Chapter 127. Texas Essential Knowledge and Skills for Career Development and Career and Technical Education

Subchapter C. Agriculture, Food, and Natural Resources

Statutory Authority: The provisions of this Subchapter C issued under Texas Education Code, §7.102(c)(4) and §28.002(a) and (c), unless otherwise noted.

§127.30. Principles of Agriculture, Food, and Natural Resources (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products and resources.

(3) In Principles of Agriculture, Food, and Natural Resources, students explore major areas of agriculture, food, and natural resources, including organizations, agribusiness leadership and communications, plant science, animal science, food science and technology, agricultural technology and mechanical systems, and environmental and natural resources. To prepare for careers in agriculture, food, and natural resources, students must attain academic knowledge and skills, acquire technical knowledge and skills related to the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, experience, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career development, education, and entrepreneurship opportunities in agriculture, food, and natural resources;

(B) identify and demonstrate interpersonal, problem-solving, and critical-thinking skills in agriculture, food, and natural resources;

(C) describe and demonstrate appropriate personal and occupational safety and health practices for the workplace;

(D) identify employers' legal responsibilities and expectations, including appropriate work habits and ethical conduct;

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy; and

(F) identify training, education, and certification requirements for occupational choices in agriculture, food, and natural resources.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student understands the agriculture industry in Texas and the United States. The student is expected to:

(A) identify top agricultural commodities, exports, and imports in Texas and the United States; and

(B) identify regions of commodity production such as regions that produce livestock, corn, wheat, dairy products, and cotton and explain the correlation between the region and the commodity.

(5) The student explains the historical, current, and future significance of the agriculture, food, and natural resources industry. The student is expected to:

(A) define agriculture and identify the sectors of the agriculture industry;

(B) analyze the impact agriculture, food, and natural resources have on society;

(C) identify and explain significant historical and current events that have impacted the agriculture industry;

(D) identify issues that may impact agriculture, food, and natural resources systems, including related domestic and global systems, now and in the future;

(E) identify and discuss major innovations in the fields of agriculture, food, and natural resources;

(F) describe how emerging technologies such as online mapping systems, drones, and robotics impact agriculture, food, and natural resources; and

(G) compare how different issues such as biotechnology, employment, safety, environmental, and animal welfare issues impact agriculture, food, and natural resources industries.

(6) The student understands opportunities for leadership development in student organizations within agriculture, food, and natural resources. The student is expected to:

(A) describe the history, structure, and development of and opportunities in student organizations in the agriculture, food, and natural resources career cluster;

(B) develop and demonstrate leadership and personal growth skills and collaborate with others to accomplish organizational goals and objectives; and

(C) demonstrate use of parliamentary procedures when conducting meetings.

(7) The student identifies opportunities for involvement in professional agricultural organizations. The student is expected to:

(A) discuss the role of agricultural organizations in formulating public policy;

(B) develop strategies for effective participation in agricultural organizations; and

(C) identify and discuss the purpose of various professional agricultural organizations.

(8) The student demonstrates skills related to agribusiness, leadership, and communications. The student is expected to:

(A) demonstrate written and oral communication skills appropriate for formal and informal situations such as prepared and extemporaneous presentations;

(B) identify and demonstrate effective customer service skills, including appropriate listening techniques and responses; and

(C) explain the impact of marketing and advertising on the agricultural industry.

(9) The student applies a scientific process to agriculture, food, and natural resources topics. The student is expected to:

(A) identify and select an important agricultural issue, question, or principle;

(B) develop and test a hypothesis for the selected issue, question, or principle;

(C) collect and analyze data for the selected agricultural issue, question, or principle; and

(D) present findings and conclusions based on research performed using scientific practices.

(10) The student applies problem-solving, mathematical, and organizational skills to maintain financial or logistical records. The student is expected to:

(A) identify the components of and develop a formal business plan for an agricultural enterprise; and

(B) develop, maintain, and analyze records for an agricultural enterprise.

(11) The student develops technical knowledge and skills related to plant and soil systems. The student is expected to:

(A) define plant and soil science and analyze the relevance of horticulture, agronomy, forestry, and floriculture;

(B) identify the components and properties of soils;

(C) describe the basic structure and functions of plant parts;

(D) identify and use techniques for plant germination, growth, and development; and

(E) identify and use tools, equipment, and personal protective equipment common to plant and soil systems.

(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:

(A) define animal science and analyze the relevance of animal selection, production, and marketing in the industry;

(B) analyze the roles and how animals benefit the agriculture industry;

(C) identify basic external anatomy of animals in agriculture;

(D) identify and classify breeds of livestock; and

(E) identify and use tools, equipment, and proper handling techniques related to animal systems.

(13) The student describes the principles of food products and processing systems. The student is expected to:

(A) identify food products and processing systems;

(B) identify emerging technologies and trends in domestic and global food production;

(C) compare various food labels;

(D) discuss current issues in food production; and

(E) identify and use tools, equipment, and personal protective equipment common to food products and processing systems.

(14) The student safely performs skills related to agricultural technology and mechanical systems. The student is expected to:

(A) identify the major disciplines of agricultural technology and mechanical systems;

(B) demonstrate basic measuring practices with accuracy;

(C) create a bill of materials and a technical drawing for a proposed agricultural engineering project;

(D) identify common building tools, materials, and fasteners; and

(E) identify and use tools, equipment, and personal protective equipment common to agricultural technology and mechanical systems.

(15) The student explains the principles of environmental and natural resources. The student is expected to:

(A) identify natural resources of economic importance to Texas agriculture;

(B) explain the relationship between agriculture and environmental and natural resources;

(C) identify and describe regulations and governmental programs related to environmental and natural resources, including water regulations, pesticide usage, and hunting and fishing laws;

(D) identify and compare alternative energy sources that stem from or impact environmental and natural resources; and

(E) identify and compare energy and water conservation methods.

Source: The provisions of this §127.30 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.31. Mathematical Applications in Agriculture, Food, and Natural Resources (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: Algebra I. Recommended prerequisite: one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster. This course satisfies a high school mathematics graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) In Mathematical Applications in Agriculture, Food, and Natural Resources, students will apply knowledge and skills related to mathematics, including algebra, geometry, and data analysis in the context of agriculture, food, and natural resources. To prepare for careers in agriculture, food, and natural resources, students must acquire technical knowledge in the discipline as well as apply academic skills in mathematics. To prepare for success, students need opportunities to reinforce, apply, and transfer their knowledge and skills related to mathematics in a variety of contexts.

(4) The mathematical process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

(5) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(6) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

(A) apply mathematics to problems arising in everyday life, society, and the workplace;

(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;

(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;

(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;

(E) create and use representations to organize, record, and communicate mathematical ideas;

(F) analyze mathematical relationships to connect and communicate mathematical ideas; and

(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

(2) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(3) The student performs mathematical calculations used in agriculture, food, and natural resources. The student is expected to:

(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources;

(B) apply mathematical skills such as measurement, conversion, and data analysis needed for agriculture, food, and natural resources;

(C) find solutions to problems related to agriculture, food, and natural resources by calculating percentages and averages;

(D) convert between English and metric units;

(E) use scientific calculations to determine weight, volume, and linear measurements;

(F) solve word problems using ratios and dimensional analysis; and

(G) interpret data using tables, charts, and graphs.

(4) The student demonstrates mathematics knowledge and skills required to solve problems related to the agriculture, food, and natural resources industries. The student is expected to:

(A) demonstrate use of relational expressions such as equal to, not equal, greater than, and less than in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems;

(B) apply statistical and data analysis to solve problems related to agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems;

(C) analyze mathematical problem statements for missing or irrelevant data essential to agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems;

(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems;

(E) analyze data using measures of central tendency when interpreting operational documents in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems; and

(F) use mathematical operations and knowledge of relationships to solve problems such as the calculation of gallons of water from inches of rain, acres of ground water, liquid and

gaseous volumes, and conversion of units; calculation of caloric value, parts per million of restricted ingredients, conversion of measurements, and U.S. Department of Agriculture (USDA) grades; estimation of wildlife populations and pulpwood yields; and calculation of mapping data inherent to systems of agriculture or agribusiness.

(5) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:

(A) use mathematical operations and knowledge of relationships to solve daily problems related to record keeping such as profit/loss statements, income statements, capital asset inventories, insurance, risk management, lease agreements, employee payroll and benefits, and investments and loan, real estate contract, or tax documentation in agribusiness systems;

(B) demonstrate knowledge of algebraic applications and linear and exponential functions related to concepts such as simple interest, compound interest, maturity value, tax rates, depreciation, production analysis, market trends, investments, and price determination in agribusiness systems;

(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data; and

(D) report statistical data related to concepts such as pricing, market trends, commodity prices, exports and imports, supply and demand, and production yields numerically or graphically.

(6) The student demonstrates mathematical knowledge and skills required to solve problems related to animal systems and related career opportunities. The student is expected to:

(A) use mathematical operations and knowledge of relationships to solve problems such as the calculation of purchasing, marketing, and production costs; housing requirements; conversion of units; average daily gain; topical and injectable medication dosages; USDA grades; feeding schedules; volumes; stocking rates; and breeding and gestation cycles related to animal systems;

(B) demonstrate knowledge of algebraic applications related to animal system calculations such as ration formulation using the Pearson Square, percent homozygosity, heritability, USDA grades, gene frequency, cost per unit of nutrient, and weaning weight ratio;

(C) use geometric principles to solve problems such as the use of right triangles for perpendicular cross fencing and the calculation of square footage for housing requirements; acreage for normal and irregular shaped pastures; feed bin volume based upon shape such as cylinder, cone, cube, or pyramid; and housing volume for ventilation related to animal systems; and

(D) use statistical and data analysis to evaluate animal systems data reported numerically or graphically such as birth weight, weaning weight, days to market weight, expected progeny differences, feed efficiencies, birth type, litter size, presence or absence of genetic abnormality, milk production, sow productivity index, and veterinary costs or records.

(7) The student demonstrates mathematical knowledge and skills required to solve problems related to environmental service systems and related career opportunities. The student is expected to:

(A) demonstrate knowledge of algebraic applications to create solutions to problems such as the calculation of acre feet of water, water volume in ponds, water well volume, water pressure friction loss, flow rate, total head pressure, pump efficiency, soil solids volume, and soil degree of saturation related to environmental service systems;

(B) use geometric principles to solve problems such as calculating acreage for normal and irregular shaped pastures and slope of land, planning runoff drainage structures, and applying differential leveling techniques related to environmental service systems; and

(C) use statistical and data analysis to evaluate environmental service systems data reported numerically or graphically such as rainfall, soil classifications, groundwater levels, recycling activities, and pollution rates.

(8) The student demonstrates mathematical knowledge and skills required to solve problems related to food products and processing systems and related career opportunities. The student is expected to:

(A) demonstrate knowledge of algebraic applications to solve problems such as the calculation of exponential growth of bacteria, contribution margin in processing, percentage of weight loss in packaged food, percentage of water absorption in packaged food, and microbe analysis following pasteurization related to food products and processing systems;

(B) use geometric principles to solve problems such as the calculation of packaging requirements, construction of food storage structures and containers, liquid transfer materials, and vessels design and volume related to food products and processing systems; and

(C) use statistical and data analysis to evaluate food products and processing systems data reported numerically or graphically such as governmental regulations, hazard analysis, critical control points data, taste tests, quality assurance data, and industry packing practices.

(9) The student demonstrates mathematical knowledge and skills required to solve problems related to natural resource systems and related career opportunities. The student is expected to:

(A) demonstrate knowledge of algebraic applications to solve problems such as the calculation of mean harvest area, calibration of pesticides, and the Doyle Log Rule related to natural resource systems;

(B) use geometric principles to solve problems such as planning and construction of structures related to wildlife and fisheries management, determination of lumber volume in given tree stock, and calculation of tank volume for chemical application related to natural resource systems; and

(C) use statistical and data analysis to evaluate natural resource systems data reported numerically or graphically such as Geographic Information Systems and Global Positioning Systems data, weather-related data, and data related to wildlife and habitat.

(10) The student demonstrates mathematical knowledge and skills required to solve problems related to plant systems and related career opportunities. The student is expected to:

(A) use mathematical operations and knowledge of relationships to solve problems such as the calculation of crop yields, crop loss, grain drying requirements, grain weight shrinkage, germination rates, greenhouse heating, and cooling and fertilizer application rates related to plant systems;

(B) demonstrate knowledge of algebraic applications to solve problems such as the calculation of grain handling efficiency, harvesting capacity, crop rotation, seeding rates, fertilizer nutrient requirements, and greenhouse ventilation related to plant systems;

(C) use geometric principles for the analysis of problems such as planning grain storage structures and calculating volume of grain storage vessels, grain handling volume, greenhouse capacity, and regular and irregular shaped planting bed size related to plant systems; and

(D) use statistical and data analysis to evaluate plant systems data such as crop yields, Global Information Systems data, plant growth data, and climate data.

(11) The student demonstrates mathematical knowledge and skills required to solve problems related to power, structural, and technical systems and related career opportunities. The student is expected to:

(A) use mathematical operations and knowledge of relationships to solve problems such as the calculation of gear ratio, fuel efficiency, construction costs, project layout, energy costs, unit conversions, and bid preparation and labor-related calculations related to power, structural, and technical systems;

(B) demonstrate knowledge of algebraic applications such as the calculation of strength of magnetism, chain or belt tension, horsepower, Ohm's Law, hydraulic multiplication of force, stresses using Mohr's Circle, and tensile strength related to power, structural, and technical systems;

(C) use geometric principles for the evaluation of problems such as rafter length, land measurement, differential leveling, concrete volume, heating, ventilating, and air conditioning requirements and creation of structural drawings related to power, structural, and technical systems;

(D) use statistical and data analysis to evaluate power, structural, and technical systems data such as construction cost data; equipment maintenance; heating, ventilation, and air conditioning efficiencies; engine performance; and labor costs; and

(E) use geometric principles to develop and implement a plan for construction of a project such as a trailer, an agricultural structure, a storage facility, or a fence.

Source: The provisions of this §127.31 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.32. Energy and Natural Resource Technology (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Energy and Natural Resource Technology examines the interrelatedness of environmental issues and production agriculture. Students will evaluate the environmental benefits provided by sustainable resources and green technologies. Instruction is designed to allow for the application of science and technology to measure environmental impacts resulting from production agriculture through field and laboratory experiences. To prepare for careers in environmental service systems, students must attain academic skills and knowledge, acquire advanced technical knowledge and skills related to environmental service systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for

success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student uses instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a supervised agriculture experience. The student is expected to:

(A) demonstrate safe practices during field and laboratory investigations in a supervised agriculture experience; and

(B) use accepted procedures for the use and conservation of resources and for the safe handling of materials.

(3) The student discusses the importance and scope of natural resources. The student is expected to:

(A) identify various types of natural resources;

(B) discuss renewable and non-renewable energy resources and their impact on the environment;

(C) analyze the impacts of natural resources and their effects on the agricultural economy; and

(D) map the geographic and demographic uses of natural resources.

(4) The student identifies water use and management in agricultural settings. The student is expected to:

(A) identify the distribution and properties of water in the hydrologic cycle;

(B) identify agricultural uses of water such as recycling;

(C) discuss how agricultural uses may impact water resources;

(D) define point source and non-point source pollution;

(E) identify sources of point source and non-point source pollution associated with agriculture;

(F) evaluate how the different agricultural water uses may impact water availability; and

(G) research water use legislation.

(5) The student describes air quality associated with agricultural production. The student is expected to:

(A) describe the components of the atmosphere and the atmospheric cycle;

(B) define air pollution;

(C) analyze air quality legislation;

(D) identify sources and effects of air pollution from agricultural production;

(E) discuss different emission management strategies; and

(F) identify common air pollution controls used in agricultural production.

(6) The student examines soil erosion as related to agricultural production. The student is expected to:

(A) identify agricultural production practices that can contribute to soil erosion;

(B) analyze effects of soil erosion;

(C) discuss the legal aspects of soil erosion; and

(D) identify soil erosion control methods and programs.

(7) The student explains the effects of natural resource use. The student is expected to:

(A) identify the progression of use of natural resources leading to environmental degradation;

(B) explain the impact of human population dynamics on the environment;

(C) discuss the abuse of natural resources; and

(D) communicate the environmental consequences of natural resource use such as the impact on living organisms.

