to the daily class and to aid the learner's progression to higher proficiency levels. Many of these skills and tasks are not isolated to a particular lesson but will be incorporated throughout the course of study.

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Concepts

5692.1	Interactive (interpersonal) communication.
5692.1.1	Exchange some personal information. • Ask and give home address and e-mail address. • Ask and give someone's nationality. • Ask and give characteristics of family members. Ask and give descriptions of friends, classmates, teachers, or co-workers.
5692.1.2	Discuss opinions about personal experiences and other familiar topics. • Discuss a favorite restaurant. • Discuss favorite leisure activities. Discuss an opinion on school uniforms.
5692.1.3	Negotiate meaning of signed information to reach an understanding. • Determine meaning based on context. Ask for clarification of a particular sign.
5692.1.4	Ask for and give simple directions. • Ask for directions to a particular place. • Tell someone how to get from one place to another. Tell someone where something is located.
5692.1.5	Interact with others in everyday situations. • Order a meal. • Make a purchase. Buy a ticket.
5692.1.6	Make plans with others. • Accept or reject an invitation to do something or go somewhere. • Invite and make plans with someone to do something or go somewhere. Exchange information about where to go such as the store, the movie theatre, a concert, a restaurant, the lab, or when to meet.
5692.2	Expressive (presentational) communication.
5692.2.1	Present information about self and others using words and phrases. • Sign physical descriptions of self and others. Sign personality traits of self and others.
5692.2.2	Express likes and dislikes, with supporting details, using signs, phrases, and memorized expressions. • Sign sports preferences

	• Sign favorite free-time activity preferences. Sign food and drink preferences.
5692.2.3	Present information about familiar items in the immediate environment. • Sign about location of home. • Sign about school or workplace. • Sign about room or office and personal possessions in it. Present basic information about community, town, city, state, or country.
5692.2.4	Sign about daily activities using words, phrases, and memorized expressions. • Sign classes and tell what time they start and end. • Name activities and times in daily schedule. Sign about what weekend activities that have been done or enjoyed.
5692.2.5	Present simple information about something learned, sign signs, phrases, and memorized expressions. • Sign about holiday celebrations based on pictures or photos. • Name the main cities on a map. Sign about animals, colors, foods, historical figures, or sports based on pictures or photos.
5692.3	Receptive (interpretive) communication.
5692.3.1	Understand simple questions or statements on familiar topics. • Recognize the difference between questions and statements. • Understand questions about age, location, free time activities, etc. • Understand questions or statements about family. Understand questions or statements about friends, classmates, or workmates.
5692.3.2	Understand simple information when presented with pictures and graphs. • Understand facts about the weather when weather symbols are used. • Understand when someone describes physical descriptions from a photo or a work of art. Follow along with arithmetic problems when figures can be seen.
5692.3.3	Understand the main topic of conversations and presentations that are viewed. • Understand to whom people are referring. • Understand if people are signing about their homes or asking for directions. Understand a simple transaction between a customer and a salesclerk.
5692.3.4	Carry out multi-step directions, commands, and instructions based on familiar topics and vocabulary. • Follow classroom directions to complete a task. Follow directions to go to a particular point in town.
5692.3.5	Understand selected literary presentations (e.g., storytelling, folklore, poetry, drama) • Distinguish the principal characters of the literary work. • Distinguish the main idea of the literary work. Distinguish the themes of the literary work.

5692.4	Investigation of products and practices.
5692.4.1	Identify beliefs, values, and customs of the Deaf community.
5692.4.2	Demonstrate an awareness of Deaf heritage and identify major historical events and persons from the Deaf culture.
5692.4.3	Identify and discuss the contributions of linguists and pioneers of the language and culture.
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5692.5.1	Recognize themes, ideas, and/or perspectives of the deaf culture (e.g., folklore, deaf humor, ABC stories).
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5692.6.4	Locate and participate in activities in which the ability to communicate in ASL may be beneficial to schools and communities.

Allowable Teacher Endorsement: 2500, 2600, 2700, 2705, 2710, 2800, 2900, 2910, 2915, 7710

This course is an advanced level Science course designed to provide students with hands-on experience in various aspects of a criminal investigation. Utilizing 21st Century skills students will demonstrate proficiency in evidence collection; interpretation and analysis of collected data, maintenance of data integrity, formulation of a conclusion/summary, and succinct communication of findings. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills as they evaluate the academic requirements and prepare for occupational opportunities in science, technology, engineering, and math. Safety instruction is integrated into all activities. Students are encouraged to become active members of the student organization SkillsUSA. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and skill sets.

