

Career and Technical Education, Texas Essential Knowledge and Skills
Agriculture, Food, and Natural Resources Career Cluster
Agribusiness Program of Study
Work Group Final Recommendations

Prepared by the State Board of Education CTE TEKS Work Groups

Final Recommendations, January 2024

These recommendations reflect final recommendations for the career and technical education (CTE) Texas Essential Knowledge and Skills (TEKS) for the Agriculture, Food, and Natural Resources Career Cluster that have been recommended by State Board of Education’s TEKS work group for the Agribusiness Program of Study. Proposed additions are shown in green font with underlines (additions). Proposed deletions are shown in red font with strikethroughs (~~deletions~~). Text proposed to be moved from its current student expectation is shown in purple, italicized font with strikethrough (~~*moved text*~~) and is shown in the proposed new location in purple, italicized font with underlines (*new text location*).

Comments identified on the left-hand side link to explanations at the bottom of each page for the work group's proposed recommendations.

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§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) Principles of Agriculture, Food, and Natural Resources allows students to 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 skills and knowledge, 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 the field of 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' expectations, including appropriate work habits, ethical conduct, and legal responsibilities;
 - (E) describe and demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership; 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;
 - (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (3) The student identifies the impact of the agriculture industry in Texas and the United States. The student is expected to:
- comment¹(A) identify top agricultural commodities, exports, and imports in Texas and the United States; and
- (B) identify regions of commodity production such as corn, wheat, dairy, cattle, and cotton and explain the correlation between the region and the commodity.
- (4) 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 agricultural industry;
- comment²(B) analyze the impact-effect agriculture, food, and natural resources have on society;
- Comment³(C) identify and explain significant historical and current events that have impacted the and explain how they relate to the agricultural industry;
- Comment⁴(D) identify potential future scenarios, including potential global impacts for agriculture, food, and natural resources systems and their global impacts;
- (E) describe how emerging technologies such as online mapping systems, drones, and robotics impact agriculture, food, and natural resources; and
- (F) compare issues impacting agriculture, food, and natural resources such as biotechnology, employment, safety, environment, and animal welfare issues.
- (5) The student understands opportunities for leadership development in student organizations within agriculture, food, and natural resources. The student is expected to:
- (A) identify the history, structure, and development of and opportunities in the agriculture, food, and natural resources student organization(s) and opportunities within such organizations;
- (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.
- (6) 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

¹ SBOE feedback

² Clarifying vocabulary

³ Clarify SE

⁴ Redundant; clarify SE intent

- (C) identify and discuss the purpose of various professional agricultural organizations.
- (7) 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.
- comment⁵(8) The student applies a scientific process ~~appropriate research methods~~ to agriculture, food, and natural resources topics. The student is expected to:
- Comment⁶(A) identify and discuss major innovations ~~research and developments~~ in the fields of agriculture, food, and natural resources;
- (B) identify and select an important agricultural issue, question or principle ~~explain scientific practices~~;
 - (C) develop and test a hypothesis for the selected topic;
 - (D)(E) collect and analyze data for the selected agricultural issue, question or principle ~~apply scientific practices to independent research~~; and
 - (E)(D) present findings and conclusions based on research performed using scientific practices.
- (9) 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.
- (10) 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 apply techniques related to plant germination, growth, and development; and
 - (E) identify and use tools, equipment, and personal protective equipment common to plant and soil systems.
- (11) 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 selection, production, and marketing in the industry;
 - (B) define the roles and benefits of animals in agriculture;
 - (C) identify basic external anatomy of animals in agriculture;
 - (D) identify and classify breeds of livestock; and

⁵ To clarify the scientific process

⁶ Strengthen and clarify SE

- (E) identify and use tools, equipment, and proper handling techniques related to animal systems.
- (12) 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 global food production;
 - (C) compare various food labels;
 - (D) discuss current issues in food production; and
 - (E) use tools, equipment, and personal protective equipment common to food products and processing systems.
- (13) 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.
- (14) The student explains the principles of environmental and natural resources. The student is expected to:
- comment⁷(A) identify natural resources of economic importance to Texas agriculture ~~in Texas~~;
- Comment⁸(B) explain ~~discuss~~ the relationship between agriculture and environmental and natural resources;
- comment⁹(C) identify and describe regulations and governmental programs related to environmental and natural resources, including ~~such as~~ water regulations, pesticide usage, and ~~or~~ hunting and fishing laws;
- comment¹⁰(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.

⁷ SBOE feedback

⁸ Strengthen SE

⁹ Advisor feedback

¹⁰ SBOE feedback

§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 ~~skills~~ **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' expectations, including appropriate work habits, ethical conduct, and legal responsibilities;
 - (E) describe and demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership; 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;
 - (B) apply proper record-keeping skills as they relate to the 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.
- comment¹(3) The student analyzes ~~understands~~ 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) identify various leadership styles;
 - (C) prepare personal resumes, 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 from different cultures, genders, and backgrounds.
- (4) 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.
- (5) The student communicates effectively through various mediums with groups and individuals. The student is expected to:
- (A) identify elements of 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 influences the listener's understanding;
 - (C) evaluate aspects of presentations such as delivery, vocabulary, length, and purpose and modify based on audience;
 - (D) identify appropriate professional communications in agribusiness such as correct usage of grammar and punctuation;
 - (E) demonstrate the importance of communicating factual and unbiased data and information obtained from reliable sources;
 - (F) identify and demonstrate nonverbal communication skills and effective listening strategies; and
 - (G) discuss the importance of relationships and group organization.
- (6) The student understands the dynamics of group collaboration. The student is expected to:
- (A) define 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 a working knowledge of parliamentary procedures.