Source: The provisions of this §127.32 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.33. Advanced Energy and Natural Resource Technology (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Recommended prerequisites: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster and Energy and Natural Resource Technology. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Advanced Energy and Natural Resource Technology is designed to explore the interdependency of the public and natural resource systems related to energy production. In addition, renewable, sustainable, and environmentally friendly practices will be explored. To prepare for careers in the field of energy and natural resource systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to energy and natural resources and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry

expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student uses instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a supervised agriculture experience. The student is expected to:

(A) demonstrate safe practices during field and laboratory investigations in a supervised agriculture experience; and

(B) apply accepted procedures for the use and conservation of resources and for the safe handling of materials.

(3) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:

(A) identify various types of natural resources;

(B) identify renewable, non-renewable, and sustainable energy resources and determine their availability;

(C) evaluate the impacts of energy production on natural resources and the agricultural economy; and

(D) analyze the geographic and demographic uses of natural resources.

(4) The student analyzes ethical issues related to natural resource management and energy production. The student is expected to:

(A) compile examples of different lease agreements used for leasing minerals and natural resources;

(B) interpret legal documents related to natural resource management and energy production; and

(C) compare and contrast public and industry interest in natural resource management.

(5) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:

(A) identify policy affecting the use of natural resources;

(B) identify policy affecting energy production;

(C) research controls that protect Earth's natural resources;

(D) identify state and federal agencies that have natural resource management and energy production responsibilities; and

(E) define the roles of government, society, and property owners in the development of natural resource management and energy production policy.

(6) The student recognizes the purpose of land use planning for natural resource management and energy production. The student is expected to:

(A) discuss advantages and disadvantages of land use planning for natural resource management and energy production; and

(B) compare and contrast land use policy trends within the state.

(7) The student identifies water use and wastewater management. The student is expected to:

(A) identify municipal, industrial, and agricultural uses of water;

(B) explore and develop water recycling opportunities;

(C) evaluate sources of point and non-point source pollution associated with municipal, industrial, and agricultural uses;

(D) describe effective management practices commonly used to abate point and non-point sources of pollution;

(E) analyze how water use impacts water availability;

(F) research water use legislation;

(G) discuss water quality policy and how it affects the decisions made in agricultural production; and

(H) discuss the interaction of energy production and water resources.

(8) The student describes air quality associated with natural resource management and energy production. The student is expected to:

(A) research air quality legislation;

(B) identify sources and effects of air pollution;

(C) discuss different emission management strategies; and

(D) identify air pollution controls used in energy production.

(9) The student examines soil erosion as related to natural resource management and energy production. The student is expected to:

(A) examine the effects of natural resource management and energy production on soil erosion;

(B) analyze the components and functions of soils;

(C) appraise soil and water conservation programs; and

(D) compare soil erosion control methods.

(10) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:

(A) classify types of waste and hazardous materials;

(B) research legislation related to waste and hazardous materials;

(C) select appropriate entities responsible for waste and hazardous material management; and

(D) describe safe handling, storing, and disposal of waste materials such as composting and recycling.

(11) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:

(A) identify agricultural and silvicultural crops and bio-products suitable for renewable production;

(B) discuss production processes for agricultural- and silvicultural-based bio-products;

(C) describe the fundamentals for non-renewable resource recovery;

(D) analyze the effects of non-renewable resource recovery methods and the environmental considerations associated with each method such as environmentally friendly alternatives;

(E) analyze the advantages and disadvantages of wind-generated energy;

(F) identify public policy considerations associated with transmission line construction to transport wind-generated energy;

(G) locate areas in the state that have geothermal energy production potential;

(H) explain the benefits of geothermal energy;

(I) identify solar energy systems and describe the function of each; and

(J) identify the environmental considerations associated with biofuels.

Source: The provisions of this §127.33 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.34. Food Technology and Safety (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Food Technology and Safety examines the food technology industry as it relates to food production, handling, and safety. To prepare for careers in value-added and food processing systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to value-added and food processing and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student explains the impact of food science systems. The student is expected to:

(A) explain the significance of food science systems;

(B) define trends in food production, world population, and supply and demand for food products;

(C) research trends in animal and food science research; and

(D) evaluate the relationship between biotechnology and the food science industry.

(3) The student analyzes the nutritive value of food constituents. The student is expected to:

(A) define the terms used in food technology;

(B) compare and contrast the nutritive value of food groups; and

(C) apply data and measurements to solve a problem related to food processing.

(4) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:

(A) identify food industry inspection standards, including hazard analysis and critical control points;

(B) describe procedures for insect and rodent control;

(C) identify appropriate chemicals used in the food industry;

(D) assess conditions with regard to safety and health; and

(E) identify specific regulation for organic animal products, grains, and produce.

(5) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:

(A) research regulations dealing with preserving red meat, poultry, and fish;

(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish;

(C) explain the impact of temperature in food preservation;

(D) compare and contrast packaging requirements; and

(E) evaluate cultural practices and exotic species in food harvesting and processing.

(6) The student demonstrates an understanding of the trends and issues important to careers in the food science industry by comparing and contrasting issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare issues. The student is expected to:

(A) select solutions for different environmental issues;

(B) identify issues affecting food science;

(C) research history and policies related to food science issues;

(D) analyze and defend solutions for different environmental issues; and

(E) apply economic principles such as supply, demand, and profit to food science systems.

(7) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:

(A) describe preparing livestock carcasses for market;

(B) describe the U.S. Department of Agriculture's inspection and grading procedures;

(C) identify wholesale and retail cuts;

(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts; and

(E) identify methods of fabricating and marketing processed meats.

(8) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:

(A) describe processing techniques;

(B) demonstrate poultry and retail cuts evaluation;

(C) identify grades and classes of eggs, poultry, fish, and seafood;

(D) fabricate specialty and value-added products;

(E) demonstrate an understanding of quality and portion control procedures; and

(F) describe marketing procedures for eggs, poultry, fish, and seafood.

(9) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:

(A) identify, classify, and grade fruits, nuts, and vegetables;

(B) demonstrate trimming, washing, waxing, peeling, blanching, and other marketing techniques;

(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables; and

(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables.

(10) The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:

(A) describe methods of preparing milk for processing;

(B) evaluate methods of processing milk and dairy products;

(C) identify dairy products, including cultured milk products and frozen dairy desserts; and

(D) process, classify, and grade cheese.

Source: The provisions of this §127.34 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.35. Food Processing (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Food Technology and Safety. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Food Processing focuses on the food processing industry with special emphasis on the handling, processing, and marketing of food products. To prepare for careers in food products and processing systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to natural resources and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student knows the relationship of the food processing industry to the free enterprise system. The student is expected to:

(A) explain the importance of the food processing industry in the free enterprise system; and

(B) explain trends in the consumption of food products.

(3) The student understands consumer satisfaction issues. The student is expected to:

(A) practice equipment maintenance and sanitation procedures;

(B) explain the factors that affect food palatability;

(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts; and

(D) demonstrate work ethics, customer relations skills, and management competencies consistent with industry standards.

(4) The student understands quality control issues in food processing. The student is expected to:

(A) practice procedures relating to the safe manufacture of foods through hygienic food handling and processing;

(B) develop and maintain sanitation schedules;

(C) describe hazard analysis and critical control point implementation issues;

(D) research food safety laws; and

(E) describe solutions for different environmental issues.

(5) The student identifies marketing considerations for food processing. The student is expected to:

(A) practice methods of merchandising red meat, poultry, game, fish, and their by-products;

(B) identify, select, and grade meat;

(C) develop food preservation programs using appropriate food preservation methods;

(D) explain the impact of temperature in food preservation;

(E) compare and contrast preservation packaging such as film, plastic, and cans;

(F) describe harvest and inspection techniques to process food products and analyze food product options; and

(G) identify specific criteria for organic food processing and marketing.

Source: The provisions of this §127.35 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.36. Wildlife, Fisheries, and Ecology Management (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Wildlife, Fisheries, and Ecology Management examines the management of game and non-game wildlife species, fish, and aquacrops and their ecological needs as related to current agricultural practices. To prepare for careers in natural resource systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student analyzes the importance of wildlife, with an emphasis on use and management. The student is expected to:

(A) analyze the importance of wildlife, fisheries, and ecology management;

(B) discuss the history of wildlife, fisheries, and ecology management;

(C) discuss policies, laws, and the administration of wildlife, fisheries, and ecology management; and

(D) analyze the economic impact of public recreation.

(3) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:

(A) analyze the basic ecological concepts of game management;

(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species;

(C) describe and assess the management of wildlife populations;

(D) identify diseases and parasites impacting wildlife species;

(E) discuss the appropriate method of reporting disease and parasite outbreaks;

(F) identify plants impacting aquaculture and wildlife management practices; and

(G) discuss habitat and food plot management to benefit aquaculture and wildlife species.

(4) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:

(A) discuss the importance and role of the Wildlife Management Areas of Texas in the management of private and public lands;

(B) identify laws and regulations regarding the use of wildlife resources;

(C) apply laws and regulations regarding recreation safety such as angler, archer, boater, and hunter safety;

(D) compare and contrast public and private land use;

(E) identify appropriate safety certification requirements;

(F) recognize precautions to use when interfacing with the public concerning regulations and law enforcement;

(G) describe security issues for closed and restricted areas;

(H) recognize potential threat situations for the public of dangers on public and private lands;

(I) recognize the role of law enforcement; and

(J) summarize wildlife and fish harvest techniques and procedures.

(5) The student examines natural cycles and ecological concepts. The student is expected to:

(A) explain the hydrologic, nitrogen, carbon, and nutrient cycles;

(B) evaluate the impact of natural cycles on succession;

(C) analyze the effects of natural cycles on population dynamics;

(D) distinguish between primary and secondary producers;

(E) compare and contrast predator-prey relationships;

(F) evaluate the effects of pollution sources; and

(G) evaluate riparian zones.

(6) The student applies cartographic skills to natural resource activities. The student is expected to:

(A) compare and contrast types of maps;

(B) interpret map features and legends;

(C) compare map scale to actual distance;

(D) evaluate elevation and terrain features from topographic maps;

(E) use land survey and coordinate systems; and

(F) locate position and interpret images using a geospatial interface.

(7) The student evaluates planning data by monitoring natural resource status. The student is expected to:

(A) identify resource inventory and population studies;

(B) devise sample plots and points;

(C) identify and locate resources;

(D) interpret data concerning resource availability and health;

(E) organize databases of resource data; and

(F) create a technical report.

(8) The student analyzes various natural resource enhancement techniques using scientific knowledge. The student is expected to:

(A) develop a riparian zone enhancement technique plan;

(B) evaluate wildlife habitat enhancement plans; and

(C) evaluate public use and recreation area enhancement plans.

(9) The student demonstrates concepts related to optimum production. The student is expected to:

(A) discuss the importance and progress of aquaculture as an emerging industry;

(B) describe nutritional requirements of aquaculture production;

(C) identify requirements for optimum growth of species-specific aqua crops/aquaculture products; and

(D) identify appropriate treatments for diseases and parasites impacting wildlife species and aquaculture.

Source: The provisions of this §127.36 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.37. Forestry and Woodland Ecosystems (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Forestry and Woodland Ecosystems examines current management practices for forestry and woodlands. Special emphasis is given to management as it relates to ecological requirements and how these practices impact the environment. To prepare for careers in natural resource systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student describes the principles of forestry and woodland ecosystems. The student is expected to:

(A) describe the historical and economic significance of forestry;

(B) illustrate tree anatomy and morphology;

(C) differentiate between species of trees;

(D) classify forest and woodland soils;

(E) describe silviculture;

(F) compare and contrast forest and woodland ecosystems;

(G) describe photosynthesis and respiration as they relate to forest and woodland species;

(H) describe watershed management as it relates to forest and woodland ecosystems;

(I) describe sexual and asexual reproduction in forest and woodland species;

(J) define succession; and

(K) compare natural and managed forests and woodlands.

(3) The student demonstrates forestry biometrics skills. The student is expected to:

(A) calculate tree volume;

(B) estimate timber growth and yield;

(C) evaluate forest and woodland quality by cruising timber stands; and

(D) scale logs to calculate their quality and volume.

(4) The student demonstrates knowledge of forestry management skills. The student is expected to:

(A) identify forestry management techniques;

(B) discuss multiple-use possibilities for forest and woodlands areas; and

(C) develop a control plan for destructive agents such as fire, insects, and disease.

(5) The student identifies softwood and hardwood forest management and use practices. The student is expected to:

(A) identify principles of forestry economics;

(B) research sources of forestry management assistance;

(C) identify harvesting practices and equipment;

(D) describe merchandising practices; and

(E) evaluate research in forestry and wood technology.

(6) The student describes the role of wood technology in forest product development. The student is expected to:

(A) compare timber manufacturing processes and products; and

(B) discuss research and development issues in forestry and wood technology.

(7) The student applies cartographic skills to natural resource activities. The student is expected to:

(A) compare and contrast types of maps;

(B) interpret map features and legends;

(C) compare map scale to actual distance;

(D) evaluate elevation and terrain features from topographic maps;

(E) use land survey and coordinate systems; and

(F) locate position and interpret images using a geospatial interface.

Source: The provisions of this §127.37 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.38. Range Ecology and Management (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Range Ecology and Management is designed to develop students' understanding of rangeland ecosystems and sustainable forage production. To prepare for careers in environmental and natural resource systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to environmental and natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student develops an understanding of the rangeland ecosystem. The student is expected to:

(A) describe ecology, photosynthesis, energy flow, and climax vegetation;

(B) describe the impact of rangeland on the water cycle and water quality; and

(C) determine capabilities and limitations of rangelands.

(3) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:

(A) explain the relationship of rangeland to the environment;

(B) discuss the interrelationships among water, alternative use, carrying capacity, and population;

(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem;

(D) explore the use of rangeland plants as alternative energy sources;

(E) develop an understanding of the role of rangeland in water recharge and conservation; and

(F) recognize the importance of successful rangeland ecology practices.

(4) The student analyzes the biotic and abiotic components of a rangeland. The student is expected to:

(A) discuss components of rangeland with an emphasis on soil;

(B) determine components of rangeland with an emphasis on topography; and

(C) classify range sites by soil properties;

(5) The student develops an understanding of the dynamic process of a renewable rangeland resource. The student is expected to:

(A) determine range condition based on plant populations;

(B) compare and contrast rangeland condition trends; and

(C) formulate methods to improve range conditions.

(6) The student identifies methods of maintaining and improving rangeland for livestock management. The student is expected to:

(A) identify plants beneficial to livestock;

(B) identify plant species harmful to livestock;

(C) analyze how livestock use range plants; and

(D) discuss livestock grazing management.

(7) The student identifies methods of maintaining and improving rangeland for wildlife management. The student is expected to:

(A) identify plants beneficial to wildlife;

(B) identify plants species harmful to wildlife;

(C) analyze how wildlife species use range plants; and

(D) discuss wildlife grazing management.

(8) The student develops an understanding of rangeland management as it relates to global concerns. The student is expected to:

(A) examine how rangeland characteristics affect aquifers;

(B) analyze how rangeland characteristics affect the environment;

(C) analyze how rangeland management affects the environment; and

(D) evaluate the impact of energy production systems on rangelands.

Source: The provisions of this §127.38 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.39. Landscape Design and Management (One-Half Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one-half credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Landscape Design and Management is designed to develop an understanding of landscape design and management techniques and practices. To prepare for careers in horticultural systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:

(A) assess soil characteristics and environmental conditions;

(B) assess site for local conditions such as property lines, easement restrictions, and location of public utilities;

(C) complete a site analysis checklist;

(D) produce a site sketch using graphic design equipment or software;

(E) identify plants used in designing landscapes;

(F) identify structures and hardscape materials used in designing landscapes;

(G) create landscape designs demonstrating the application of design elements and principles; and

(H) analyze different landscape design styles and identify the different aesthetic and environmental factors of each style.

(3) The student performs landscape business procedures. The student is expected to:

(A) demonstrate skills for interviewing potential clients;

(B) develop landscape ideas from a checklist;

(C) prepare cost estimates and schedules for landscaping services, including materials, labor, and business costs; and

(D) analyze service contracts.

(4) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:

(A) identify, store, and maintain landscaping hand tools and power equipment;

(B) analyze costs associated with purchasing and maintaining landscaping hand tools and power equipment;

(C) assess different landscape irrigation systems for efficiency, application, and environmental impact;

(D) identify common irrigation system components and materials; and

(E) examine local and state regulations affecting irrigation systems.

(5) The student performs landscape installation services. The student is expected to:

(A) prepare landscape sites for installation; and

(B) install landscape plants and structures using proper installation techniques.