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Fundamentals of Forensic Science

6044.1	Nature and Application of Science
6044.1.1	Demonstrate an understanding of history and nature as a LSMAN endeavor encompassing the contributions of diverse cultures and scientists.
6044.1.2	Demonstrate the ability to use the inquiry process to solve problems.
6044.1.3	Relate science-technology-societal issues while using a variety of sources to construct and defend their solutions.
6044.1.4	Implement safe procedures and practices when manipulating equipment, materials, organisms, and models.
6044.1.5	Formulate scientific explanations based on historical observations and experimental evidence, accounting for variability in experimental results.
6044.1.6	Conduct and/or design investigations that incorporate the skills and attitudes and/or values of scientific inquiry (e.g., established research protocol, accurate record keeping, replication of results and peer review, objectivity, openness, skepticism, fairness, or creativity and logic).
6044.1.7	Design, conduct, evaluate and revise experiments (e.g., compose a question to be investigated, design a controlled investigation that produces numeric data, evaluate the data in the context of scientific laws and principles, construct a conclusion based on findings, propose revisions to investigations based on manipulation of variables and/or analysis of error, or communicate and defend the results and conclusions).
6044.1.8	Draw conclusions from a variety of data sources to analyze and interpret systems and models (e.g., use graphs and equations to measure and apply variables such as rate and scale, evaluate changes in trends and cycles, or predict the influence of external variances such as potential sources of error, or interpret maps).
6044.1.9	Investigate, compare and design scientific and technological solutions to address personal and societal problems.
6044.1.10	Given current science-technology-societal issues, construct and defend potential solutions.
6044.1.11	Relate societal, cultural, and economic issues to key scientific innovations.
6044.1.12	Synthesize concepts across various science disciplines to better understand the natural world (e.g., form and function, systems, or change over time).

Analyzing Evidence

6044.2	Content of Science
6044.2.1	Demonstrate knowledge, understanding and applications of scientific facts, concepts, principles, theories, and models delineated in the objectives.
6044.2.2	Demonstrate an understanding of the interrelationships among physics, chemistry, biology, and earth/environmental science; and apply knowledge, understanding and skills of science subject matter/concepts to daily life.
6044.2.3	Relate science-technology-societal issues while using a variety of sources to construct and defend their solutions.
6044.2.4	Identify evidence which encompasses materials establishing a link between a crime and its victim or a crime and its perpetrator: impressions (tire, tool, teeth, shoes); prints (finger, lip, voice); hair and fiber analysis; drugs and poisons; ballistics; soil and pollen; glass; serology/ questioned documents.
6044.2.5	Distinguish between types of evidence: testimonial; physical: individual and class; quantitative; qualitative.
6044.2.6	Analyze modes of transfer and the factors affecting persistence of evidence (Locard's Exchange Principle): indirect; direct.
6044.2.7	Demonstrate steps of crime scene processing: note-taking; photography; sketching to scale; evidence collection; chain of custody.
6044.2.8	Validate, classify, and analyze fingerprints as individual evidence: type; pattern; minutiae.
6044.2.9	Model techniques of collecting and developing prints on various objects and textures: physical (dusting powders); chemical (ninhydrin; iodine; cyanoacrylate).
6044.2.10	Examine the absorption and effects of toxins in the human body: alcohol; drugs; poisons.
6044.2.11	Identify known and unknown substances utilizing the techniques of forensic toxicology: white powders; blood alcohol; over the counter/illicit drugs; gas chromatography charts.
6044.2.12	Discuss and cite evidence of biological and chemical hazards and their impact on society and the environment: arson; bombs; bioterrorism; environmental terrorism.
6044.2.13	Apply forensic entomology to assess a crime scene: Berlese funnel; life cycles.
6044.2.14	Analyze bones and teeth as forensic evidence: type; articulation; origin; sex; age; race; stature; disease/injury.
6044.2.15	Analyze the composition of blood as evidence: ABO system; Rh factor; NDA fingerprinting.
6044.2.16	Investigate forensic applications of chromatography: inks and dyes; cosmetics; calculation of Rf values.
6044.2.17	Explore earth science concepts as they relate to forensic science: rock and mineral identification; classify soils' common constituents in relation to crime scene location.
6044.2.18	Identify and describe agents and processes of degradation of evidence: weathering; scavengers.
6044.2.19	Solve multi-step problems involving velocity, acceleration, net force, and projectile motion during analysis of crime scene: ballistics; vehicular collisions; blood spatter.
6044.2.20	Investigate and analyze forensic evidence utilizing optical and acoustical applications.
6044.2.21	Utilize biometric techniques for forensic science investigations: prints; recognition scans; anthropometry.
6044.2.22	Research and evaluate technological advances and careers related to the field of forensics.