¹ Advisor feedback

- (7) The student applies principles of design in visual media as it relates 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 for a targeted purpose such as web design or print design in agribusiness; and
 - (D) interpret, evaluate, and justify artistic decisions in visual media related to agribusiness.
- (8) The student demonstrates journalistic writing in agriculture. The student is expected to:
- (A) differentiate news, feature, and opinion writing;
- Comment²(B) ~~identify~~create different forms of journalistic writing such as feature story, press release, and editorials; and
- Comment³(C) ~~identify and complete the steps to create draft~~ different forms of journalistic writing for a topic in agribusiness through use of the drafting process, including ~~selecting a layout selection, and revisions~~ revising, and editing ~~copy~~.
- (9) The student identifies new media being used in agriculture. The student is expected to:
- Comment⁴(A) identify effective use of emerging technology in agriculturalle communications;
 - (B) propose a media campaign for an agricultural product or business;
 - (C) distinguish between appropriate and inappropriate uses of media; and
 - (D) practice digital citizenship.
- Comment⁵(10) The student examines media laws and ethics related to agriculturalle communications. The student is expected to:
- (A) define free speech, free press, defamation, and libel within communications;
- Comment⁶(B) apply media laws and policies to agricultural communications;
- Comment⁷(C) identify and discuss ethical considerations related to media; and
- (D) evaluate and practice safe, legal, and responsible use of communication technologies.
- Comment⁸(11) The student examines crisis management and risk communication in agriculturalle 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.

² Scaffold skills needed within the SE

³ Clarify SE with scaffolding from 8.B.

⁴ Used as an adjective

⁵ Used as an adjective

⁶ Clarify SE

⁷ Create a more measurable student outcome

⁸ Used as an adjective

§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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.
 - (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;
 - (B) use appropriate record-keeping skills in a supervised agricultural experience program;

- (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.
- (3) 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 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.
- (4) 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.
- (5) 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;
 - comment¹(C) identify key economic principles of free enterprise ~~and how they impact agribusiness~~;
 - (D) explain the impact of key economic principles in agribusiness;
 - (E)(D) analyze the economic opportunities of agribusiness in a selected market or region; and
 - (F)(E) identify how agribusiness management and marketing impact consumer and market trends.
- (6) 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.
- (7) 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;

¹ To clarify SE

- Comment²(B) identify and examine the effects of government policies and regulations in making management decisions;
- comment³(C) describe the role of human resources in ensuring equality equity in the workplace;
- (D) identify employee rights and laws pertaining to the workplace; and
- comment⁴(E) identify the rights and responsibilities of land and property ownership laws pertaining to land and property ownership, such as uses, taxes, wills, and liabilities.
- (8) 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
- comment⁵(E) identify and analyze ~~analyze and identify~~ trends in agricultural commodity markets.
- (9) The student understands the efficiency aspects of agribusiness management. The student is expected to:
- Comment⁶(A) develop agricultural management and financial documents using management software or information technology ~~use management software and information technology to create agricultural management and financial documents such as spreadsheets and databases;~~
- (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.

² Increase SE measurability

³ SBOE feedback

⁴ To clarify SE

⁵ To clarify SE

⁶ Clarify intent and strengthen SE

§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.
 - comment¹(3) Agricultural Leadership, Research, and Communications focuses on challenging ~~agriculture, food, and natural resources~~ students to use higher level thinking skills, develop leadership abilities, ~~employ standard research principles~~, 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 ~~skills and knowledge~~, 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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.

¹ Clarifying

- (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;
 - (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (3) The student researches the qualities and characteristics of effective leaders within the agricultural industry. The student is expected to:
- Comment²(A) identify past agricultural leaders, explain ~~their~~ contributions made by the leaders, and define the impact of the ~~how their~~ contributions on ~~affected~~ the agricultural industry;
- (B) compare characteristics of effective leaders and explain how these traits enabled them to enact meaningful change; and
- Comment³(C) analyze and present the leadership skills of a present-day leader in the field of agriculture ~~and present findings~~.
- (4) The student describes organizational leadership structures at the local, state, and national levels. The student is expected to:
- Comment⁴(A) identify agricultural or governmental leadership positions in the local community and at the state and national levels, and explain and evaluate ~~their roles~~ how individuals in leadership positions and decisions made by leadership impact the agricultural industry; ~~and determine how their decisions affect production agriculture~~;
- Comment⁵~~(B)~~ ~~identify agricultural leadership positions at the state and national levels, explain their roles, and evaluate their impact~~;
- (B) ~~(C)~~ define and analyze the processes by which laws, regulations, and policies are developed at the local, state, and national levels; and
- Comment⁶(C) ~~(D)~~ evaluate a recent law affecting agriculture, food, and natural resources and analyze ~~its~~ the impact of recent law on local agriculture. ~~;~~ and
- ~~⁷(E) identify the format used by local, state, or national government in developing legislation.~~
- (5) The student develops skills needed to participate effectively in an organizational meeting. The student is expected to:
- comment⁸(A) describe ~~investigate~~ parliamentary laws, motions, and other procedures;
- comment⁹(B) apply parliamentary procedures to conduct organizational ~~business~~ 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

² Clarify SE
³ Clarify SE
⁴ Clarify SE
⁵ Combined with SE 4.A
⁶ Clarifying SE
⁷ Clarifying wording
⁸ Clarifying wording
⁹ SBOE feedback