(6) The student performs landscape maintenance services. The student is expected to:

(A) identify and demonstrate proper pruning techniques for different plant materials;

(B) recognize methods for renovating existing landscapes;

(C) analyze nutritional needs of plants;

(D) develop fertilization plans that address plant needs and environmental concerns;

(E) examine Integrated Pest Management in assessing an insect, pathogen, or weed problem;

(F) use pesticide application techniques and equipment properly;

(G) explain pesticide labeling and safety data sheets; and

(H) demonstrate lawn management techniques.

Source: The provisions of this §127.39 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.40. Turf Grass Management (One-Half Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one-half credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Turf Grass Management is designed to develop an understanding of turf grass management techniques and practices. To prepare for careers in horticultural systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student identifies the environmental, aesthetic, and financial benefits of turf grass in residential, commercial, and athletic settings. The student is expected to:

(A) assess sites for environmental factors that impact turf grass establishment and management such as soil type, soil pH, and elevation differences;

(B) develop a site assessment checklist; and

(C) develop a site preparation plan.

(3) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:

(A) identify turf grass varieties and cultivars that fulfill site requirements;

(B) identify pests and pathogens of turf grasses;

(C) identify common weeds found in turf grasses;

(D) determine the importance of site grading for water movement;

(E) determine the importance of soil compaction on turf grass establishment;

(F) reduce impact of compaction using aeration methods;

(G) compare establishment procedures such as seeding, sodding, sprigging, and hydromulching; and

(H) explain the importance of turf grass installation timing.

(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:

(A) explain and demonstrate mowing heights;

(B) explain the principle of mowing frequency;

(C) compare residential, commercial, and athletic turf maintenance needs;

(D) determine turf grass irrigation requirements;

(E) analyze and address thatch accumulation in turf grass;

(F) analyze nutritional needs of turf grass;

(G) develop fertilization plans that address turf grass needs and environmental concerns;

(H) examine Integrated Pest Management in assessing an insect, pathogen, or weed problem;

(I) use turf grass pesticide application techniques and equipment properly; and

(J) explain turf grass pesticide labeling and safety data sheets.

(5) The student performs turf grass management business procedures. The student is expected to:

(A) assess the needs of prospective clients;

(B) analyze material, labor, and business costs related to turf grass sites;

(C) develop and analyze service contracts and maintenance schedules;

(D) prepare a cost estimate for establishing a turf grass site, including materials and labor; and

(E) prepare a cost estimate for maintaining a turf grass site, including materials and labor.

(6) The student manages turf grass maintenance equipment. The student is expected to:

(A) identify, store, and maintain turf grass hand tools and power equipment;

(B) analyze the costs associated with turf grass hand tools and power equipment; and

(C) analyze components of turf grass irrigation systems.

Source: The provisions of this §127.40 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.41. Agricultural Mechanics and Metal Technologies (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Agricultural Mechanics and Metal Technologies is designed to develop an understanding of agricultural mechanics as it relates to safety and skills in tool operation, electrical wiring, plumbing, carpentry, fencing, concrete, and metal working techniques. To prepare for careers in agricultural power, structural, and technical systems, students must attain academic skills and knowledge; acquire technical knowledge and skills related to power, structural, and technical agricultural systems and the industry; and develop knowledge and skills regarding career opportunities, entry requirements, industry certifications, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:

(A) select, use, maintain, and store appropriate hand tools to perform a given task;

(B) select, use, maintain, and store appropriate power equipment such as tools powered by electric, pneumatic, and internal combustion engines; and

(C) select and use measuring and marking devices.

(3) The student identifies and performs electric wiring skills. The student is expected to:

(A) identify principles of electricity and wiring terminology;

(B) install electric wiring components and fixtures to comply with governmental regulations and applicable codes; and

(C) maintain electric motors.

(4) The student performs plumbing skills. The student is expected to:

(A) identify and use plumbing tools; and

(B) identify plumbing fixtures.

(5) The student performs concrete construction skills. The student is expected to:

(A) project cost estimates for materials; and

(B) form and pour concrete slabs.

(6) The student performs carpentry skills. The student is expected to:

(A) identify materials used in agricultural construction;

(B) identify elements of a cost estimate and prepare a bid package for a planned project;

(C) demonstrate basic carpentry skills; and

(D) paint and protect a project with coatings.

(7) The student identifies fencing methods. The student is expected to:

(A) select fencing materials; and

(B) plan and install fences.

(8) The student performs appropriate cold and hot metal techniques. The student is expected to:

(A) identify types of metal;

(B) cut, file, shape, and drill metal;

(C) select and operate oxy-fuel welding and cutting equipment to meet standards;

(D) select and operate electric-arc welding equipment to meet standards; and

(E) perform specialty welding and cutting techniques to meet standards.

(9) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:

(A) select, use, and maintain appropriate tools, equipment, and facilities; and

(B) identify and determine properties, types, and uses of metal.

(10) The student plans and performs cost-effective construction techniques. The student is expected to:

(A) analyze site, equipment, and permit requirements;

(B) operate computer-aided drafting design software;

(C) develop, read, and interpret designs and sketches;

(D) estimate material needs and costs;

(E) measure, mark, and cut material; and

(F) perform specialized nonmetallic fabrication techniques.

Source: The provisions of this §127.41 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.42. Agricultural Structures Design and Fabrication (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Recommended prerequisite: Agricultural Mechanics and Metal Technologies. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) In Agricultural Structures Design and Fabrication, students will explore career opportunities, entry requirements, and industry expectations. To prepare for careers in mechanized agriculture and technical systems, students must attain knowledge and skills related to agricultural structures design and fabrication. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their academic knowledge and technical skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:

(A) develop building plans;

(B) select site and locate agricultural building placement;

(C) estimate materials and costs needed for construction with an emphasis on renewable and eco-friendly materials;

(D) select appropriate environmental control systems with a special emphasis on green technology; and

(E) use computer-aided design software as appropriate.

(3) The student explores the different types of power systems used in agricultural structures. The student is expected to:

(A) define the terms and principles of electricity;

(B) estimate electrical needs and loads;

(C) plan installations using local codes and National Electric Code guidelines;

(D) demonstrate the use of various meters;

(E) select circuit wiring materials and supplies;

(F) demonstrate electrical systems repair; and

(G) explore alternative power systems, including solar, wind, and biomass.

(4) The student constructs agricultural structures using appropriate technology. The student is expected to:

(A) demonstrate appropriate use of surveying equipment;

(B) demonstrate and apply Geographic Information System (GIS) and Global Positioning System (GPS) principles;

(C) reinforce, place, finish, and cure concrete;

(D) plan, establish, and maintain water-management systems;

(E) identify non-traditional structural building techniques, including industry trends that are eco-friendly;

(F) discuss the use of masonry and drywall construction;

(G) install doors, windows, and roofing materials; and

(H) install plumbing equipment and fixtures to comply with governmental regulations and applicable codes.

(5) The student demonstrates metal construction techniques related to agricultural design and fabrication of structures. The student is expected to:

(A) explain the operations of safe oxy-fuel cutting; and

(B) demonstrate safe electrical welding.

Source: The provisions of this §127.42 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.43. Agricultural Equipment Design and Fabrication (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Recommended prerequisite: Agricultural Mechanics and Metal Technologies. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) In Agricultural Equipment Design and Fabrication, students will acquire knowledge and skills related to the design and fabrication of agricultural equipment. To prepare for careers in mechanized agriculture and technical systems, students must attain knowledge and skills related to agricultural equipment design and fabrication. To prepare for success, students reinforce, apply, and transfer their academic knowledge and technical skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:

(A) develop project construction plans;

(B) select appropriate construction and finish materials for different types of agricultural equipment;

(C) estimate materials and costs needed for construction with an emphasis on renewable and eco-friendly materials;

(D) construct one or more agricultural equipment projects using measuring and mechanical skills;

(E) integrate a logical order of operations into the construction of an agricultural equipment project; and

(F) use computer-aided design software.

(3) The student plans, constructs, and maintains fences, corrals, and other agricultural enclosures. The student is expected to:

(A) select site and locate enclosures;

(B) estimate materials and building costs; and

(C) define appropriate construction methods that are friendly to the environment.

(4) The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:

(A) operate oxy-fuel and plasma cutting equipment safely;

(B) proficiently demonstrate safe electrical welding; and

(C) use hand and power tools safely in the construction and repair of agricultural equipment.

(5) The student demonstrates knowledge of laws and regulations related to the construction, design and fabrication of agricultural equipment. The student is expected to:

(A) incorporate industry standards developed by entities such as American National Standards Institute (ANSI), American Society of Agricultural Engineers (ASAE), or Occupational Safety and Health Administration (OSHA) into the construction of agricultural equipment; and

(B) design and build equipment in compliance with state and federal laws enforced by agencies such as the U.S. Department of Transportation (DOT).

Source: The provisions of this §127.43 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.44. Agricultural Power Systems (Two Credits), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded two credits for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Agricultural Power Systems is designed to develop an understanding of power and control systems as related to energy sources, small and large power systems, and agricultural machinery. To prepare for careers in agricultural power, structural, and technical systems, students must attain academic skills and knowledge; acquire technical knowledge and skills related to power, structural, and technical agricultural systems and the workplace; and develop knowledge and skills regarding career opportunities, entry requirements, industry certifications, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and technical skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;

(C) participate in youth leadership opportunities to create a well-rounded experience program; and

(D) produce and participate in a local program of activities using a strategic planning process.

(2) The student connects power generation to differing energy sources. The student is expected to:

(A) examine benefits and detriments of petroleum and alternative energy sources;

(B) compare environmental impacts of varying energy sources;

(C) compare efficiency and characteristics of different energy sources; and

(D) investigate the efficiency of power generation systems that use various energy sources.

(3) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:

(A) select and identify standard tools, equipment, and safety procedures common to power and control applications;

(B) follow operating instructions of specialized tools and equipment such as micrometers, digital multimeters, and dynamometers;

(C) set up and adjust tools and equipment such as dynamometers, flow meters, torque wrenches, lathes, and mills;

(D) maintain and store tools and equipment common to power and control applications; and

(E) inventory tools and equipment in a service or maintenance facility.

(4) The student selects, operates, and maintains small engines. The student is expected to:

(A) describe principles of operation of internal combustion engines;

(B) disassemble and reassemble small engines;

(C) select, maintain, and troubleshoot small engines; and

(D) research small engine industry certifications.

(5) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:

(A) identify and select agricultural equipment for appropriate tasks such as the selection of tillage equipment to obtain a desired result;

(B) identify and maintain component materials such as bearings, hydraulic cylinders, seals, chains, and drives on varying types of machines and equipment;

(C) ensure the presence and function of safety devices such as guards and shields and hardware on machinery and equipment;

(D) calibrate metering, monitoring, and sensing equipment on various equipment such as tillage, harvest, transport, and haying equipment; and

(E) perform pre-operation inspection and appropriate start-up procedures, identify causes of equipment malfunctions and failures, perform scheduled preventive maintenance, and safely operate equipment.

(6) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:

(A) select tractors based upon application and power requirements and describe or perform safe operation of tractors in various applications;

(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers;

(C) select lubricants and apply appropriate lubrication as required by maintenance schedules;

(D) identify and maintain various fuel systems, power trains, and hydraulic systems used on farm tractors;

(E) explain charging, starting, operating, and igniting direct current electrical systems;

(F) maintain steering and braking systems;

(G) maintain tires and tracks and describe the role of ballasting and traction in farm tractors; and

(H) explain the operation of and maintain liquid- and air-cooling systems in tractors.

(7) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:

(A) collect data and troubleshoot electrical systems using various meters and test equipment such as digital multimeters;

(B) employ appropriate techniques for applying devices, controls, and grounding in electrical systems;

(C) apply local and national codes and regulations relevant in electrical systems;

(D) select and apply electric controls such as motor controls, switches, circuit breakers, timers, sensors, and relays; and

(E) interpret data generated by electrical monitoring systems.

(8) The student implements control systems related to agricultural machines and equipment. The student is expected to:

(A) analyze schematic drawings for electrical control systems;

(B) describe uses of various electrical control system components;

(C) install control system components such as motor controls, switches, circuit breakers, timers, sensors, and relays and properly use appropriate tools, procedures, and safety practices; and

(D) identify system performance problems and apply troubleshooting techniques using monitoring or troubleshooting devices.

(9) The student describes hydraulic controls and applications as related to agricultural machines and equipment. The student is expected to:

(A) describe the operation of open and closed center hydraulic systems;

(B) explain the purpose and function of hydraulic controls such as valves, motors, pumps, cylinders, manifolds, and meters; and

(C) create basic hydraulic circuits using a variety of hydraulic controls.

(10) The student describes additional control systems as related to agricultural machines and equipment. The student is expected to:

(A) explain the application of pneumatic systems and controls; and

(B) explain the application of water or other fluid control systems to agricultural machines and equipment and their components.

Source: The provisions of this §127.44 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.45. Professional Standards and Communication in Agribusiness (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and

resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Professional Standards and Communication in Agribusiness focuses on leadership, communication, employer-employee relations, and problem solving as they relate to agribusiness. To prepare for careers in agribusiness systems, students must attain academic knowledge and skills, acquire technical knowledge and skills related to leadership development and communications in agriculture, and develop knowledge and skills regarding agricultural career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career development, education, and entrepreneurship opportunities in the field of agribusiness;

(B) identify and demonstrate interpersonal, problem-solving, and critical-thinking skills used in agriculture, food, and natural resources industries;

(C) describe and demonstrate appropriate personal and occupational safety and health practices for the workplace;

(D) identify employers' legal responsibilities and expectations, including appropriate work habits and ethical conduct;

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy; and

(F) identify training, education, and certification requirements for occupational choices.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) apply proper record-keeping skills as they relate to the supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student analyzes the professional development skills needed to be an effective leader in agribusiness. The student is expected to:

(A) describe the importance of positive self-concept, social skills, and maintaining a professional image;

(B) analyze various leadership styles;

(C) prepare a professional resume, letters of interest, employment applications, and follow-up communications related to the hiring process; and

(D) explain the interpersonal skills needed to work cooperatively with others.

(5) The student evaluates employer and employee responsibilities for occupations in agriculture, food, and natural resources. The student is expected to:

(A) identify and discuss work-related and agribusiness-related ethics;

(B) identify and practice job interview skills; and

(C) outline complaint and appeal processes in the workplace.

(6) The student communicates effectively through various mediums with groups and individuals. The student is expected to:

(A) describe elements of effective communication such as accuracy, relevance, rhetoric, and organization in informal, group discussions; formal presentations; and business-related, technical communication;

(B) describe how the style and content of spoken language varies in different contexts and can influence the listener's understanding;

(C) evaluate elements of oral presentations such as delivery, vocabulary, length, and purpose;

(D) modify presentations based on audience;

(E) identify elements of appropriate professional communications in agribusiness such as correct usage of grammar and punctuation;

(F) explain the importance of communicating factual and unbiased data and information obtained from reliable sources;

(G) identify and demonstrate effective nonverbal communication skills and listening strategies; and

(H) analyze and discuss the importance of relationships and organization for effective communication within groups.

(7) The student understands the dynamics of group collaboration. The student is expected to:

(A) explain the significance of personal and group goals;

(B) apply various leadership traits to solve problems when leading a group;

(C) discuss the importance of time management and teamwork;

(D) outline the steps in the decision-making and problem-solving processes; and

(E) demonstrate an understanding of parliamentary procedures by conducting or actively participating in a meeting.

(8) The student applies principles of design in visual media as they relate to agriculture. The student is expected to:

(A) explain the purpose of visual media;

(B) identify principles of design for visual media;

(C) create designs such as web design or print design for a targeted purpose in agribusiness; and

(D) interpret, evaluate, and justify artistic decisions in visual media related to agribusiness.

(9) The student demonstrates journalistic writing in agriculture. The student is expected to:

(A) differentiate between news, feature, and opinion writing;

(B) identify different forms of journalistic writing such as feature story, press release, and editorials; and

(C) create different forms of journalistic writing for a topic in agribusiness using the drafting process, including layout, selection, revisions, and editing.

(10) The student identifies new media being used in agriculture. The student is expected to:

(A) identify effective use of emerging technology in agricultural communications;

(B) propose a media campaign for an agricultural product or business;

(C) distinguish between appropriate and inappropriate uses of media; and

(D) identify key concepts related to digital citizenship and demonstrate appropriate use of technology for the workplace.