Advanced Placement (AP) courses are a nationwide recognized curriculum available through the College Board.

For more information, visit Course & Exam Pages – AP Central | College Board at [Course & Exam Pages – AP Central | College Board](#)

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Career Exploration 6-8**Course #: 7630****Allowable Teacher Endorsement:** Certified Teacher with appropriate grade level endorsement(s)

Available for use as a county-created elective course in career exploration.

For more information, visit: [Home - Curriculum for Agricultural Science Education \(case4learning.org\)](https://case4learning.org/)

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Course description

This course is designed to provide students with an awareness of the impact of tourism in West Virginia and how tourism affects the West Virginia economy. Instruction integrates differentiated learning, technology, and informational content standards to provide knowledge and understanding of the nine tourism regions of the state. Utilizing West Virginia tourism development strategies that incorporate the economic, physical, social, and cultural geography of the state, stakeholders investigate and explore entrepreneurship, professionalism, and marketing strategies to create career building opportunities within the West Virginia travel, tourism, and hospitality industry.

Students utilize problem-solving techniques and participate in hands-on activities to develop an understanding of course concepts. Teachers should provide students with authentic learning experiences, employability skills, and instruction through *Simulated Workplace*. Teachers are responsible for providing work-based learning opportunities ensuring students submit timecards. Students are encouraged to become active members of a career technical student organization (CTSO). All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and standards. Please see the [CTE Connect – Instructor's Guide](#) for more information.

Tourism Product Knowledge

7663.1	General Hospitality and Tourism Technical Skills
7663.1.1	Apply marketing strategies and techniques within a hospitality and tourism context.
7663.1.2	Apply customer service techniques in a hospitality and tourism context.
7663.1.3	Identify elements of geography and climate that affect the hospitality and tourism industry.
7663.2	Academic Foundations
7663.2.1	Apply reading skills in a hospitality and tourism career environment.
7663.2.2	Apply writing skills in a hospitality and tourism career environment.
7663.2.3	Apply mathematical skills in a hospitality and tourism career environment.
7663.2.4	Apply knowledge of economics in a hospitality and tourism career environment.
7663.3	Ethics and Legal Responsibilities
7663.3.1	Apply appropriate laws, regulations, industry standards to hospitality and tourism situations.
7663.3.2	Identify ethical issues and demonstrate ethical behavior in hospitality and tourism situations.
7663.3.3	Locate, organize, reference written information to communicate with coworkers and clients.
7663.3.4	Develop and deliver formal and informal presentations using media to engage and inform diverse audiences.
7663.3.5	Apply listening skills; interpret verbal and nonverbal behaviors to communicate with coworkers and clients.
7663.3.6	Interpret and use tables, charts, and figures.
7663.4	Communications
7663.4.1	Locate, organize, reference written information to communicate with coworkers and clients.
7663.4.2	Develop and deliver formal and informal presentations using media to engage and inform diverse audiences.
7663.4.3	Apply listening skills; interpret verbal and nonverbal behaviors to communicate with coworkers and clients.
7663.4.4	Interpret and use tables, charts, and figures.
7663.5	Information Technology Applications
7663.5.1	Use word processing, presentation, and email applications to prepare communications.
7663.5.2	Use spreadsheet and database applications to manage and communicate data and information.
7663.6	Problem Solving, Critical Thinking, and Decision Making

7663.6.1	Use problem solving/critical thinking to locate information about problems and determine causes.
7663.6.2	Use problem solving/critical thinking; determine root causes of problems; evaluate solutions.
7663.7	Leadership and Teamwork
7663.7.1	Exhibit leadership qualities to improve the quality of work and the work environment.
7663.7.2	Work effectively in a team environment to improve the quality of work and the work environment.
7663.8	Employability and Career Development
7663.8.1	Demonstrate employability skills related to a career in hospitality and tourism.
7663.8.2	Pursue career development skills to advance in hospitality and tourism careers.
7663.8.3	Develop a presentation about a career option in hospitality in West Virginia (WV Only).