- Comment¹⁰(E) analyze an organizational meeting such as a chapter, district, area, or state meeting or local board meeting and make recommendations to increase an organizational meeting's ~~its~~ overall efficiency and effectiveness.
- (6) 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;
- Comment¹¹(C) analyze the performance of a pre-identified skill and make recommendations to increase the performance for ~~its~~ overall efficiency and effectiveness; and
- (D) evaluate the relevance of real-world applications for the demonstration process.
- comment¹²(7) The student asks questions, identifies problems, and conducts investigations to answer questions ~~or design solutions~~ in agriculture. The student is expected to:
- (A) explain ~~identify~~ the importance of using scientific processes ~~practices~~;
- (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 ~~practices~~.
- comment¹³(8) The student examines the use of logic in debate and; analysis, ~~and dissemination~~ 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;
- Comment¹⁴(B) ~~use a variety of approaches to~~ construct logical affirmative and negative cases in a debate using a variety of approaches; and
- comment¹⁵(C) present an argument free of logical fallacies on a current agricultural issue.
- comment¹⁶(9) The student examines an agricultural topic to develop an advocacy communication plan. ~~identifies a controversial topic related to agriculture and develops an advocacy plan and presentation~~. The student is expected to:
- comment¹⁷(A) identify and research ~~research and identify~~ controversial areas of agriculture such as property rights, water rights, high fencing, cloning, and growth supplements;
- (B) identify ~~explain~~ and analyze all sides of a controversial agricultural issue; ~~and~~
- (C) develop an advocacy plan accounting for supporting and opposing arguments ~~and present the plan to diverse constituents;~~ ~~and~~
- (D) present the advocacy communication plan to an audience.

¹⁰ Clarify SE

¹¹ Clarify SE

¹² Clarifying wording

¹³ Clarify KS purpose

¹⁴ Clarify SE

¹⁵ Clarifying SE

¹⁶ Clarify KS purpose

¹⁷ Clarifying SE

- (10) The student presents and communicate ~~disseminates~~ agricultural information using various media. The student is expected to:
- comment¹⁸(A) identify historical and current ~~traditional~~ media outlets;
 - (B) research and write agricultural articles for publication in print media outlets;
 - comment¹⁹(C) develop and record scripts for radio broadcasts or podcast productions ~~to and~~ effectively communicate agricultural information using ~~audio~~ technology;
 - Comment²⁰(D) develop scripts for video broadcasts and communicate agricultural information effectively usinge a video broadcast ~~to communicate agricultural information~~;
 - ²¹comment(E) examine and critique various ~~new~~ media platforms; and
 - comment²²(F) communicate ~~disseminate~~ agricultural information in a responsible, professional manner via ~~new~~ media.
- (11) The student communicates ~~disseminates~~ agricultural information by means of ~~via~~ 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
 - comment²³(C) critique ~~group or self-critique~~ agricultural presentations through an examination of logical structure, smooth transitions, accurate evidence, and well-chosen details presentations.
- (12) The student evaluates and critiques ~~diverse~~ agricultural informational resources. The student is expected to:
- (A) identify processes used in the evaluation of a variety of ~~diverse~~ agricultural resources;
 - comment²⁴(B) evaluate ~~identify industry positions that require professional judgments on~~ agricultural resources for credibility, bias, and accuracy;
 - Comment²⁵(C) compare, ~~contrast~~, and evaluate agricultural resources and make professional decisions using reliable methods of approach; and
 - (D) explain and defend decisions made on the evaluation of agricultural resources.
- (13) The student understands the importance of agricultural education. The student is expected to:
- comment²⁶(A) identify and examine historical and present-day agricultural education;
 - comment²⁷(B) identify and research individuals ~~persons~~, governmental agencies, and advocacy groups that are responsible for agricultural information dissemination and ~~agricultural~~ education; and
 - (C) explain the importance of agricultural education.

¹⁸Clarifying SE

¹⁹SBOE feedback

²⁰Clarify SE

²¹Broaden SE

²²Broaden SE to include all forms of media

²³tighten SE; CCRS:ELAR III speaking B3

²⁴Clarify the need for evaluation of resources

²⁵Removed “contrast” as it is redundant

²⁶Broaden SE

²⁷Broaden SE

§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~~ ~~skills and knowledge~~, 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) complete tasks with high standards to ensure quality products and services;~~
 - ~~(E)(F)~~ model professional appearance, including using appropriate dress, grooming, and personal protective equipment;

Comment¹ ~~(E)~~ ~~(G)~~ comply with ~~practicum setting~~ safety rules and regulations to maintain safe working conditions and environments;

~~(G)~~ ~~(H)~~ demonstrate a positive and productive work ethic by performing assigned tasks as directed; and

~~(H)~~ ~~(I)~~ 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;
 - (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (3) 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 in 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.
- (4) 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;
- Comment² ~~(B)~~ ~~demonstrate teamwork skills through working cooperatively with others to achieve tasks in the agricultural workplace;~~
- (C) 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;
 - (D) demonstrate responsibility for shared group and individual work tasks in the agricultural workplace;
- Comment³ ~~(E)~~ establish and maintain effective working relationships using interpersonal skills ~~in order~~ to accomplish objectives ~~and tasks~~; and
- (F) demonstrate respect for all individuals.
- (5) 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;

¹ Clarify the SE

² Redundant. New 4.B. better explains the SE intention

³ Redundant

- (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.
- (6) 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.
- (7) 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 practicum;
 - Comment⁴(E) identify the cost of supplies, tools, equipment, or structures related to the work experience practicum;
 - (F) identify the importance of maintaining supplies, tools, equipment, or structures related to the work experience practicum; and
 - (G) identify opportunities for licensure or certification related to the chosen career path.
- (8) 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

⁴ Clarify SE

- (B) present the portfolio to interested stakeholders.