(11) The student examines media laws and ethics related to agricultural communications. The student is expected to:

(A) define free speech, free press, defamation, and libel within communications;

(B) identify and explain media laws applicable to various agricultural communications;

(C) identify and discuss ethical considerations related to media; and

(D) evaluate and practice safe, legal, and responsible use of communication technologies.

(12) The student examines crisis management and risk communication in agricultural communications. The student is expected to:

(A) differentiate between crisis and risk communication;

(B) create an outline for a crisis communication plan in agriculture; and

(C) analyze communication techniques, relevant communication networks, and organization communication strategies before, during, and after a crisis.

Source: The provisions of this §127.45 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.46. Agribusiness Management and Marketing (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Agribusiness Management and Marketing is designed to provide a foundation to agribusiness management and the free enterprise system. Instruction includes the use of economic principles such as supply and demand, budgeting, record keeping, finance, risk management, business law, marketing, and careers in agribusiness. To prepare for careers in agribusiness systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to agribusiness marketing and management and the workplace, and develop knowledge and skills

regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career and entrepreneurship opportunities for a chosen occupation in the field of agribusiness systems science and develop a plan for obtaining the education, training, and certifications required;

(B) model professionalism by continuously exhibiting appropriate work habits, solving problems, taking initiative, communicating effectively, listening actively, and thinking critically;

(C) model appropriate personal and occupational safety and health practices and explain the importance of established safety and health protocols for the workplace;

(D) analyze and interpret the rights and responsibilities, including ethical conduct and legal responsibilities, of employers and employees; and

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student recognizes and explains roles within organizations, inter-organizational systems, and the larger environment. The student is expected to:

(A) identify how organizational systems affect performance and the quality of products and services related to agriculture, food, and natural resources;

(B) research and describe the domestic and global context of agricultural industries and careers;

(C) describe the nature and types of agribusiness organizations; and

(D) identify the sectors of agribusiness such as production, processing, and distribution.

(5) The student examines critical aspects of career opportunities in one or more agriculture, food, and natural resources careers. The student is expected to:

(A) research job descriptions for one or more careers in agriculture, food, and natural resources and analyze labor market trends for the selected career(s); and

(B) identify educational and credentialing requirements for one or more careers in agriculture, food, and natural resources.

(6) The student defines and examines agribusiness management and marketing and its importance to agriculture and the economy. The student is expected to:

(A) describe different roles and functions of management and leadership in agribusiness;

(B) analyze the impact of management and marketing on the production, processing, and distribution of agricultural products;

(C) identify key economic principles of free enterprise;

(D) explain the impact of key economic principles in agribusiness;

(E) analyze the economic opportunities of agribusiness in a selected market or region; and

(F) identify how agribusiness management and marketing impact consumer and market trends.

(7) The student explains the importance of maintaining records and budgeting in agribusiness. The student is expected to:

(A) maintain and analyze agribusiness records such as payroll, employee benefits, inventories, financial statements, and balance sheets to make informed business decisions;

(B) research and identify loan and financing opportunities in agribusiness;

(C) compare methods of capital resource acquisition as it pertains to agriculture; and

(D) apply a cost-benefit analysis to a budget for an agricultural business.

(8) The student describes issues related to government policy and seeks opportunities to eliminate barriers for all stakeholders. The student is expected to:

(A) analyze methods of decision making;

(B) identify and examine the effects of government policies and regulations in making management decisions;

(C) describe the role of human resources in ensuring equality in the workplace;

(D) identify employee rights and laws pertaining to the workplace; and

(E) identify the rights and responsibilities of land and property ownership such as uses, taxes, wills, and liabilities.

(9) The student describes the marketing of agricultural products. The student is expected to:

(A) describe the purpose and importance of marketing agricultural products;

(B) develop a marketing plan for an agricultural business or product;

(C) compare various agribusiness markets and influence factors;

(D) identify methods used in agriculture for managing risk; and

(E) identify and analyze trends in agricultural commodity markets.

(10) The student understands the efficiency aspects of agribusiness management. The student is expected to:

(A) develop agricultural management and financial documents using management software or information technology;

(B) identify components of and develop an agribusiness entrepreneurial plan;

(C) identify components of and develop an agribusiness financial management plan; and

(D) create and present an agriculture business proposal.

Source: The provisions of this §127.46 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.47. Agricultural Leadership, Research, and Communications (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Agricultural Leadership, Research, and Communications focuses on challenging students to use higher level thinking skills, develop leadership abilities, and develop and communicate agricultural positions effectively with all stakeholders. To prepare for careers in agriculture, food, and natural resources, students must attain academic knowledge and skills, acquire technical knowledge and skills related to the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and applying technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career and entrepreneurship opportunities for a chosen occupation in the field of agriculture and develop a plan for obtaining the education, training, and certifications required for the chosen occupation;

(B) model professionalism by continuously exhibiting appropriate work habits, solving problems, taking initiative, communicating effectively, listening actively, and thinking critically;

(C) model appropriate personal and occupational safety and health practices and explain the importance of established safety and health protocols for the workplace;

(D) analyze and interpret the rights and responsibilities, including ethical conduct and legal responsibilities, of employers and employees; and

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student researches the qualities and characteristics of effective leaders within the agricultural industry. The student is expected to:

(A) identify past agricultural leaders, explain contributions made by these leaders, and define the impact of their contributions on the agricultural industry;

(B) compare characteristics of effective leaders and explain how these traits enabled them to enact meaningful change; and

(C) analyze and present the leadership skills of a leader in the field of agriculture.

(5) The student describes organizational leadership structures at the local, state, and national levels. The student is expected to:

(A) identify agricultural or governmental leadership positions at the local, state, and national levels;

(B) explain how individuals in leadership positions and their decisions impact the agricultural industry;

(C) explain the processes by which laws, regulations, and policies are developed at the local, state, and national levels; and

(D) evaluate a recent law affecting agriculture, food, and natural resources and analyze the impact of that law on local agriculture.

(6) The student develops skills needed to participate effectively in an organizational meeting. The student is expected to:

(A) describe parliamentary laws, motions, and other procedures;

(B) apply parliamentary procedures to conduct organizational meetings;

(C) debate and discuss issues in a clear, concise, and professional manner;

(D) serve as presiding officer over an actual or mock organizational meeting; and

(E) analyze an organizational meeting such as a chapter, a district, an area, or a state meeting or a local board meeting and make recommendations to increase the meeting's overall efficiency and effectiveness.

(7) The student demonstrates an agriculture-related technical skill to stakeholders. The student is expected to:

(A) examine the components of an effective skills demonstration and create a list of essential characteristics;

(B) identify an agricultural skill, develop detailed instructions for performing that skill, and demonstrate the skill with proficiency;

(C) analyze the performance of a pre-identified skill and make recommendations to increase the performance for overall efficiency and effectiveness; and

(D) explain the relevance of real-world applications for the demonstration process.

(8) The student asks questions, identifies problems, and conducts investigations to answer questions in agriculture. The student is expected to:

(A) explain the importance of using scientific processes;

(B) ask questions and define problems based on observations or data;

(C) collect, organize, and analyze quantitative and qualitative data; and

(D) present findings and conclusions based on research performed using scientific processes.

(9) The student examines the use of logic in debate and analysis of current issues impacting the agricultural community. The student is expected to:

(A) identify the rules and responsibilities of the affirmative and negative positions in a debate;

(B) construct logical affirmative and negative cases in a debate using a variety of approaches; and

(C) present an argument free of logical fallacies on a current agricultural issue.

(10) The student examines an agricultural topic to develop an advocacy communication plan. The student is expected to:

(A) identify and research controversial areas of agriculture;

(B) identify and analyze all sides of a controversial agricultural issue;

(C) develop an advocacy communication plan that addresses both supporting and opposing arguments; and

(D) present the advocacy communication plan to an audience.

(11) The student presents and communicates agricultural information using various media. The student is expected to:

(A) identify historical and current media outlets;

(B) research and write agricultural articles for publication in print media outlets;

(C) develop and record scripts for radio broadcasts or podcast productions to effectively communicate agricultural information using technology;

(D) develop scripts for video broadcasts and communicate agricultural information effectively using a video broadcast;

(E) examine and critique various media platforms; and

(F) communicate agricultural information in a responsible, professional manner via media.

(12) The student communicates agricultural information by means of presentations to groups of various sizes. The student is expected to:

(A) select appropriate tone, language, and content for an intended audience;

(B) plan, develop, and deliver effective presentations; and

(C) critique agricultural presentations given by self or others for structure, transitions, evidence, and details.

(13) The student evaluates and critiques agricultural informational resources. The student is expected to:

(A) identify processes used in the evaluation of a variety of agricultural resources;

(B) evaluate agricultural resources for credibility, bias, and accuracy;

(C) evaluate and compare agricultural resources and make professional decisions using reliable research resources; and

(D) explain and defend decisions made in the evaluation of agricultural resources.

(14) The student understands the importance of agricultural education. The student is expected to:

(A) identify and examine historical and present-day agricultural education;

(B) identify and research individuals, governmental agencies, and advocacy groups that are responsible for agricultural information dissemination and education; and

(C) explain the importance of agricultural education.

Source: The provisions of this §127.47 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.48. Equine Science (One-Half Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one-half credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) In Equine Science, students acquire knowledge and skills related to the equine industry. Equine Science may address topics related to horses, donkeys, and mules. To prepare for careers in the field of animal science, students must enhance academic knowledge and skills, acquire knowledge and skills related to equine systems, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career development, education, and entrepreneurship opportunities in the field of equine science;

(B) identify and demonstrate interpersonal, problem-solving, and critical-thinking skills used in equine science;

(C) describe and demonstrate appropriate personal and occupational safety and health practices for the workplace;

(D) identify employers' legal responsibilities and expectations, including appropriate work habits and ethical conduct;

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy; and

(F) identify training, education, and certification requirements for occupational choices.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills as they relate to the supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student analyzes the history, domestication, and selection of equine. The student is expected to:

(A) research and describe the history and evolution of equine;

(B) describe the impacts of equine industries such as racing, rodeos, equestrian therapy, and the global food market; and

(C) evaluate and select equine breeds based on purpose and conformation.

(5) The student explains the anatomy and physiology of equine. The student is expected to:

(A) explain the function of the skeletal, muscular, respiratory, reproductive, digestive, and circulatory systems of equine;

(B) identify and interpret ranges for healthy equine vital signs; and

(C) compare normal and abnormal behavior of equine such as emotional and physical.

(6) The student determines the nutritional requirements of equine. The student is expected to:

(A) compare the equine digestive system to the digestive systems of other species;

(B) identify and describe sources of nutrients and classes of feed for equine;

(C) identify and research vitamins, minerals, and feed additives for equine;

(D) formulate feed rations based on the nutritional requirements of equine; and

(E) identify and discuss equine feeding practices, grazing practices, and feed quality issues.

(7) The student understands how equine are affected by diseases and pests. The student is expected to:

(A) identify and describe how bacteria, fungi, viruses, genetics, and nutrition affect equine health;

(B) identify signs, symptoms, and prevention of equine diseases;

(C) identify parasites of equine and explain the signs, symptoms, treatment, and prevention of equine parasites; and

(D) discuss methods of administering equine medications and calculating dosage.

(8) The student analyzes the management of equine. The student is expected to:

(A) identify tools and equipment for grooming, riding, and training equine and select the appropriate tools or equipment for such tasks and purposes;

(B) identify tools and equipment for safe handling and restraining of equine and select the appropriate tools or equipment for such tasks and purposes;

(C) identify types and essential features of equine facilities such as housing, performance, veterinary, and reproduction facilities;

(D) explain the procedures for breeding equine and caring for foals in accordance with industry standards;

(E) explain and demonstrate methods of identifying ownership of equine, including branding and tattooing;

(F) discuss effective equine management strategies such as financial planning, complying with governmental regulations, and interpreting performance data; and

(G) explain methods of maintaining equine health and soundness such as hoof care and dental health.

(9) The student discusses issues affecting the equine industry. The student is expected to:

(A) describe biotechnology issues related to the equine industry;

(B) research and explain animal welfare policy pertaining to equine industries such as racing, rodeos, equestrian therapy, the global food market, and pharmaceutical research; and

(C) research and explain governmental regulations, environmental regulations, or current events that affect the equine industry.

Source: The provisions of this §127.48 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.49. Livestock and Poultry Production (One Credit), Adopted 2024.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: at least one course from the Agriculture, Food, and Natural Resources Career Cluster. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and

resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) In Livestock and Poultry Production, students acquire knowledge and skills related to the livestock and poultry production industry. Livestock and Poultry Production may address topics related to beef cattle, dairy cattle, swine, sheep, goats, and poultry. To prepare for careers in the field of animal science, students must attain academic knowledge and skills, acquire knowledge and skills related to livestock and poultry systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills as they relate to the supervised agricultural experience program.

(2) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(3) The student analyzes the history, domestication, and selection of livestock and poultry. The student is expected to:

(A) research and describe the history, domestication, and evolution of livestock and poultry species;

(B) describe the impacts other industries such as entertainment, recreation and leisure, and exhibition of animals have on the livestock and poultry industry; and

(C) evaluate and select livestock and poultry breeds based on purpose and conformation.

(4) The student explains the anatomy and physiology of livestock and poultry species. The student is expected to:

(A) identify and explain the skeletal, muscular, respiratory, and circulatory systems of livestock and poultry;

(B) identify and interpret ranges for healthy livestock and poultry vital signs; and

(C) compare normal and abnormal behavior of livestock and poultry.

(5) The student determines nutritional requirements of livestock and poultry. The student is expected to:

(A) describe and compare the digestive systems of ruminant and non-ruminant animals;

(B) identify sources of nutrients and classes of feed for livestock and poultry;

(C) identify vitamins, minerals, and feed additives for livestock and poultry;

(D) formulate feed rations based on nutritional needs and economic factors for livestock and poultry;

(E) research and discuss feeding practices and feed quality issues for livestock and poultry;

(F) identify forage plants used for livestock grazing; and

(G) research and explain livestock and poultry grazing practices such as rotational grazing and deferred grazing.

(6) The student explains livestock and poultry genetics and reproduction. The student is expected to:

(A) describe and compare the reproductive systems of various livestock and poultry;

(B) identify and explain livestock and poultry breeding systems such as grading up, crossbreeding, linebreeding, and inbreeding;

(C) use Expected Progeny Differences (EPDs) to evaluate livestock production;

(D) research and explain current and emerging technologies in livestock and poultry reproduction such as cloning, embryo transfer, in vitro fertilization, and artificial insemination;

(E) use Punnett squares to predict phenotypes and genotypes of livestock offspring; and

(F) explain the relationship between body condition scores and reproductive efficiency for livestock and poultry.

(7) The student understands how livestock and poultry are affected by pests and diseases. The student is expected to:

(A) identify and describe how bacteria, fungi, viruses, genetics, and nutrition affect livestock and poultry health;

(B) identify signs, symptoms, and prevention of livestock and poultry diseases;

(C) identify parasites and explain the signs, symptoms, treatment, and prevention of livestock and poultry parasites; and

(D) calculate dosage and identify administration methods of livestock and poultry medications.

(8) The student analyzes the management skills needed for livestock and poultry production. The student is expected to:

(A) identify tools and equipment for safe handling and restraining of livestock and poultry and select the appropriate tools or equipment for such tasks and purposes;

(B) identify types and essential features of facilities for livestock and poultry such as housing, veterinary, and reproduction facilities;

(C) evaluate and describe industry practices such as dehorning, castrating, docking, and vaccinating and sire, dam, and newborn care to maximize the efficiency of livestock and poultry;

(D) explain and demonstrate methods of identifying ownership of livestock and poultry such as branding, ear tagging, ear notching, wing bands, and tattooing; and

(E) explain the use of technology such as aircraft, robotics, and smart irrigation in modern livestock and poultry production.

(9) The student examines the interrelationship of the factors impacting livestock and poultry production operations. The student is expected to:

(A) research and explain livestock and poultry biosecurity and waste management practices;

(B) create an effective financial management plan for a livestock and poultry production operation;

(C) analyze and discuss environmental regulations, governmental regulations, and animal welfare policies related to livestock and poultry production;

(D) analyze the United States Department of Agriculture (USDA) standards and guidelines for organic livestock and poultry production;

(E) analyze and describe the interrelationship between grain markets and the livestock and poultry industry;

(F) assess the impact of the United States livestock and poultry industry on world commodity markets;

(G) use charts, tables, data, or graphs to evaluate the efficiency of livestock and poultry production; and

(H) develop and present a livestock or poultry operation plan that includes health, reproduction, nutrition, and management practices necessary for maximum efficiency.