Geographical Exploration

7663.9	Impact of Tourism in West Virginia
7663.9.1	Interpret data regarding tourism in West Virginia.
7663.9.2	Categorize types of tourism available in West Virginia.
7663.9.3	Research West Virginia's infrastructure and its importance in developing tourism in West Virginia.
7663.9.4	Complete the training for the Certificate of Recognition in West Virginia Welcome.
7663.10	Pride in the State of West Virginia
7663.10.1	Research the effectiveness to slogans the promote West Virginia.
7663.10.2	Propose strategies to increase a positive view of West Virginia.
7663.11	West Virginia's Economic, Physical, Social, and Cultural Landscape
7663.11.1	Locate the nine tourist regions of West Virginia on a map.
7663.11.2	Locate ten places of cultural significance in West Virginia.
7663.11.3	Locate ten places of economic significance in West Virginia that are nature based related to Parks, Recreation and Tourism.
7663.11.4	Locate ten places of recreational interest in West Virginia that are man-made in each of the tourism regions.
7663.11.5	Categorize historical/geographic places of interest in each of the tourism regions.
7663.11.6	Categorize historical places of interest by time period in each of the tourism regions.
7663.12	Economic Opportunities in the Regions of West Virginia
7663.12.1	Chart the strengths and weaknesses of each of the tourist regions.
7663.12.2	Categorize the industries and products that are most important to West Virginia's economy.
7663.12.3	Evaluate the economic impact of special events such as fairs, festivals, etc.
7663.12.4	Examine how an increase or decrease in tourism affects businesses.
7663.12.5	Evaluate the importance of natural and historical preservation versus economic progress.
7663.13	Role of Business Innovation in West Virginia Tourism
7663.13.1	Evaluate information from a variety of sources to assess marketing needs for the local tourism region.
7663.13.2	Formulate a marketing strategy in digital and social networking for a new hospitality or tourism business in the local region.
7663.13.3	Prepare a summary of a business idea in tourism.
7663.13.4	Defend a need for a business idea in tourism.
7663.13.5	Relate the business to the current infrastructure.
7663.13.6	Create a facility design of a tourism business idea.
7663.13.7	Prepare advertising element for the business idea.
7663.13.8	Prepare a presentation about the business idea.

Allowable Teacher Endorsement: Certified Teacher with appropriate grade level endorsement(s)

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Impact of Tourism in West Virginia

7664.1	Impact of Tourism in West Virginia
7664.1.1	Explain the factors that impact tourism.
7664.1.2	Analyze the relationship between employee attitude, appearance, actions, and customer satisfaction.
7664.1.3	Complete the training for West Virginia Welcome.

Pride in the State of West Virginia

7664.2	Pride in the State of West Virginia
7664.2.1	Describe examples of positive and negative stereotyping of West Virginia.
7664.2.2	Propose strategies to increase a positive view of West Virginia.

West Virginia's Tourism Landscape

7664.3	West Virginia's Tourism Landscape
7664.3.1	Identify the nine travel regions of West Virginia on a map.
7664.3.2	Locate historical/geographic places of interest in each of the travel regions.
7664.3.3	Locate significant West Virginia parks.
7664.3.4	Locate places of recreational interest in West Virginia.

Economic Opportunities in the Regions of West Virginia

7664.4	Economic Opportunities in the Regions of West Virginia
7664.4.1	Describe the industries and products that are most important to West Virginia's economy.
7664.4.2	Explain the economic impact of special events such as fairs, festivals, etc.
7664.4.3	Explain how an increase or decrease in tourism affects businesses.
7664.4.4	Formulate a business idea to support West Virginia tourism and create a presentation.

Careers in West Virginia Tourism

7664.5	Careers in West Virginia Tourism
7664.5.1	Identify careers in the hospitality and tourism industry.
7664.5.2	Describe the benefits of a career in hospitality and tourism.
7664.5.3	Demonstrate job seeking skills.