DRAFT

§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.

Comment¹(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 ~~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. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources.~~ 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 ~~skills and knowledge~~, 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;

¹ Alignment of prerequisite

- (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;
 - (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (3) 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.
- (4) 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.
- (5) 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.
- (6) 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.

Career and Technical Education, Texas Essential Knowledge and Skills
Agriculture, Food, and Natural Resources Career Cluster
Animal Science Program of Study
Work Group Final Recommendations

Prepared by the State Board of Education CTE TEKS Work Groups

Final Recommendations, January 2024

These recommendations reflect final recommendations for the career and technical education (CTE) Texas Essential Knowledge and Skills (TEKS) from the Agriculture, Food, and Natural Resources Career Cluster that have been recommended by State Board of Education’s TEKS review work group for the Animal Science Program of Study. Proposed additions are shown in green font with underlines (additions). Proposed deletions are shown in red font with ~~font with~~ strikethroughs (~~deletions~~). Text proposed to be moved from its current student expectation is shown in purple, italicized font with strikethrough (~~*moved text*~~) and is shown in the proposed new location in purple, italicized font with underlines (*new text location*).

Comments identified on the left-hand side link to explanations at the bottom of each page for the work group's proposed recommendations.

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§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' expectations, including appropriate work habits, ethical conduct, and legal responsibilities;
 - (E) describe and demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership; 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;
 - (B) use appropriate record-keeping skills as they relate to the 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.
- (3) 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.
- (4) The student explains the anatomy and physiology of equine. The student is expected to:
- Comment ¹(A) ~~identify and~~ 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
- Comment ²(C) compare normal and abnormal behavior of equine, such as emotional and physical.
- (5) 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;
- Comment ³(B) identify and describe sources of nutrients and classes of feed for equine;
- Comment ⁴(C) identify and research vitamins, minerals, and feed additives for equine;
- (D) formulate feed rations based on the nutritional requirements of equine; and
- Comment ⁵(E) identify and discuss equine feeding practices, grazing practices, and feed quality issues.
- (6) 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;
- Comment ⁶(B) identify signs, symptoms, ~~treatment~~, and prevention of equine diseases;
- Comment ⁷(C) identify parasites of equine and explain the signs, symptoms, treatment, and prevention of equine parasites;
- Comment-⁸(D) ~~identify behavioral conditions such as cribbing, heaving, and wind sucking; and~~
- (E) discuss methods of administering equine medications and calculating dosage.

¹ Advisor feedback

² Added to included all types of behaviors

³ Clarification

⁴ Clarification

⁵ Clarification

⁶ B/I feedback; Clarification

⁷ Clarification

⁸ Struck because it is included in 4C

- (7) The student analyzes the management of equine. The student is expected to:
- Comment ⁹(A) identify and select appropriate tools and equipment for grooming, riding, and training equine;
 - (B) identify and select appropriate tools and equipment for safe handling and restraining of equine;
 - (C) identify and select appropriate equine facilities such as housing, performance, veterinary, and reproduction;
 - (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, managing governmental regulations, and interpreting performance data; and
 - (G) explain methods of maintaining equine health and soundness such as hoof care and dental health.
- (8) The student discusses issues affecting the equine industry. The student is expected to:
- (A) describe biotechnology issues related to the equine industry;
 - Comment ¹⁰(B) research and ~~present~~ explain animal welfare policy pertaining to equine industries such as racing, rodeos, equestrian therapy, the global food market, and pharmaceutical research; and
 - Comment ¹¹(C) research and ~~present~~ explain governmental regulations, environmental regulations, or current events that affect the equine industry.

⁹ Clarification

¹⁰ Addressing Advisor feedback

¹¹ Addressing Advisor feedback

Comment ¹§127.49. Livestock and Poultry 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. 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. 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.
- Comment ²(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 ~~and knowledge~~, 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 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 livestock and poultry production;
 - (B) identify and demonstrate interpersonal, problem-solving, and critical-thinking skills used in livestock and poultry production;
 - (C) describe and demonstrate appropriate personal and occupational safety and health practices for the workplace;
 - (D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities;
 - (E) describe and demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership; and
 - (F) identify training, education, and certification requirements for occupational choices.

¹ Changing title to Livestock and Poultry Production to include all species discussed – ESC Feedback

² Including “and poultry” to include all species discussed – ESC Feedback

- (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;
 - (B) use appropriate record-keeping skills as they relate to the 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.
- (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;
- Comment³ (B) describe the impacts other industries such as entertainment, recreational and leisure, and exhibition of livestock animals, have on the livestock and poultry industry of the livestock industry such as entertainment, recreational, exhibition of livestock, environmental impacts, sustainability, and the global food market;
- (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;
- Comment⁴ (D) formulate feed rations based on ~~least cost~~ nutritional needs and economic factors and nutritional needs for livestock and poultry;
- Comment⁵ (E) research and discuss feeding practices and feed quality issues for livestock and poultry;
- (F) identify forage plants used for livestock grazing; and
- Comment⁶ (G) research and ~~present~~ explain livestock and poultry grazing practices such as rotational grazing and deferred grazing.