Source: The provisions of this §127.49 adopted to be effective September 9, 2024, 49 TexReg 6994; amended to be effective November 2, 2025, 50 TexReg 7013.

§127.50. Small Animal Management (One-Half Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one-half credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) In Small Animal Management, students acquire knowledge and skills related to the small animal management industry. Small Animal Management may address topics related to small animals such as dogs and cats, rabbits, pocket pets, amphibians, reptiles, and birds. To prepare for careers in the field of animal science, students must enhance academic knowledge and skills, acquire knowledge and skills related to small animal systems, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career development, education, and entrepreneurship opportunities in the field of small animal management;

(B) identify and demonstrate interpersonal, problem solving, and critical thinking skills used in small animal management;

(C) describe and demonstrate appropriate personal and occupational safety and health practices for the workplace;

(D) identify employers' legal responsibilities and expectations, including appropriate work habits and ethical conduct;

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy; and

(F) identify training, education, and certification requirements for occupational choices.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills as they relate to the supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student analyzes the history, domestication, and importance of small animal ownership. The student is expected to:

(A) research and explain the history, domestication, and purpose of small animals;

(B) identify and discuss the influence small animals have on society;

(C) describe the economic impact of the small animal industry;

(D) describe the responsibilities and benefits of small animal ownership;

(E) explain services small animals provide to society such as medical, support, research, and working; and

(F) research and discuss the environmental and governmental regulations related to small animal ownership.

(5) The student understands the hazards associated with working in the small animal industry. The student is expected to:

(A) explain and demonstrate safe practices, including the proper use of personal protective equipment (PPE), when working with small animals;

(B) identify zoonotic diseases that can be transmitted by small animals;

(C) describe sanitation methods used to prevent the spread of disease in small animals; and

(D) locate, interpret, and implement safety data sheets (SDS) for handling chemicals.

(6) The student evaluates current topics in small animal rights and animal welfare. The student is expected to:

(A) analyze current issues in animal rights and animal welfare;

(B) research and report important persons, organizations, and groups involved in the animal rights movement; and

(C) create and discuss a historical timeline of major legislation related to animal welfare.

(7) The student explains anatomy and physiology of small animals. The student is expected to:

(A) identify and explain the skeletal, muscular, respiratory, reproductive, digestive, and circulatory systems for each species studied;

(B) identify and interpret ranges for healthy small animal vital signs; and

(C) compare normal and abnormal behavior of small animals.

(8) The student analyzes the care and management skills for a variety of small animals. The student is expected to:

(A) identify and discuss the impact physical characteristics have on the management practices for each species studied;

(B) identify and compare the breeds and types of each species studied;

(C) discuss the ownership identification methods, habitat, housing, and equipment needs for each species studied;

(D) identify nutritional requirements for each species studied;

(E) explain health maintenance for each species studied, including prevention and control of diseases and parasites;

(F) describe and practice methods of handling for each species studied;

(G) discuss basic grooming procedures for each species studied; and

(H) identify copulation, gestation, parturition, and weaning practices for each species studied.

(9) The student examines the interrelationship of the factors impacting small animal ownership. The student is expected to:

(A) develop and present a small animal ownership plan that includes health, reproduction, nutrition, and management practices; and

(B) research and create a financial plan for small animal operation or ownership.

Source: The provisions of this §127.50 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.51. Veterinary Science (One Credit), Adopted 2024.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Equine Science, Small Animal Management, or Livestock and Poultry Production. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Veterinary Science covers topics relating to veterinary practices, including practices for large and small animal species. To prepare for careers in the field of animal science, students must attain academic knowledge and skills, acquire technical knowledge and skills related to animal systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills as they relate to the supervised agricultural experience program.

(2) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(3) The student understands safety and health practices associated with working in veterinary medicine. The student is expected to:

(A) explain the importance of safe practices such as handling, restraint, and proper use of tools and equipment when working with animals;

(B) identify and discuss transmission and prevention of zoonotic diseases in large and small animal species;

(C) describe sanitation methods to prevent the spread of pathogens and maintain asepsis in sterile environments;

(D) locate, interpret, and implement safety data sheets (SDS) for handling chemicals;

(E) demonstrate and explain safe usage of clinical tools and equipment; and

(F) perform proper disposal of sharps and biohazards.

(4) The student understands current topics, professional ethics, and laws that relate to veterinary medicine. The student is expected to:

(A) research and discuss historical events, trends, and issues that have impacted veterinary medicine;

(B) analyze topics related to veterinary medical ethics, including animal rights and animal welfare; and

(C) explain policies and procedures in veterinary medicine that reflect local, state, and federal laws.

(5) The student evaluates effective management approaches and marketing strategies to determine their importance to the success of veterinary practices such as clinics and hospitals. The student is expected to:

(A) describe how the human-animal bond impacts veterinary practices when working with clients and their animals;

(B) identify and demonstrate skills needed to communicate effectively with clients and veterinary professionals;

(C) identify marketing strategies and explain how marketing affects the success of a veterinary practice; and

(D) research and discuss how electronic technology such as computer programs, medical records, hospital-to-hospital communication, and tablets is used in a veterinary practice.

(6) The student communicates the importance of medical terminology, evaluates veterinary terms to discover their meanings, and demonstrates the ability to use terms correctly. The student is expected to:

(A) analyze Greek and Latin prefixes, suffixes, and roots to determine the meaning of veterinary terms;

(B) identify, pronounce, and spell veterinary terms appropriately; and

(C) use directional anatomy terms appropriately for large and small animal species.

(7) The student understands proper animal handling as it relates to characteristics and behavior. The student is expected to:

(A) identify animal breeds according to characteristics;

(B) identify and compare normal and abnormal behavior within and among various animal species; and

(C) identify and discuss correct handling and restraint protocols for large and small animal species such as muzzling, lateral recumbency, sternal recumbency, jugular venipuncture, and haltering.

(8) The student explains anatomy and physiology of animals. The student is expected to:

(A) identify the parts and functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems for large and small animal species; and

(B) describe the interrelationships among animal body systems.

(9) The student determines the importance of animal nutrition in maintaining a healthy animal. The student is expected to:

(A) identify sources of nutrients and classes of feeds for large and small animal species;

(B) identify feed additives for large and small animal species and describe how additives affect the food supply;

(C) analyze dietary needs and feed-quality issues for large and small animal species and their effect on feeding practices; and

(D) research and compare the nutritional value of feeds such as prescription, commercial, homemade, fad, and raw diets for large and small animal species.

(10) The student evaluates an animal's health during a clinical examination. The student is expected to:

(A) describe the characteristics and signs of a healthy and an unhealthy animal;

(B) identify ranges for healthy vital signs for large and small animal species such as temperature, pulse, respiration, hydration, and capillary refill time;

(C) demonstrate the proper procedures for obtaining vital signs for large and small animal species and interpret vital sign measurements to determine the health of the animal;

(D) describe effects of age, stress, and environmental factors on vital signs of animals;

(E) explain procedures for physical examinations for large and small animal species;

(F) explain the anatomical regional approach to assess an animal's health;

(G) apply mathematical skills to calculate weight and linear body measurement for large and small animal species and to convert between measurement systems; and

(H) analyze tables, charts, and graphs to interpret large and small animal patient and clinical data.

(11) The student analyzes how diseases and parasites affect animal health. The student is expected to:

(A) describe the process of immunity and disease transmission for large and small animal species;

(B) identify and describe pathogens for large and small animal species and the diseases they cause;

(C) describe the effects that diseases have on various body systems for large and small animal species;

(D) identify parasites for large and small animal species using common and scientific names;

(E) describe life cycles of parasites found in large and small animal species;

(F) explain how parasites found in large and small animal species are transmitted and explain the effects on the host;

(G) describe parasitic diagnostic procedures for large and small animal species; and

(H) describe treatment protocols for parasites found in large and small animal species.

(12) The student examines various aspects of veterinary laboratory procedures. The student is expected to:

(A) explain the procedures used in collecting, handling, and preparing fecal, blood, and urine specimens for large and small animal species;

(B) explain veterinary procedures used in examining fecal, blood, and urine specimens; and

(C) analyze and compare normal and abnormal results obtained in veterinary laboratory procedures.

(13) The student analyzes technical veterinary procedures and skills. The student is expected to:

(A) explain the care, maintenance, and use of equipment and instruments found in veterinary practices;

(B) interpret and prepare a veterinary medical record, adhering to client and patient confidentiality;

(C) explain and demonstrate routine animal care skills such as administering medications, nail trimming, bathing, dipping, grooming, ear cleaning, expressing anal sacs, dental care, placing a tail tie, and ownership identification methods;

(D) explain and demonstrate therapeutic care for large and small animal species such as patient observation, maintaining and administering fluids, applying and removing bandages, removing sutures, caring for open wounds, and providing hydrotherapy physical therapy;

(E) describe emergency protocols and first aid procedures for large and small animal species, including cardiopulmonary resuscitation, control of bleeding, and signs of shock; and

(F) research and compare veterinary care of specialty patients, including newborns, orphans, geriatric animals, recumbent animals, and animals with disabilities.

(14) The student identifies and discusses surgical-assisting procedures and skills. The student is expected to:

(A) explain the veterinary protocol for pre-surgical and post-surgical care of a patient;

(B) identify tools and equipment used in veterinary surgical procedures;

(C) describe methods used in the preparation, sterilization, and opening of surgery packs; and

(D) describe veterinary surgical procedures such as spaying, castration, dehorning, docking, dental prophylaxis, and tooth extraction.

(15) The student identifies imaging equipment and understands how to safely operate and maintain equipment. The student is expected to:

(A) research and explain the parts and function of imaging equipment such as an ultrasonograph, endoscope, electrocardiograph, and radiograph;

(B) explain safety, maintenance, and operation procedures of imaging equipment;

(C) demonstrate patient restraint and positioning methods used for imaging purposes of large and small animal species; and

(D) differentiate between the images from various imaging equipment.

(16) The student identifies veterinary pharmacology procedures and skills. The student is expected to:

(A) identify veterinary medications according to their classification, schedule, form, routes of administration, and methods of administration;

(B) explain handling, storage, distribution, protocols, and laws for veterinary medications, including controlled substances;

(C) calculate dosage for large and small animal species using factors such as concentration of drug, weight of animal, and prescribed dosage;

(D) prepare a veterinary prescription label with identifiers that are required by the United States Food and Drug Administration;

(E) identify and explain the equipment and instruments used to safely administer medications for large and small animal species; and

(F) research and present emerging trends in veterinary pharmacology such as internet pharmacies, herbal supplements, organic labeling, and extra-label and off-label use of medications.

Source: The provisions of this §127.51 adopted to be effective September 9, 2024, 49 TexReg 6994; amended to be effective November 2, 2025, 50 TexReg 7013.

§127.52. Advanced Animal Science (One Credit), Adopted 2024.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology and Chemistry or Integrated Physics and Chemistry (IPC); Algebra I and Geometry; and either Small Animal Management, Equine Science, or Livestock and Poultry Production. Recommended prerequisite: Veterinary Science. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Advanced Animal Science examines the interrelatedness of human, scientific, and technological dimensions of animal production, including canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorpha production. Instruction is designed to allow for the application of scientific and technological aspects of animal science through field and laboratory experiences. To prepare for careers in the field of animal science, students must attain academic knowledge and skills, acquire knowledge and skills related to animal systems, and develop knowledge and skills regarding career opportunities, entry requirements, and industry standards. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.

(4) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(5) Scientific hypotheses and theories. Students are expected to know that:

(A) hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and

(B) scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.

(6) Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.

(A) Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.

(B) Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.

(7) Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).

(8) Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide tools for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(9) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(10) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;

(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;

(D) use appropriate tools such as dissection equipment, standard laboratory glassware, microscopes, various prepared slides, measuring devices, micropipettors, hand lenses, thermometers, hot plates, laboratory notebook, timing devices, cameras, Petri dishes, laboratory incubators, models, diagrams, and samples of biological specimens, syringes, needles, scalpels, microscopes slides, cover slips, artificial insemination equipment, and drench gun;

(E) collect quantitative data using the International System of Units (SI) and qualitative data as evidence;

(F) organize quantitative and qualitative data using calculators, computers, software, laboratory notebook, recordkeeping system, and reliable sources;

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

(H) distinguish between scientific hypotheses, theories, and laws.

(2) Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

(C) use mathematical calculations to assess quantitative relationships in data; and

(D) evaluate experimental and engineering designs.

(3) Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(4) Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student;

(B) relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content; and

(C) research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

(5) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(6) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(7) The student analyzes the history, domestication, and evaluation of animals, including canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs. The student is expected to:

(A) research and describe the history, including evolution, domestication, and introduction of species to countries, of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(B) analyze and describe how changes in the global food market impact the animal production industry; and

(C) evaluate breeds of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorph based on purpose and conformation.

(8) The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to:

(A) compare cells to show specialization of structure and function;

(B) explain cell division, including mitosis and meiosis;

(C) explain cell differentiation in the development of tissues and organs; and

(D) identify and explain the biological levels of organization in animals.

(9) The student examines and compares anatomy and physiology in animals. The student is expected to:

(A) compare the external anatomy of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(B) identify the anatomical structures and physiological functions of the skeletal, muscular, circulatory, genitourinary, respiratory, nervous, immune, and endocrine systems of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; and

(C) investigate and describe the interrelationship among animal body systems.

(10) The student understands the anatomical structures and physiological functions of the digestive system to determine nutritional requirements of ruminant and non-ruminant animals. The student is expected to:

(A) describe the structures and functions of the digestive systems of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(B) identify and describe sources of nutrients and classes of feeds for canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(C) identify and describe the feed additives and supplements used to meet the nutritional requirements of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(D) formulate rations based on different nutritional requirements, including age, gestation, lactation, sex, and purpose, for canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(E) analyze feeding practices in relation to nutritional requirements, including age, gestation, lactation, sex, and purpose, for canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(F) analyze feed quality issues and determine their effect on the health of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(G) research and compare the nutritional value of feeds for all species discussed;

(H) identify forage plants used for livestock grazing and analyze the protein levels of each; and

(I) research grazing practices such as rotational grazing and deferred grazing and explain the advantages and disadvantages of each using the scientific and engineering design process.

(11) The student understands the principles of molecular genetics and heredity. The student is expected to:

(A) explain Mendel's laws of inheritance and predict genotypes and phenotypes of offspring using a Punnett square;

(B) use a Punnett square and assign alleles to justify genotype and phenotype predictions;

(C) identify the parts of the nucleotide and differentiate between the nucleotides found in deoxyribonucleic acid (DNA) and ribonucleic acid (RNA); and

(D) explain the functions of DNA and RNA.

(12) The student applies the principles of reproduction and breeding to animal improvement. The student is expected to:

(A) describe and compare reproductive anatomy of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(B) analyze and compare reproductive cycles and phases of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(C) correlate the reproductive cycles and phases to animal behavior;

(D) research breeding systems, including grading up, crossbreeding, linebreeding, and inbreeding, and explain the advantages and disadvantages of each using the scientific and engineering design process; and

(E) research breeding methods, including embryo transfer, artificial insemination, and natural mating, and explain the advantages and disadvantages of each using the scientific and engineering design process.

(13) The student analyzes how diseases and parasites affect animal health. The student is expected to:

(A) examine how factors such as geographic location, age, genetic composition, and inherited diseases influence the health of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(B) describe the process of immunity and disease transmission of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(C) identify and describe pathogens and the diseases they cause in canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(D) describe the effects that diseases have on various body systems of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(E) research and explain the methods of prevention and control for diseases of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(F) identify parasites of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs using common and scientific names;

(G) describe the life cycles of various parasites and relate them to animal health issues;

(H) explain how parasites are transmitted and the effect they have on canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;

(I) conduct or simulate parasite diagnostic tests; and

(J) explain the methods of prevention, control, and treatment of parasites of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs.

(14) The student discusses livestock market readiness and harvesting methods. The student is expected to:

(A) explain the stages of animal growth and development and how they relate to market readiness;

(B) evaluate market class and grades of livestock;

(C) compare harvesting methods for various species using the scientific and engineering design process;

(D) research and describe federal and state meat inspection standards such as safety, hygiene, and quality control standards;

(E) identify wholesale and retail cuts of meat and correlate to major muscle groups; and

(F) research animal by-products and explain their impact on society.