³ Clarification of misplaced modifier; struck content due to them being found in other KS/SE (9C, 9D, 9E)

⁴ Advisor feedback

⁵ Advisor feedback

⁶ Advisor feedback

- (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;
- Comment⁷ (D) research and ~~present~~ 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;
- Comment⁸ (B) identify signs, symptoms, ~~treatment~~, 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 and select appropriate tools and equipment for safe handling and restraining of livestock and poultry;
 - (B) identify and select appropriate facilities for livestock and poultry such as housing, veterinary, and reproduction;
- Comment⁹ (C) evaluate and describe industry practices, such as dehorning, castrating, docking, vaccinating, and sire, dam, and newborn care, to maximize the efficiency of livestock and poultry ~~such as dehorning, castrating, docking, and vaccinating~~; and
- Comment¹⁰ (D) explain and demonstrate methods of identifying ownership of livestock and poultry, ~~including such as~~ branding, ear tagging, ear notching, wing bands, and tattooing.
- (9) The student examines the interrelationship of the factors impacting livestock and poultry production operations. The student is expected to:
- Comment¹¹ (A) ~~identify~~ research and explain livestock and poultry biosecurity and waste management ~~problems and generate potential solutions for them~~ practices;
- Comment¹² (B) create an effective financial management plan for a livestock and poultry production operation;

⁷ Advisor feedback

⁸ B/I feedback

⁹ B/I feedback

¹⁰ Clarification

¹¹ B/I feedback

¹² For the break out, students should create one livestock plan and one poultry plan.

- (C) analyze and discuss environmental regulations, governmental regulations, and animal welfare policies related to livestock and poultry production;
- Comment ¹³(D) ~~evaluate~~ analyze and describe the interrelationship between *grain markets* and the livestock and poultry industries ~~and grain markets~~;
- (E) assess the impact of the United States livestock and poultry industry on world commodity markets;
- (F) use charts, tables, data, or graphs to evaluate the efficiency of livestock and poultry production; and
- (G) develop and present a livestock or poultry operation plan that includes health, reproduction, nutrition, and management practices necessary for maximum efficiency.

¹³ Advisor feedback

§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' expectations, including appropriate work habits, ethical conduct, and legal responsibilities;
 - (E) describe and demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership; 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;
 - (B) use appropriate record-keeping skills as they relate to the supervised agricultural experience;

- (C) participate in youth agricultural leadership opportunities to create a well-rounded experience program;
 - (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.
- (3) The student analyzes the history, domestication, and importance of small animal ownership. The student is expected to:
- Comment ¹(A) research and ~~present~~ 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.
- (4) The student understands the hazards associated with working in the small animal industry. The student is expected to:
- Comment ²(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
- Comment ³(D) ~~follow~~ locate, interpret, and implement ~~S~~ safety ~~D~~ data ~~S~~ sheets (SDS) ~~when~~ for handling ~~dangerous~~ chemicals.
- (5) 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
- Comment ⁴(C) create and ~~present~~ discuss a timeline of legislation related to animal welfare.
- (6) 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.

¹ Advisor feedback

² B/I feedback

³ Advisor feedback

⁴ Advisor feedback

- (7) 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.
- (8) 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.

§127.51. Veterinary 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. Prerequisite: Equine Science, Small Animal Management, or Livestock 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 and knowledge*, 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 demonstrates professional standards/employability skills as required by business and industry. The student is expected to:
 - (A) identify career, education, and entrepreneurship opportunities for a chosen occupation in the field of veterinary 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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.
 - (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;
 - (B) use appropriate record-keeping skills as they relate to the 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.
- (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 when working with animals such as handling, restraint, and proper use of tools and equipment;
- Comment¹ (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:
- Comment² (A) research and ~~present~~ discuss historical events, trends, and issues that have impacted veterinary medicine;
- (B) analyze 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;
- Comment³ (C) identify marketing strategies and explain how marketing affects the success of a veterinary practice; and
- Comment⁴ (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

¹ Using language from the introduction to provide consistency/clarification

² Advisor feedback

³ Advisor feedback

⁴ Advisor feedback

- (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 interrelationship 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 [for large and small animal species](#) such as prescription, commercial, homemade, fad diets, and raw diets.
- (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 ~~animal~~ 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) ~~apply mathematical skills to~~ 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](#);

- Comment⁵ ~~(D) explain courses of treatment for common diseases;~~
(~~E~~D) identify parasites for large and small animal species using common and scientific names;
- Comment⁶ (~~FE~~) describe life cycles of ~~common~~ parasites found in large and small animal species;
- Comment⁷ (~~GF~~) explain how parasites found in large and small animal species are transmitted and explain their effects on the host;
- (~~H~~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 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;
- Comment⁸ (B) explain ~~the~~ veterinary procedures used in examining fecal, blood, and urine specimens; and
- Comment⁹ (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;
- Comment¹⁰ (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, ~~and~~ physical therapy, ~~and suture removal~~;
- Comment¹¹ (E) describe emergency protocols and first aid procedures for large and small animal species, including cardiopulmonary resuscitation, control of bleeding, and ~~treatment for~~ signs of shock; and
- (F) research and compare veterinary care of specialty patients, including newborns, orphans, geriatric animals, recumbent animals, and animals with disabilities.

⁵ B/I feedback – only a DVM can provide a treatment plan for diseases

⁶ Advisor feedback

⁷ Clarification

⁸ Clarification

⁹ Clarification

¹⁰ Clarification

¹¹ Advisor feedback

- (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.