(15) The student explores methods of marketing animals and animal products. The student is expected to:

(A) compare various methods of animal marketing such as auction, contract sales, private treaty, internet sales, value-based, and exhibition of various animals;

(B) describe methods of marketing animal products such as farmers market, direct sales, wholesale, and retail;

(C) research and evaluate the effectiveness of various strategies and campaigns to market animal products based on consumption patterns and consumer preferences; and

(D) research and evaluate the effectiveness of various labeling options to market animal products such as organic, farm-raised, hormone-free, cage-free, grass-fed, antibiotic-free, and non-GMO labels based on consumption patterns and consumer preferences.

(16) The student demonstrates an understanding of policies and current issues in animal science. The student is expected to:

(A) investigate and discuss the use of biotechnology and biosecurity in the animal science industry;

(B) identify governmental regulations and policies such as environmental and animal welfare and research the impacts on animal production; and

(C) identify and research a current issue in scientific animal agriculture and design a protocol to address the issue using the scientific and engineering design process.

Source: The provisions of this §127.52 adopted to be effective September 9, 2024, 49 TexReg 6994; amended to be effective November 2, 2025, 50 TexReg 7013.

§127.53. Floral Design (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 9-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. This course satisfies the fine arts graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Floral Design is designed to develop students' ability to identify and demonstrate the elements and principles of floral design as well as develop an understanding of the management of floral enterprises. Through the analysis of artistic floral styles and historical periods, students develop respect for the traditions of and appreciation for the contributions of diverse cultures. Students respond to and analyze floral designs, thus contributing to the development of lifelong skills of making informed judgments and evaluations. To prepare for careers in floral design, students must

attain academic knowledge and skills, acquire technical knowledge and skills related to horticultural systems, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Floral Design follows the four basic fine arts strands of foundations: observation and perception; creative expression; historical and cultural relevance; and critical evaluation and response to provide broad, unifying structures for organizing the knowledge and skills students are expected to acquire. Each strand is of equal value and may be presented in any order throughout the year. Students rely on personal observations and perceptions, which are developed through increasing visual literacy and sensitivity to surroundings, communities, memories, imaginings, and life experiences as sources for thinking about, planning, and creating original floral art. Students communicate their thoughts and ideas with innovation and creativity. Through floral design, students challenge their imaginations, foster critical thinking, collaborate with others, and build reflective skills. While exercising meaningful problem-solving skills, students develop the lifelong ability to make informed judgments.

(5) Students are encouraged to participate in extended learning experiences related to floral design such as career and technical student organizations and other leadership or extracurricular organizations.

(6) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career and entrepreneurship opportunities for a chosen occupation in the field of floral design and develop a plan for obtaining the education, training, and certifications required;

(B) model professionalism by continuously exhibiting appropriate work habits, solving problems, taking initiative, communicating effectively, listening actively, and thinking critically;

(C) model appropriate personal and occupational safety and health practices and explain the importance of established safety and health protocols for the workplace;

(D) analyze and interpret the rights and responsibilities, including ethical conduct and legal responsibilities, of employers and employees; and

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student identifies elements and principles of design in floral art in both historical and current contexts. The student is expected to:

(A) identify the historical trends and characteristics of floral art as they relate to current industry practices;

(B) identify design elements in floral art, including color, texture, form, line, space, pattern, size, and fragrance;

(C) identify design principles in floral art, including rhythm, balance, proportion, dominance, contrast, harmony, and unity;

(D) identify the ancillary concepts of design principles such as emphasis, focal area, repetition, transition, opposition, and variation; and

(E) compare the forms and functions of flowers and foliage, including form, mass, line, and filler.

(5) The student demonstrates elements and principles through the creation of floral designs using flowers and plants. The student is expected to:

(A) create and evaluate floral arrangements using cut flowers, including arrangements using bud vases, and round, symmetrical, and asymmetrical designs;

(B) create and evaluate floral designs using permanent botanicals such as homecoming mums;

(C) design and create corsages and boutonnieres;

(D) create floral designs for specific holidays and cultural occasions such as weddings and funerals; and

(E) create interiorscapes using the elements and principles of floral design.

(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:

(A) interpret, evaluate, and justify artistic decisions in the design of personal arrangements;

(B) evaluate and appraise floral designs;

(C) construct a physical or electronic portfolio of personal floral artwork to provide evidence of learning; and

(D) interpret and evaluate design elements and principles in floral arrangements of others.

(7) The student demonstrates contemporary designs and creativity in the floral industry by developing floral design skills. The student is expected to:

(A) identify and classify specialty floral items for a variety of occasions;

(B) create specialty designs to expand artistic expression;

(C) apply proper wiring and taping techniques to materials used in the floral industry; and

(D) demonstrate safe and proper usage of floral design tools.

(8) The student recognizes the current industry practices of floral enterprises. The student is expected to:

(A) identify and classify flowers, foliage, and plants used in floral design;

(B) use temperature, preservatives, and cutting techniques to extend the vase life of floral materials;

(C) identify and describe how tools, chemicals, and equipment are used in floral design and describe safe handling practices;

(D) analyze the needs of indoor plants such as fertilizer, light, pruning, and water based on the condition of the plant;

(E) identify common pests and diseases that affect the floral industry; and

(F) identify management techniques of pests and diseases in the floral industry, including the safe use of pesticides.

(9) The student recognizes current business management practices of floral enterprises. The student is expected to:

(A) create cost-effective floral designs;

(B) apply pricing strategies and order-processing skills to meet various budgets and needs; and

(C) describe packaging, distribution, and setup logistics in the floral industry.

(10) The student understands botany and physiology and how they relate to floral design and interiorscapes. The student is expected to:

(A) analyze the structure and functions of indoor plants used in the floral industry; and

(B) identify the structure and functions of flowers used in the floral industry.

Source: The provisions of this §127.53 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.54. Horticultural Science (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisites: at least one credit in a course from the Agriculture, Food, and Natural Resources Career Cluster. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) In Horticultural Science, students develop an understanding of common horticultural management practices as they relate to food and ornamental plant production. To prepare for careers in horticultural industry systems, students must attain academic knowledge and skills, acquire technical knowledge and skills related to horticulture and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career and entrepreneurship opportunities in the field of plant science and develop a plan for obtaining the education, training, and certifications required;

(B) model professionalism by continuously exhibiting appropriate work habits, solving problems, taking initiative, communicating effectively, listening actively, and thinking critically;

(C) model appropriate personal and occupational safety and health practices and explain the importance of established safety and health protocols for the workplace;

(D) analyze and interpret the rights and responsibilities, including ethical conduct and legal responsibilities, of employers and employees; and

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student understands the history and progression of the horticulture industry. The student is expected to:

(A) trace how relevant historical advancements in the horticulture industry relate to current industry practices;

(B) identify and describe different disciplines of horticulture such as arboriculture, floriculture, olericulture, pomology, viticulture, turf management, and ornamental horticulture;

(C) identify and research emerging technology in the horticulture industry;

(D) identify current trends in the horticulture industry; and

(E) compare types of horticulture industries in the different regions of Texas.

(5) The student identifies plant structures and their functions and needs. The student is expected to:

(A) classify horticultural plants by their common and scientific names;

(B) describe functional differences in plant structures, including roots, stems, flowers, leaves, and fruit;

(C) identify pollination factors affecting plants and trees such as access to pollinators, wind, and hand pollination;

(D) compare monocots and dicots;

(E) analyze environmental needs of plants, including light, water, and nutrients; and

(F) identify the components of a fertilizer label.

(6) The student develops technical knowledge and skills associated with the production of horticultural plants. The student is expected to:

(A) classify horticultural plants based on taxonomy;

(B) identify classifications of plants, including annuals, perennials, biennials, and evergreens, based on growing cycles;

(C) identify horticultural plants based on their physical characteristics;

(D) compare the reproduction of flowering and non-flowering horticultural plants;

(E) select appropriate tools and equipment for production of horticultural plants;

(F) demonstrate safe and appropriate use of tools and equipment; and

(G) identify maintenance practices for hand tools, power tools, and equipment.

(7) The student understands plant propagation techniques and growing methods. The student is expected to:

(A) identify asexual propagation methods for horticultural plants, including cuttings, grafting, budding, layering, and tissue culture;

(B) propagate horticultural plants using asexual methods such as cuttings, grafting, budding, layering, and tissue culture;

(C) manipulate the germination of seeds using various methods such as mechanical scarification, chemical scarification, and heat and cold treatments;

(D) compare various soil-based growing media; and

(E) identify soilless growing methods used in the horticulture industry.

(8) The student manages and controls common pests, diseases, and deficiencies of horticultural plants. The student is expected to:

(A) identify and manage common horticultural pests, diseases, and deficiencies;

(B) identify and manage common weeds that impact horticultural production;

(C) develop a plan for disease control using integrated pest management;

(D) apply proper sanitation methods to prevent the spread of pests;

(E) demonstrate safe and proper practices in selecting, applying, storing, and disposing of chemicals; and

(F) review and explain the parts of a pesticide label.

(9) The student understands the concepts of ornamental plants and landscape design. The student is expected to:

(A) compare landscaping methods that account for environmental variables such as water availability, soil type, light availability, and climate;

(B) identify and select plants, including bedding plants, shrubs, trees, and turf grasses, for landscapes based on United States Department of Agriculture (USDA) hardiness zones;

(C) design a landscape using design elements and principles; and

(D) compare sustainability practices such as planting native plants, water conservation, and irrigation technology used in a landscape.

(10) The student demonstrates business skills used in the horticulture industry. The student is expected to:

(A) identify opportunities for entrepreneurship in the horticulture industry;

(B) identify practices to maintain business relationships;

(C) describe and demonstrate correct procedures for handling customer sales transactions;

(D) calculate pricing to maximize profit for wholesale and retail settings;

(E) develop a plan to market horticultural products and services; and

(F) formulate a budget for a horticultural enterprise.

Source: The provisions of this §127.54 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.55. Greenhouse Operation and Production (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Greenhouse Operation and Production is designed for students to develop an understanding of greenhouse production techniques and practices. To prepare for careers in horticultural and controlled environment agricultural systems, students must attain academic knowledge and skills, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career development, education, and entrepreneurship opportunities in the field of greenhouse operation and production;

(B) identify and demonstrate interpersonal, problem-solving, and critical-thinking skills used in greenhouse operation and production;

(C) describe and demonstrate appropriate personal and occupational safety and health practices for the workplace;

(D) identify employers' legal responsibilities and expectations, including appropriate work habits and ethical conduct;

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy; and

(F) identify training, education, and certification requirements for occupational choices.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student understands the history and progress of the greenhouse industry. The student is expected to:

(A) trace the relevant historical advancements in the greenhouse industry such as developments in construction materials and use of technology and describe the impact of these advancements on current industry practices;

(B) research and identify emerging technologies in the greenhouse industry; and

(C) analyze current trends in the greenhouse industry.

(5) The student identifies and investigates different greenhouse structures, interior layout, and construction factors. The student is expected to:

(A) compare greenhouse styles and construction materials;

(B) compare and select greenhouse coverings;

(C) analyze the costs associated with greenhouse construction;

(D) identify factors to consider when constructing a greenhouse such as greenhouse orientation and access to electricity, roads, drainage, water, and plumbing;

(E) identify and describe additional growing structures such as cold frames and hotbeds;

(F) design a layout of essential areas of a greenhouse such as receiving, storage, seedling propagation, crop production, harvest, sanitation, packaging, labeling, and distribution areas;

(G) describe the adaptation of greenhouse concepts to plant production in controlled environments such as indoor vertical farms and freight containers;

(H) differentiate between passive and controlled greenhouses; and

(I) analyze greenhouse operation regulations enacted by regulatory agencies such as the Texas Department of Agriculture, the United States Department of Agriculture, and local agencies.

(6) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:

(A) describe various environmental factors controlled in the greenhouse;

(B) determine and calculate factors used in heating and cooling a greenhouse;

(C) describe the effects of greenhouse climate conditions such as ventilation, carbon dioxide generation, and humidity on plant growth in the greenhouse;

(D) explore the importance of light characteristics on the production of greenhouse crops; and

(E) compare open and closed environmental systems in the greenhouse such as irrigation, lighting, climate control, carbon dioxide injection, and fertilization.

(7) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:

(A) explain how to operate and maintain heating, cooling, and ventilation systems in a greenhouse;

(B) explain how to operate and maintain electrical systems in a greenhouse;

(C) explain how to operate and maintain various water systems in a greenhouse;

(D) explain how to operate lighting systems in a greenhouse; and

(E) illustrate and describe the integration of automated control systems such as lighting, cooling, irrigation, fertigation, and carbon dioxide injection.

(8) The student identifies and classifies plants used in greenhouse production. The student is expected to:

(A) classify plants commonly used in greenhouses based on taxonomic systems;

(B) identify and compare plant anatomical structures and functions that are used in plant identification; and

(C) analyze plant classifications based on cropping schedules and market demand for greenhouse crops.

(9) The student identifies and investigates greenhouse crop production factors. The student is expected to:

(A) identify and explain the chemical and physical differences in greenhouse media components;

(B) compare greenhouse growing mixes for factors, including drainage and nutrient-holding capacity;

(C) compare different containers, benches, and production equipment used in greenhouses;

(D) evaluate different methods of watering greenhouse crops based on the type of crop, stage of development, cost-effectiveness, and weather;

(E) analyze the effect of nutrients on greenhouse plant growth;

(F) diagnose common nutrient deficiency symptoms found in greenhouse crops; and

(G) develop fertilization plans that address greenhouse crop needs and environmental impacts.

(10) The student propagates greenhouse crops. The student is expected to:

(A) analyze different methods of propagating greenhouse crops using sexual and asexual propagation methods;

(B) propagate greenhouse crops using sexual and asexual methods;

(C) investigate and explain physiological conditions that affect plant propagation; and

(D) analyze the effects of plant growth regulators on plant growth and development.

(11) The student investigates pest and disease identification and control methods in the greenhouse environment. The student is expected to:

(A) identify and classify common diseases, insects, pathogens, and weeds in the greenhouse;

(B) identify essential components of an integrated pest management plan in controlling an insect, pathogen, or weed problem;

(C) identify appropriate greenhouse pesticide application techniques and equipment; and

(D) analyze pesticide labeling and safety data sheets.

(12) The student performs greenhouse management business procedures. The student is expected to:

(A) identify and develop effective marketing strategies to market greenhouse crops to increase profits;

(B) develop appropriate methods for preparing greenhouse crops for various means of transport;

(C) analyze materials, labor, and administrative costs related to greenhouse production;

(D) analyze methods used to maintain crop quality during marketing and transport; and

(E) prepare a production schedule for a greenhouse crop from establishment to market within a specific timeline.

Source: The provisions of this §127.55 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.56. Viticulture (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisites: at least one credit in a course from the Agriculture, Food, and Natural Resources Career Cluster. Recommended prerequisite: Principles of Agriculture, Food and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Viticulture is a course designed to provide students with the academic and technical knowledge and skills that are required to pursue a career related to vineyard operations, grape cultivation, and related industries that contribute to the Texas economy. Students in Viticulture develop an understanding of grape production techniques and practices while emphasizing environmental science related to production decisions. To prepare for success, students need opportunities to learn, reinforce, experience, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career and entrepreneurship opportunities for a chosen occupation in the field of viticulture and develop a plan for obtaining the education, training, and certifications required;

(B) model professionalism by continuously exhibiting appropriate work habits, solving problems, taking initiative, communicating effectively, listening actively, and thinking critically;

(C) model appropriate personal and occupational safety and health practices and explain the importance of established safety and health protocols for the workplace;

(D) analyze and interpret the rights and responsibilities, including ethical conduct and legal responsibilities, of employers and employees; and

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student understands the history and progression of the viticulture industry. The student is expected to:

(A) trace how relevant historical advancements in viticulture relate to current industry practices;

(B) research and identify emerging technology in the viticulture industry; and

(C) identify current trends in the viticulture industry.

(5) The student explains the production cycle and basic physiology of grapevines. The student is expected to:

(A) describe asexual propagation techniques used in the production of domesticated grapes;

(B) identify the major vegetative and reproductive structures of grapevines;

(C) explain the role of rootstock in grapevine production;

(D) describe the annual vegetative growth and reproductive cycle of grapevines;

(E) explain how environmental conditions influence grapevine vegetative and reproductive growth; and

(F) describe the use of training systems in vineyard production.

(6) The student analyzes vineyard design and development. The student is expected to:

(A) identify the site characteristics required for successful vineyard production;

(B) evaluate the soil and climatic characteristics of a potential vineyard site to determine if it is suitable for vineyard production;

(C) identify and research successful vineyards in other parts of the world with soil and climatic characteristics similar to local conditions; and

(D) develop a vineyard design and installation plan.

(7) The student evaluates technology and practices used for vineyard frost protection. The student is expected to:

(A) describe the environmental conditions that lead to plant cold injury;

(B) identify frost damage in grapevines and effective frost damage mitigation techniques;

(C) differentiate advection and radiation frost events;

(D) evaluate the effectiveness of passive frost protection techniques employed in vineyards;

(E) evaluate the effectiveness of active frost protection techniques employed in vineyards; and

(F) analyze the cost effectiveness of frost protection systems.

(8) The student demonstrates vineyard management techniques. The student is expected to:

(A) identify and demonstrate safe and appropriate usage of vineyard tools;

(B) describe and demonstrate dormant pruning of grapevines to minimize crop loss due to frost;

(C) describe grapevine-training techniques such as spur and cane pruning; and

(D) explain the use of technology in modern vineyard production systems such as drones, robotics, and smart irrigation.

(9) The student develops an integrated pest management plan for vineyards. The student is expected to:

(A) identify common insect pests and diseases found in vineyards;

(B) identify common animal pests that are problematic in vineyards;

(C) evaluate the components of integrated pest management used in vineyards;

(D) explain cultural practices for vineyard pest control; and

(E) describe the safe and effective use of pesticides in vineyards, ensuring compliance with federal and state regulations.

(10) The student examines soil properties and soil fertility as they relate to vineyard production systems. The student is expected to:

(A) explain the concepts of soil type, soil texture, and basic soil chemistry;

(B) identify the essential nutrients required by grapevines;

(C) describe the relationship between soil properties and fertility;

(D) calculate the fertilizer needs of grapevines;

(E) develop and present a vineyard fertilization plan; and

(F) identify the practices of organic vineyards related to soil properties and fertility.

(11) The student evaluates water requirements of vineyards and associated climatic factors. The student is expected to:

(A) evaluate grapevine water requirements;

(B) compare grape varieties that thrive in local soil and weather conditions;

(C) analyze the influence of soil properties and climate on vineyard water usage;

(D) describe irrigation strategies used in vineyards;

(E) identify the water resources required for vineyards;

(F) describe methods used to determine soil moisture; and

(G) calculate the irrigation needs of vineyards based on soil and climate.

Source: The provisions of this §127.56 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.57. Advanced Floral Design (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Floral Design. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) In Advanced Floral Design, students gain advanced knowledge and skills specifically needed to enter the workforce as floral designers or as freelance floral event designers, with an emphasis on specialty designs and occasion-specific designs and planning. Students are also prepared to enter postsecondary certification or degree programs in floral design or special events design. Students build on the knowledge base from Floral Design and are introduced to more advanced floral design concepts. In addition, students gain knowledge of the design elements and planning techniques used to produce unique specialty floral designs that support the goals and objectives of an occasion or event.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career and entrepreneurship opportunities for a chosen occupation in the field of floral design and develop a plan for obtaining the education, training, and certifications required;

(B) model professionalism by continuously exhibiting appropriate work habits, solving problems, taking initiative, communicating effectively, listening actively, and thinking critically;

(C) model appropriate personal and occupational safety and health practices and explain the importance of established safety and health protocols for the workplace;

(D) analyze and interpret the rights and responsibilities, including ethical conduct and legal responsibilities, of employers and employees; and

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student understands advanced floral design elements and principles. The student is expected to:

(A) describe floral materials using advanced botanical terminology;

(B) identify the symbolic meaning of flowers and plants used in floral design such as love, friendship, courage, and innocence;

(C) compare the characteristics of contemporary floral design styles such as abstract, assemblage, asymmetrical, Biedermeier, cascade/waterfall, hedgerow, parallel, synergistic, submerged, topiary, and vegetative;

(D) illustrate ideas for arrangements using contemporary floral design styles from direct observation, experience, and imagination;

(E) identify and explain various basing design techniques, including layering, terracing, pavé, clustering, and pillowing; and

(F) identify and explain advanced focal-emphasis design techniques, including grouping, banding, binding, shadowing, sequencing, framing, zoning, and parallelism.

(5) The student demonstrates advanced design techniques using fresh and permanent floral designs. The student is expected to:

(A) plan and design fresh flower and permanent botanical arrangements using various contemporary design styles such as abstract, assemblage, asymmetrical, Biedermeier, cascade/waterfall, hedgerow, parallel, synergistic, submerged, topiary, and vegetative;

(B) design and evaluate floral designs that exhibit various basing design techniques such as layering, terracing, pavé, clustering, and pillowing; and

(C) design and evaluate floral designs using advanced focal-emphasis design techniques such as grouping, banding, binding, shadowing, sequencing, framing, zoning, and parallelism.

(6) The student describes effective design planning and the processes used to create floral designs for specific occasions and events. The student is expected to:

(A) describe and apply proper planning techniques in floral design;

(B) identify and execute the steps of effective planning used to design floral arrangements for specific occasions such as weddings and funerals;

(C) analyze and discuss contingency factors when planning large-volume floral designs; and

(D) identify effective consultation practices to determine customers' expectations for design, including budget.

(7) The student applies key floral design elements and principles to enhance the experience of specific occasions and events. The student is expected to:

(A) identify floral design terminology used for specific occasions, including weddings and funerals;

(B) apply elements and principles of floral design to wedding and funeral arrangements such as bouquets, boutonnieres, corsages, sprays, and pedestal arrangements;

(C) describe current floral design trends;

(D) use and maintain floral design tools; and

(E) create examples of appropriate occasion-specific floral designs from direct observation, experience, and imagination.

(8) The student demonstrates effective planning of occasion-specific floral designs from the conceptual stage through completion. The student is expected to:

(A) conduct a floral design consultation to gather details, including occasion, budget, formality, and theme;

(B) evaluate and select floral arrangements that achieve the objectives and budget expectations of an occasion;

(C) develop a proposal that showcases floral arrangements appropriate for the selected occasion;

(D) develop a production schedule that allows sufficient time for the design, creation, installation, and disassembly of floral arrangements;

(E) develop a procurement plan to ensure necessary resources are obtained within a specified budget and timeframe; and

(F) implement a floral design plan through completion and evaluate the results of the plan.

(9) The student demonstrates business management and merchandising skills necessary for floral design and freelance floral event design professionals. The student is expected to:

(A) calculate mark-up of floral products and design services;

(B) evaluate the cost-effectiveness and profitability of pricing policies;

(C) develop and negotiate contracts for floral services;

(D) formulate a floral budget, including per-item total costs;

(E) describe and demonstrate proper customer service skills for a floral business;

(F) identify the benefits of establishing business relationships with a variety of vendors such as wedding venues, funeral homes, wholesale florists, and wire services; and

(G) analyze basic marketing principles and procedures used in the floral industry such as displays and advertisements.

(10) The student explains the significance of professional organizations to the floral design industry. The student is expected to:

(A) identify industry-related professional organizations; and

(B) describe the benefits of participating in professional floral organizations and earning industry-based certifications.

Source: The provisions of this §127.57 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.58. Advanced Plant and Soil Science (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology; either Chemistry or Integrated Physics and Chemistry (IPC); Algebra I; Geometry; and either Horticultural Science, Greenhouse Operation and Production, or Floral Design. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Advanced Plant and Soil Science provides a way of learning about the natural world. In this course, students learn how plant and soil science has influenced a vast body of knowledge, that there are still applications to be discovered, and that plant and soil science is the basis for many other fields of science. To prepare for careers in plant and soil science, students must attain academic knowledge and skills, acquire technical knowledge and skills related to plant and soil science and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(5) Scientific hypotheses and theories. Students are expected to know that:

(A) hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and

(B) scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.

(6) Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.

(A) Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.

(B) Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.

(7) Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).

(8) Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide tools for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(9) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(10) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career and entrepreneurship opportunities for a chosen occupation in the field of plant science and develop a plan for obtaining the education, training, and certifications required;

(B) model professionalism by continuously exhibiting appropriate work habits, solving problems, taking initiative, communicating effectively, listening actively, and thinking critically;

(C) model appropriate personal and occupational safety practices and explain the importance of established safety and health protocols for the workplace;

(D) analyze and interpret the rights and responsibilities, including ethical conduct and legal responsibilities, of employers and employees; and

(E) describe and demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship, community leadership, civic engagement, and agricultural awareness and literacy.

(2) Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;

(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;

(D) use appropriate tools such as microscopes, measuring equipment, sensors, plant propagation tools, soil testing kits, and calculators;

(E) collect quantitative data using the International System of Units (SI) and qualitative data as evidence;

(F) organize quantitative and qualitative data using graphs and charts;

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

(H) distinguish between scientific hypotheses, theories, and laws.

(3) Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

(C) use mathematical calculations to assess quantitative relationships in data; and

(D) evaluate experimental and engineering designs.

(4) Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(5) Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student;

(B) relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content; and

(C) research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

(6) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(7) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(8) The student understands interrelationships between plants, soil, and people in historical and current contexts. The student is expected to:

(A) research and document major historical milestones related to plant and soil science in human civilization;

(B) explain how humans have influenced plant selection and how plant selection has influenced civilization's development;

(C) analyze the effect of soil properties on settlement of civilizations and migration; and

(D) investigate and explain how plants have shaped major world economies.

(9) The student identifies how plants grow and how specialized cells, tissues, and organs develop. The student is expected to:

(A) describe the unique structure and function of organelles in plant cells;

(B) explain the growth and division of plant cells;

(C) compare cells from different parts of the plant, including roots, stems, flowers, and leaves, to show specialization of structures and functions; and

(D) illustrate the levels of cellular organization in plants.

(10) The student develops a knowledge of plant anatomy and functions. The student is expected to:

(A) describe the structure and function of plant parts, including roots, stems, leaves, flowers, fruits, and seeds;

(B) compare the anatomy of monocots and dicots;

(C) compare the various propagation methods for plants; and

(D) identify the functions of modified plant structures such as tubers, rhizomes, pseudo stems, and pitchers.

(11) The student develops an understanding of plant physiology and nutrition. The student is expected to:

(A) explain the metabolic process of photosynthesis and cellular respiration;

(B) describe the role of mineral nutrition in the soil for plant development;

(C) identify the essential nutrients in soil; and

(D) describe the role of macronutrients and micronutrients in plants.

(12) The student analyzes soil science as it relates to plant and human activity. The student is expected to:

(A) explain soil formation;

(B) investigate and document the properties of soils, including texture, horizons, structure, color, parent materials, and fertility;

(C) identify and classify soil orders;

(D) explain methods of soil conservation such as crop rotation, mulching, terracing, cover cropping, and contour plowing;

(E) describe the application of soil mechanics to buildings, landscapes, and crop production;

(F) research and explain soil management practices such as tillage trials and sustainable soil management practices;

(G) practice and explain soil evaluations related to experiential activities such as land judging;

(H) evaluate and determine soil health through soil testing; and

(I) analyze concepts of soil ecology.

(13) The student maps the process of soil formation influenced by weathering, including erosion processes due to water, wind, and mechanical factors influenced by climate. The student is expected to:

(A) illustrate the role of weathering in soil formations;

(B) distinguish between chemical weathering and mechanical weathering;

(C) identify geological formations that result from differing weathering processes; and

(D) describe the role of biotic factors in soil formation.

(14) The student explains the relationship of biotic and abiotic factors within habitats and ecosystems and their effects on plant ecology. The student is expected to:

(A) identify and define plant populations, ecosystems, communities, and biomes;

(B) distinguish between native and introduced plants in an ecosystem;

(C) investigate and describe characteristics of native and introduced plants;

(D) make observations and compile data about fluctuations in abiotic cycles;

(E) describe the effects of fluctuations in abiotic cycles on local ecosystems; and

(F) describe potential positive and negative impacts of human activity such as pest control, hydroponics, monoculture planting, and sustainable agriculture on ecosystems.

(15) The student evaluates components of plant science as they relate to crop production and advancements. The student is expected to:

(A) analyze the genetics and evolution of various crops;

(B) identify and classify plants according to taxonomy;

(C) identify characteristics related to seed quality, including mechanical damage, viability, and grade;

(D) identify plant pests and diseases using laboratory equipment such as microscopes, test kits, and technology;

(E) evaluate the effectiveness of plant management practices, including germination tests, plant spacing trials, and fertilizer tests;

(F) analyze trends in crop species and varieties grown locally in Texas and the United States and how trends affect producers and consumers; and

(G) investigate and identify recent advancements in plant and soil science such as biotechnology, artificial intelligence, and drone, infrared, and sensor technologies.

(16) The student describes the relationship between resources within environmental systems. The student is expected to:

(A) summarize and evaluate methods of land use and management;

(B) identify sources, quality, and conservation of water in plant production;

(C) explore and describe conservation practices such as rainwater collection, water-conserving irrigation systems, and use of biofuels;

(D) analyze and evaluate the economic significance and interdependence of components of the environment;

(E) debate the impact of human activity and technology on soil health and plant productivity;

(F) research and summarize the impact of natural disasters on soil health and plant productivity; and

(G) explain how regional changes in the environment may have a global effect.

(17) The student describes the dynamics of soil on watersheds and its effects on plant growth and production. The student is expected to:

(A) identify and record the characteristics of a local watershed such as average annual rainfall, runoff patterns, aquifers, location of water basins, and surface reservoirs; and

(B) analyze the impact of floods, drought, irrigation, urbanization, and industrialization in a watershed.

(18) The student analyzes plant and soil science as it relates to plant and soil relationships affecting the production of food, fiber, and other economic crops. The student is expected to:

(A) explain the importance and interrelationship of soil and plants;

(B) compare soil and plants in agricultural and urban settings;

(C) explain growing plants without soil (hydroponic techniques); and

(D) evaluate advantages and disadvantages of hydroponics.

(19) The student demonstrates skills related to the human, scientific, and technological dimensions of crop production and the resources necessary for producing domesticated plants. The student is expected to:

(A) describe the growth and development of major agricultural crops in Texas such as cotton, corn, sorghum, sugarcane, wheat, and rice;

(B) apply principles of genetics and plant breeding to plant production;

(C) illustrate the development of new crop varieties that are developed over time;

(D) design and conduct investigations to test principles of genetics; and

(E) identify and test alternative growing methods such as hydroponics and aquaponics used in plant production.

Source: The provisions of this §127.58 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.59. Geographic Information Systems for Agriculture (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisites: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources career cluster focuses on the essential elements of life, food, water, land, and air. This career cluster includes occupations ranging from farmer, rancher, and veterinarian to geologist, land conservationist, and florist.

(3) Geographic Information Systems for Agriculture is a course designed to provide students with the academic and technical knowledge and skills that are required to pursue a career as a precision agriculture specialist, a crop specialist, an independent crop consultant, a nutrient management specialist, a physical scientist, a precision agronomist, a precision farming coordinator, a research agricultural engineer, or a soil fertility specialist. Students will learn to use computers to develop or analyze maps of remote sensing to compare physical topography with data on soils, fertilizer, pests, or weather.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience as an experiential learning activity;

(B) use appropriate record-keeping skills in a supervised agricultural experience;

(C) participate in youth agricultural leadership opportunities;

(D) review and participate in a local program of activities; and

(E) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(2) The student explains the current applications of geographic information system (GIS) in agriculture, food, and natural resources and identifies the future need for GIS in precision agriculture. The student is expected to:

(A) research and compare current and emerging careers related to GIS in agriculture and natural resource fields;

(B) identify and analyze applications of GIS technologies in agriculture, food, and natural resources;

(C) explain GIS data as it pertains to agriculture; and

(D) describe the types of licensing, certification, and credentialing requirements related to GIS occupations.

(3) The student analyzes geographic information and spatial data types in agriculture, food and natural resources. The student is expected to:

(A) identify the uses of GIS in agriculture;

(B) identify the GIS terminology used in agriculture applications, such as spatial analysis, remote sensing, georeferencing, geostatistics, and geocoding;

(C) identify GIS models and representations in precision agriculture;

(D) explain GIS representations of geographic phenomena in soil types, topography, and farming management;

(E) organize and describe spatial data in yield monitoring for crop planning; and

(F) analyze GIS data sources and ethics in agriculture.