§127.52 Advanced Animal 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 and Chemistry or Integrated Physics and Chemistry (IPC); Algebra I and Geometry; and either Small Animal Management, Equine Science, or Livestock 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 lagomorph~~as~~ 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 and knowledge*, 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) 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 animal 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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.
 - (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 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.
- (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;

- (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (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;
- Comment ¹(B) analyze and describe how changes in the global food market impact the ~~livestock~~ animal production industry; and
- (C) evaluate breeds of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs 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
- Comment ²(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;

¹ Clarification

² Advisor feedback

- (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
 - Comment ³(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 predicting 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;
- Comment ⁴(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
- Comment ⁵(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;

³ Advisor feedback

⁴ Advisor feedback

⁵ Advisor feedback

- (D) describe the effects that diseases have on various body systems of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs;
- Comment ⁶(E) research and explain the methods of prevention, and control, ~~and treatment~~ 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;
- Comment ⁷(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 such as Beef: It's What's For Dinner, Certified Angus Beef, Pork: The Other White Meat, Got Milk?, Beef Check Off, Man's Best Friend, Cat Cafes, Goat Yoga, and Farm to Plate 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:
- Comment ⁸(A) analyze investigate and discuss the use of biotechnology and biosecurity in the animal science industry;

⁶ B/I feedback

⁷ Advisor feedback

⁸ Increase rigor; Advisor feedback

(B) identify governmental regulations and policies such as environmental and animal welfare and research the impacts on animal production; and

Comment ⁹(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](#).

DRAFT

⁹ Advisor feedback

Career and Technical Education, Texas Essential Knowledge and Skills
Agriculture, Food, and Natural Resources Career Cluster
Plant Science Program of Study
Work Group Final Recommendations

Prepared by the State Board of Education CTE TEKS Work Groups

Final Recommendations, January 2024

These recommendations reflect the final recommendations for the career and technical education (CTE) Texas Essential Knowledge and Skills (TEKS) for the Agriculture, Food, and Natural Resources Career Cluster that have been recommended by State Board of Education’s TEKS work group for the Plant Science Program of Study. Proposed additions are shown in green font with underlines (additions). Proposed deletions are shown in red font with strikethroughs (~~deletions~~). Text proposed to be moved from its current student expectation is shown in purple, italicized font with strikethrough (~~*moved text*~~) and is shown in the proposed new location in purple, italicized font with underlines (*new text location*).

Comments identified on the left-hand side link to explanations at the bottom of each page for the work group's proposed recommendations.

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§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.

Comment ¹(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.

Comments ^{2, 3}(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 ~~and knowledge~~, 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.

Comment ⁴(4) Floral Design follows the four basic strands found in fine arts--foundations: observation and perception; creative expression; historical and cultural relevance; and critical evaluation and response--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.

Comment ⁵(5) ~~(4)~~ Students are encouraged to participate in extended learning experiences related to floral designs such as career and technical student organizations and other leadership or extracurricular organizations.

- ~~(6)~~ ~~(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.

¹ Workgroup recommends not to have a mandatory CTE prerequisite for this course due to the number of non-CTE students enrolled in the course for the fine arts requirement. An alternative recommendation would be to add the prerequisite to the course but include fine arts in the exception for CTE prerequisites in the graduation requirements [TAC 74.11(K)].

² TEA recommendation

³ Business and Industry recommendation

⁴ SBOE Testimony feedback

⁵ Business and Industry recommendation

- (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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.
 - (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;
 - (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
 - (3) 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 historic trends and characteristics of floral art as they relate to current industry practices;
 - Comment ⁶(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; ~~and~~
 - Comment ⁷(D) identify the ancillary concepts of design principles such as emphasis, focal area, repetition, transition, opposition, and variation; and
 - ~~(E)-(D)~~ compare the forms and functions of flowers and foliage, including form, mass, line, and filler.
 - (4) 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 bud vase, round, symmetrical, and asymmetrical designs;
 - (B) prepare and evaluate floral designs using permanent botanicals such as homecoming mums;

⁶ Business and Industry and ESC recommendation

⁷ Business and Industry recommendation

- Comment ⁸(C) design and create ~~prepare~~ corsages and boutonnieres;
- Comment ⁹ (D) construct ~~prepare~~ floral designs for specific holidays and cultural occasions such as weddings and funerals;
- (E) create interiorscapes using the elements and principles of floral design;
- Comment ¹⁰(F) apply proper wiring and taping techniques to materials used in the industry; and
- Comment ¹¹(G) demonstrate safe and proper ~~tool~~-usage of floral design tools in the lab.
- (5) The student makes informed judgments about personal designs and the designs of others. The student is expected to:
- Comment ¹²(A) interpret, evaluate, and justify artistic decisions in the design of personal arrangements; ~~and~~
- (B) construct a physical or electronic portfolio of personal floral artwork to provide evidence of learning; and-
- Comment ¹³(C) interpret and evaluate design elements and principles in floral arrangements of others.
- (6) 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) evaluate and appraise floral designs; and
- (C) create specialty designs to expand artistic expression.
- (7) The student recognizes the current industry management and business 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 tools, chemicals, and equipment used in floral design;
- (D) determine the needs of indoor plants such as fertilizing, lighting, pruning, and watering based on the condition of the plant;
- Comment ¹⁴(E) identify ~~and manage~~ common pests and diseases that affect the floral industry;
- Comment ¹⁵(F) identify management techniques of pests and diseases in the floral industry including the safe use of pesticides;
- Comment ¹⁶(F) create ~~prepare~~ cost-effective designs;
- Comment ¹⁷(G) apply pricing and order-processing skills to meet various budgets and needs; and
- (H) identify packaging, distribution, and setup logistics in the floral industry.

⁸ TEA recommendation

⁹ TEA recommendation

¹⁰ TEA recommendation

¹¹ Business and Industry recommendation

¹² TEA recommendation

¹³ TEA recommendation

¹⁴ Clarification of student expectation based on the advisory group recommendation

¹⁵ Clarification of student expectation based on the advisory group recommendation

¹⁶ TEA recommendation

¹⁷ TEA recommendation

- (8) 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.

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§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.

Comment ¹(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.

Comment ²(3) Horticultural Science is designed for students to 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 and knowledge*, 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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.
- (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;

¹ Standard CTE requirement for advanced CTE courses

² TEA recommendation

- (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (3) The student understands the history and progression of the horticulture industry. The student is expected to:
- (A) trace relevant historical advancements in the horticulture industry as they relate to current industry practices;
- Comment ³(B) identify and describe ~~the~~ different disciplines of horticulture such as arboriculture, floriculture, olericulture, pomology, viticulture, turf management, and ornamental horticulture;
- Comment ⁴(C) identify and research ~~research and identify~~ emerging technology in the horticulture industry;
- (D) identify current trends affecting the horticulture industry; and
 - (E) compare types of horticulture industries in the different regions of Texas.
- (4) The student identifies plant structures and their functions and needs. The student is expected to:
- Comment ⁵(A) classify ~~identify~~ horticultural plants by their common and scientific names;
- Comment ⁶(B) describe ~~identify~~ 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.
- (5) 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 based on growing cycles, including annuals, perennials, biennials, and evergreens;
 - (C) identify horticultural plants based on their physical characteristics;
- Comment ⁷(D) compare reproduction flowering and non-flowering horticultural plants ~~as it pertains to reproduction~~;
- (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 of hand tools, power tools, and equipment.

³ TEA recommendation

⁴ TEA recommendation

⁵ TEA recommendation

⁶ TEA recommendation

⁷ TEA recommendation

- (6) 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.
- (7) 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
- Comment ⁸(F) review and explain the parts of a pesticide label.
- (8) 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;
- Comment ⁹(B) identify and select plants ~~for to be used in~~ landscapes, including bedding plants, shrubs, trees, and turf grasses based on United States Department of Agriculture (USDA) hardiness zones;
- (C) design a landscape using design elements and principles; and
- Comment ¹⁰(D) compare ~~apply~~-sustainability practices such as planting native plants, water conservation, and irrigation technology used in ~~to~~ a landscape.
- (9) 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) 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.

⁸ Advisory group recommendation

⁹ Work group strongly believes that USDA is the common recommendation and wants to keep it the way it is. And TEA recommendation

¹⁰ TEA recommendation

§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.
 - Comment ¹(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* ~~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 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' expectations, including appropriate work habits, ethical conduct, and legal responsibilities;
 - (E) describe and demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership; 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;

¹ TEA recommendation

- (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (3) The student understands the history and progression 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 the impact of these advancements on current industry practices;
 - (B) research and identify emerging technology in the greenhouse industry; and
 - Comment ²(C) ~~analyze~~ ~~identify~~ current trends affecting the greenhouse industry.
- (4) The student identifies and investigates different greenhouse structures, interior layout, and construction factors. The student is expected to:
- (A) compare and select greenhouse coverings;
 - (B) compare greenhouse styles and construction materials;
 - (C) analyze the costs associated with greenhouse construction;
 - Comment ³(D) ~~identify factors to consider when constructing a greenhouse such as evaluate~~ greenhouse ~~site~~ orientation and ~~construction concerns such as~~ access to electricity, roads, drainage, water, and plumbing;
 - (E) identify additional growing structures such as cold frames and hotbeds;
 - Comment ⁴(F) ~~identify and~~ design a layout of essential areas of the 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
 - Comment ⁵(I) analyze *greenhouse operation regulations enacted by regulatory agencies such as Texas Department of Agriculture, United States Department of Agriculture, and local agencies regulations affecting greenhouse operations such as Texas Department of Agriculture, United States Department of Agriculture, and local regulations.*
- (5) 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

² Business and industry recommendation

³ TEKS clarification from sub committee

⁴ Subcommittee Recommendation

⁵ TEA recommendation

- (E) compare open and closed environmental systems in the greenhouse such as irrigation, lighting, climate control, carbon dioxide injection, and fertilization.
- (6) 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.
- (7) 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 for plant identification; and
 - (C) analyze plant classifications based on cropping schedules and market demand for greenhouse crops.
- (8) The student identifies and investigates greenhouse crop production factors. The student is expected to:
- Comment ⁶(A) identify and explain ~~and~~ demonstrate 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;
 - Comment ⁷(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.
- (9) The student propagates greenhouse crops. The student is expected to:
- (A) analyze different methods of propagating greenhouse crops using sexual and asexual propagation methods;
 - Comment ⁸(B) propagate greenhouse crops using sexual and asexual ~~various~~ 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.

⁶ TEA recommendation

⁷ Subcommittee recommendation

⁸ TEA recommendation

- (10) The student investigates pest and disease identification and control methods in the greenhouse environment. The student is expected to:
- Comment ⁹(A) identify and classify common diseases, insects, pathogens, and weeds in the greenhouse;
- Comment ¹⁰~~(B) identify and assess insects, pathogens, weed infestations, and diseases in a greenhouse;~~
- ~~(B)-(C)~~ identify essential components of an integrated pest management plan in controlling an insect, pathogen, or weed problem;
- ~~(C)-(D)~~ identify appropriate greenhouse pesticide application techniques and equipment; and
- ~~(D)-(E)~~ analyze pesticide labeling and safety data sheets.
- (11) 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;
- Comment ¹¹(B) develop ~~identify~~ 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.