(4) The student uses agriculture, food, and natural resources GIS tools. The student is expected to:

(A) identify hardware and software for agriculture data management and processing;

(B) explain spatial data capture and preparation, spatial data storage and maintenance, spatial query and analysis, and spatial data presentation for agriculture; and

(C) describe remote sensing tools and technologies used in precision farming, including unmanned aerial support (UAS), unmanned aerial vehicles (UAV), and global positioning satellite (GPS).

(5) The student integrates spatial referencing and global positioning techniques in agriculture, food, and natural resources. The student is expected to:

(A) explain spatial referencing systems and projections for capturing and displaying agricultural data; and

(B) identify uses for satellite-based positioning to increase agriculture proficiency.

(6) The student evaluates applications for spatial data entry and preparation for agricultural analysis. The student is expected to:

(A) analyze agricultural GIS spatial data; and

(B) explain and analyze data accuracy and precision related to using GIS in agriculture.

(7) The student performs agricultural spatial data analysis. The student is expected to:

(A) analyze GIS maps of agricultural fields to determine variables that would impact maximum crop yields;

(B) compare vector and raster-based data for agricultural analysis; and

(C) explain types of GIS analysis used in natural resource management.

(8) The student creates spatial data visualizations and cartographic models. The student is expected to:

(A) identify types of GIS maps used in agriculture;

(B) develop GIS maps for various types of agricultural data;

(C) identify and explain the purpose of cartographic symbols used in precision farming; and

(D) analyze visual data and explain how the data is used in agricultural decision making.

Source: The provisions of this §127.59 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.61. Beekeeping and Honey Processing (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisites: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources career cluster focuses on the essential elements of life, food, water, land, and air. This career cluster includes occupations ranging from farmer, rancher, and veterinarian to geologist, land conservationist, and florist.

(3) Beekeeping and Honey Processing is a course designed to provide students with the academic and technical knowledge and skills that are required to pursue a career related to beekeeping, apiary operations, honey harvesting, and related industries. Beekeeping and honey processing is a vital part of the United States agricultural economy. To prepare for success in Beekeeping and Honey Processing, students need opportunities to learn, reinforce, experience, apply, and transfer their knowledge and skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student develops a supervised agriculture experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience as an experiential learning activity;

(B) use appropriate record-keeping skills in a supervised agricultural experience;

(C) participate in youth agricultural leadership opportunities;

(D) review and participate in a local program of activities; and

(E) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(2) The student explores the biology of bee behavior. The student is expected to:

(A) identify different types and life spans of bees;

(B) explain the different roles assumed by the different types of honeybees, including the queen, drones, and workers; and

(C) describe honeybee development, castes, behavior, division of labor, and the bee life cycle, including larval, pupal, and adult stages.

(3) The student analyzes beehive design and development. The student is expected to:

(A) identify the site characteristics required for successful beehive production;

(B) analyze factors such as climatic characteristics and food sources to determine the suitability of a beehive site for honey harvesting and pollination;

(C) research and compare the conditions of successful beehives in other parts of the world with similar local conditions; and

(D) develop a beehive design and installation plan, including consideration of sunlight, access to water, wind, topography, human and animal habitation, and good neighbor policy.

(4) The student evaluates technology and best practices for weatherizing a beehive. The student is expected to:

(A) explain the environmental conditions that lead to bee colonies adapting to extremes in climate conditions;

(B) compare seasonal strategies for proper beehive management and describe why best management practices change based on the seasons, including spring, summer, autumn, and winter; and

(C) explain practices for winterizing hives.

(5) The student demonstrates beehive management techniques. The student is expected to:

(A) identify the tools of an apiarist and demonstrate safe and proper usage of tools;

(B) demonstrate inspection of a beehive and describe necessary equipment, including a bee suit, a smoker, and a comb replacement;

(C) explain beehive training techniques, including diagnosing the brood pattern, adding brood comb to the nest, switching colonies, feeding bees, providing water, removing old combs, extracting honey, and caging queens;

(D) identify safety precautions in the field while handling live bees, caring for the colonies in the hives, and extracting honey and honeycomb;

(E) explain the proper methods of bee handling to prevent harm to handlers and others; and

(F) describe personal protective equipment used to reduce the risk of accidents.

(6) The student develops an integrated pest management plan for beehives. The student is expected to:

(A) identify the major insect pests and diseases of honeybees;

(B) compare the components of honeybee integrated pest management; and

(C) describe the safe usage of pesticides in honeybee hives.

(7) The student examines honey harvesting and the use of proper equipment and tools. The student is expected to:

(A) describe the tools and equipment used in honey production, including a bee brush, fume board, honey drip tray, nectar detector, escape board, and extractor;

(B) explain the safe use of honey harvesting tools;

(C) explain the use of technology in modern honey production systems; and

(D) explain the appropriate procedures used to extract honey.

(8) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:

(A) identify food industry inspection standards, including hazard analysis and critical control points;

(B) identify the appropriate chemicals used in the food industry, specifically in honey processing;

(C) identify safety and governmental regulations involved in the processing and labeling of foods, including honey;

(D) explain the procedures relating to the safe manufacture of foods through hygienic food handling and processing;

(E) develop and maintain sanitation schedules; and

(F) identify food safety laws that impact the bee industry.

(9) The student demonstrates an in-depth understanding of beekeeping, bee hauling, and honey processing businesses, including production, processing, marketing, sales, and distribution. The student is expected to:

(A) describe the roles of an entrepreneur in beekeeping, bee hauling, and honey processing operations;

(B) differentiate between small, medium, and large-sized bee and honey businesses;

(C) create a list of tools and equipment needed to start a beekeeping operation and develop a budget to start a beekeeping business; and

(D) develop a business model for beekeeping, honey production, and honey processing.

(10) The student completes the process for development, implementation, and evaluation of a marketing plan and a financial forecast for beekeeping. The student is expected to:

(A) identify and explain the target market for honey-related products;

(B) create and conduct a customer survey;

(C) analyze the customer survey results;

(D) identify modification recommendations based on customer survey results;

(E) complete a detailed honey-related products market analysis;

(F) analyze and explain different types of marketing strategies;

(G) describe a social media marketing campaign for honey-processed products; and

(H) develop and explain a projected income statement, cash budget, balance sheet, and projected sources and uses of funds statement.

(11) The student explains the scope and nature of distribution of honey-related products. The student is expected to:

(A) explain effective distribution activities, including transportation, storage, product handling, and inventory control;

(B) explain how distribution can add value to goods and services, which can be protected by intellectual property; and

(C) analyze distribution costs for honey-related products.

Source: The provisions of this §127.61 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.85. Agricultural Laboratory and Field Experience (One Credit), Adopted 2015.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(b) General requirements. This course is recommended for students in Grades 11 and 12 as a corequisite course for students participating in a coherent sequence of career and technical education courses in the Agriculture, Food, and Natural Resources or Energy career clusters. This course provides an enhancement opportunity for students to develop the additional skills necessary to pursue industry certification.

(1) Recommended prerequisite: a minimum of one credit from a course in the Agriculture, Food, and Natural Resources or Energy career clusters.

(2) Corequisite: this course must be taken concurrently with a corequisite course from the Agriculture, Food, and Natural Resources or Energy career clusters and may not be taken as a stand-alone course. The following courses are permitted as corequisites:

(A) Agribusiness Management and Marketing;

(B) Livestock and Poultry Production;

(C) Veterinary Science;

(D) Food Technology and Safety;

(E) Food Processing;

(F) Wildlife, Fisheries, and Ecology Management;

(G) Forestry and Woodland Ecosystems;

(H) Range Ecology and Management;

(I) Floral Design;

(J) Horticultural Science;

(K) Greenhouse Operation and Production;

(L) Agricultural Mechanics and Metal Technologies;

(M) Agricultural Structures Design and Fabrication;

(N) Agricultural Equipment Design and Fabrication;

(O) Agricultural Power Systems;

(P) Oil and Gas Production I;

(Q) Oil and Gas Production II;

(R) Energy and Natural Resource Technology; and

(S) Advanced Energy and Natural Resource Technology.

(3) Districts are encouraged to offer this lab in a consecutive block with the corequisite course to allow students sufficient time to master the content of both courses. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Agricultural Laboratory and Field Experience is designed to provide students a laboratory and/or field experience opportunity. To prepare for careers in agriculture, food, and natural resources, students must acquire knowledge and skills that meet entry requirements and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer academic knowledge and technical skills in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) investigate career development and entrepreneurship opportunities in agriculture, food, and natural resources;

(B) apply competencies related to resources, information, and interpersonal skills;

(C) practice personal and occupational health and safety practices in the workplace;

(D) examine employer expectations and exhibit appropriate work habits;

(E) develop good characteristics of citizenship, including advocacy, stewardship, and community leadership; and

(F) pursue appropriate licensing, certification, and credentialing requirements.

(2) The student uses technology to research a project. The student is expected to:

(A) effectively use search engines, databases, and other digital electronic tools to locate information;

(B) evaluate quality, accuracy, completeness, reliability, and currency of information from any source;

(C) prepare, organize, present, and apply independent research; and

(D) accept constructive criticism and revise personal views when warranted by valid evidence.

(3) The student develops an elevated aptitude for the essential knowledge and skills listed for the corequisite course. The student is expected to:

(A) demonstrate deeper understanding of the corequisite course;

(B) develop mastery of hands-on skills at an industry-accepted standard; and

(C) exhibit progress toward achieving industry-recognized documentation of specific expertise in an agriculture, food, and natural resources field or skill.

Source: The provisions of this §127.85 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.86. Practicum in Agriculture, Food, and Natural Resources (Two Credits), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 11 and 12. The practicum course is a paid or an unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Agriculture, Food, and Natural Resources Career Cluster. Prerequisite: a minimum of two credits with at least one course in a Level 2 or higher course from the Agriculture, Food, and Natural Resources Career Cluster. Students shall be awarded two credits for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and

resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products and resources.

(3) Practicum in Agriculture, Food, and Natural Resources is designed to give students supervised practical application of knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experiences such as employment, independent study, internships, assistantships, mentorships, or laboratories. To prepare for careers in agriculture, food, and natural resources, students must attain academic knowledge and skills, acquire technical knowledge and skills related to the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) adhere to policies and procedures;

(B) demonstrate positive work behaviors, including punctuality, time management, initiative, and cooperation;

(C) apply constructive criticism and critical feedback from supervisor and peers to work performance;

(D) apply ethical reasoning to a variety of situations in order to make ethical decisions;

(E) model professional appearance, including using appropriate dress, grooming, and personal protective equipment;

(F) comply with safety rules and regulations to maintain safe working conditions and environments;

(G) demonstrate a positive and productive work ethic by performing assigned tasks as directed; and

(H) comply with all applicable rules, laws, and regulations in a consistent manner.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student applies concepts of critical thinking and problem solving. The student is expected to:

(A) analyze elements of a problem to develop creative and innovative solutions that are practical for the agricultural workplace;

(B) compare alternative ways to solve a problem in the agricultural workplace; and

(C) analyze data to inform agriculture operational decisions or activities.

(5) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:

(A) analyze leadership characteristics such as trustworthiness, positive attitude, integrity, and work ethic;

(B) demonstrate teamwork processes such as team building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution in the agricultural workplace;

(C) demonstrate responsibility for shared group and individual work tasks in the agricultural workplace;

(D) establish and maintain effective working relationships using interpersonal skills to accomplish objectives; and

(E) demonstrate respect for all individuals.

(6) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:

(A) apply appropriate content knowledge, technical concepts, and vocabulary to analyze information and follow directions;

(B) use professional communication skills when receiving and conveying information in the agricultural workplace;

(C) identify and analyze information contained in informational texts, internet sites, or technical materials in the agricultural workplace;

(D) evaluate verbal and nonverbal cues and behaviors to enhance communication in the agricultural workplace;

(E) apply active listening skills to receive and clarify information in the agricultural workplace; and

(F) produce effective written and oral communication in the agricultural workplace.

(7) The student practices financial literacy as it relates to agriculture. The student is expected to:

(A) develop a budget based on personal financial goals;

(B) interpret the different components of a pay stub;

(C) read and reconcile bank statements;

(D) maintain financial records, including pay stubs, bank statements, and tax records;

(E) define credit and identify factors that impact a credit score;

(F) identify methods to prevent identity theft; and

(G) prepare or model how to complete a personal income tax form.

(8) The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources Career Cluster. The student is expected to:

(A) develop advanced technical knowledge and skills related to the individual occupational objective;

(B) develop an individualized training plan;

(C) evaluate personal strengths and weaknesses in technical skill proficiency;

(D) explain safe operation of tools and equipment related to the work experience;

(E) identify the cost of supplies, tools, equipment, or structures related to the work experience;

(F) identify the importance of maintaining supplies, tools, equipment, or structures related to the work experience; and

(G) identify opportunities for licensure or certification related to the chosen career path.

(9) The student documents technical knowledge and skills. The student is expected to:

(A) create a professional portfolio that includes:

(i) attainment of technical skill competencies;

(ii) licensures or certifications;

(iii) recognitions, awards, scholarships, or letters of recommendation;

(iv) extended learning experiences such as community service and active participation in career and technical student organizations and professional organizations;

(v) a summary of individual practicum experience;

(vi) a resume;

(vii) samples of work; and

(viii) an evaluation from the practicum supervisor; and

(B) present the portfolio to interested stakeholders.

Source: The provisions of this §127.86 adopted to be effective September 9, 2024, 49 TexReg 6994.

§127.87. Extended Practicum in Agriculture, Food, and Natural Resources (One Credit), Adopted 2024.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(b) General requirements. This course is recommended for students in Grades 11 and 12. The practicum course is a paid or an unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Agriculture, Food, and Natural Resources Career Cluster. Prerequisite: a minimum of two credits with at least one course in a Level 2 or higher course from the Agriculture, Food, and Natural Resources Career Cluster. Corequisite: Practicum in Agriculture, Food, and Natural Resources. This course must be taken concurrently with Practicum in Agriculture, Food, and Natural Resources and may not be taken as a stand-alone course. Students shall be awarded one credit for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

(3) Extended Practicum in Agriculture, Food, and Natural Resources, a corequisite course, is designed to give students supervised practical application of knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experiences such as

employment, independent study, internships, assistantships, mentorships, or laboratories. To prepare for careers in agriculture, food, and natural resources, students must attain academic knowledge and skills, acquire technical knowledge and skills related to the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) participate in a paid or an unpaid, laboratory or work-based application of previously studied knowledge and skills related to agriculture, food, and natural resources;

(B) participate in training, education, or preparation for licensure, certification, or other relevant credentials to prepare for employment;

(C) demonstrate professional standards needed to be employable such as punctuality, time management, initiative, and cooperation with increased fluency;

(D) demonstrate teamwork and conflict-management skills with increased fluency to achieve collective goals; and

(E) demonstrate planning and time-management skills and tools with increased fluency to enhance results and complete work tasks.

(2) The student develops a supervised agricultural experience program. The student is expected to:

(A) plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and

(B) use appropriate record-keeping skills in a supervised agricultural experience program.

(3) The student develops leadership skills through participation in an agricultural youth organization. The student is expected to:

(A) participate in youth agricultural leadership opportunities;

(B) review and participate in a local program of activities; and

(C) create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences.

(4) The student implements advanced professional communications strategies. The student is expected to:

(A) apply appropriate content knowledge, technical concepts, and vocabulary with increased fluency to analyze information and follow directions;

(B) demonstrate verbal communication consistently in a clear, concise, and effective manner;

(C) demonstrate non-verbal communication consistently and effectively; and

(D) analyze, interpret, and effectively communicate information, data, and observations.

(5) The student applies concepts of critical thinking and problem solving. The student is expected to:

(A) apply critical-thinking skills with increased fluency both independently and collaboratively to solve problems and make decisions; and

(B) demonstrate the use of content, technical concepts, and vocabulary when analyzing information and following directions.

(6) The student understands and applies proper safety techniques in the workplace. The student is expected to:

(A) demonstrate and consistently follow workplace safety rules and regulations;

(B) demonstrate safe operation of tools and equipment;

(C) troubleshoot equipment when operation fails;

(D) demonstrate safe handling and proper disposal of supplies;

(E) identify unsafe conditions or practices; and

(F) describe procedures for reporting and handling accidents and safety incidents.

(7) The student documents growth in advanced technical knowledge and skills. The student is expected to:

(A) develop advanced technical knowledge and skills related to the student's occupational objective;

(B) demonstrate growth of technical skill competencies;

(C) evaluate personal strengths and weaknesses in technical skill proficiency; and

(D) update a professional portfolio.

Source: The provisions of this §127.87 adopted to be effective September 9, 2024, 49 TexReg 6994.