⁹ Business and Industry Recommendation

¹⁰ TEA recommendation

¹¹ Business and Industry Recommendation

§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.

Comment ¹(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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.
- (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;

¹ Standard CTE requirement for Advanced CTE courses

- (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (3) The student understands the history and progression of the viticulture industry. The student is expected to:
- (A) trace relevant historical advancements in viticulture as they relate to current industry practices;
 - (B) research and identify emerging technology in the viticulture industry; and
 - (C) identify current trends affecting the viticulture industry.
- (4) The student explains the production cycle and basic physiology of grapevines. The student is expected to:
- Comment ²(A) ~~describe~~ ~~apply~~ asexual propagation techniques used in the production of domesticated grapes;
- (B) identify the major vegetative and reproductive structures of grapevines;
- Comment ³(C) explain the role of rootstock in grapevine production;
- ~~(D)~~ ~~(C)~~ describe the annual vegetative growth and reproductive cycle of grapevines;
 - ~~(E)~~ ~~(D)~~ explain how environmental conditions influence grapevine vegetative and reproductive growth; and
 - ~~(F)~~ ~~(E)~~ describe the use of training systems in vineyard production.
- (5) 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 climate characteristics similar to local conditions; and
 - (D) develop a vineyard design and installation plan.
- (6) 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 passive frost protection techniques employed in vineyards;
 - (E) evaluate active frost protection techniques employed in vineyards; and
 - (F) analyze the cost effectiveness of frost protection systems.
- (7) The student demonstrates vineyard management techniques. The student is expected to:
- (A) identify and demonstrate safe and appropriate usage of vineyard tools;

² TEA recommendation

³ Business and industry recommendation

- (B) describe dormant pruning of grapevines as an effective method for minimizing crop loss due to frost;
- (C) identify grapevine-training techniques such as spur and cane pruning; and
- Comment ⁴(D) explain the use of technology in modern vineyard production systems such as drones, robotics, and smart irrigation.
- (8) The student develops an integrated pest management plan for vineyards. The student is expected to:
- (A) identify the common insect pests and diseases found in vineyards;
- (B) identify common animal pests problematic in vineyards;
- Comment ⁵(C) evaluate the components of integrated pest management used in related to vineyards;
- (D) explain cultural practices for vineyard pest control; and
- Comment ⁶(E) describe the safe and effective usage of pesticides in vineyards, ensuring compliance with federal and state regulations.
- (9) 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.
- (10) The student evaluates water requirements of vineyards and associated climatic factors. The student is expected to:
- Comment ⁷(A) evaluate grapevine water requirements ~~explain the water requirements of grapevines;~~
- (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;
- Comment ⁸(F) describe methods used to determine ~~of determining~~ soil moisture; and
- (G) calculate the irrigation needs of vineyards based on soil and climate.

⁴ TEA recommendation

⁵ TEA recommendation

⁶ Advisory recommendation

⁷ TEA recommendation

⁸ TEA recommendation

§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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.
 - (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;
 - (B) use appropriate record-keeping skills in a supervised agricultural experience program;

- (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.
- (3) The student understands advanced floral design elements and principles. The student is expected to:
- Comment ¹(A) ~~describe floral materials~~ using advanced botanical terminology ~~to describe floral materials~~;
 - (B) identify the symbolic meaning of flowers and plants used in floral design such as love, friendship, courage, and innocence;
 - (C) compare 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;
 - Comment ²(E) ~~evaluate the advanced use of floral design elements and principles~~;
 - Comment ³(E) ~~(F)~~ identify various basing design techniques, including such as layering, terracing, pavé, clustering, and pillowing; and
 - Comment ⁴(F) ~~(G)~~ identify advanced focal-emphasis design techniques including such as grouping, banding, binding, shadowing, sequencing, framing, zoning, and parallelism.
- (4) 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;
 - Comment ⁵(B) ~~design prepare~~ and evaluate floral designs that exhibit various basing design techniques such as layering, terracing, pavé, clustering, and pillowing; and
 - Comment ⁶(C) ~~design prepare~~ and evaluate floral designs using advanced focal-emphasis design techniques such as grouping, banding, binding, shadowing, sequencing, framing, zoning, and parallelism.
- (5) 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) develop 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.

¹ TEA recommendation

² TEA recommendation and subcommittee recommends removing it, to address redundancy.

³ TEA recommendation

⁴ TEA recommendation

⁵ Subcommittee clarification of verbs

⁶ Subcommittee clarification of verbs

- (6) 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.
- (7) The student demonstrates effective planning of occasion-specific floral designs from the conceptual stage through completion. The student is expected to:
- Comment ⁷(A) conduct a floral design consultation to gather details including such as occasion, budget, formality, and theme;
- (B) evaluate and select floral arrangements that achieve the objectives and budget expectations of an occasion;
- Comment ⁸(C) develop present a proposal that showcases floral arrangements appropriate for the selected occasion;
- Comment ⁹(D) develop a production schedule that allows sufficient time for ~~assess~~ the design, creation, installation, and disassembly of floral arrangements when ~~developing a production schedule~~;
- (E) develop a procurement plan to ensure necessary resources are obtained within a specified budget and timeframe; and
- (F) implement and evaluate a floral design plan through completion.
- (8) 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;
- Comment ¹⁰(B) evaluate the cost effectiveness and profitability of pricing policies ~~related to cost effectiveness and profitability~~;
- (C) develop and negotiate contracts for floral services;
- (D) formulate a floral budget, including per-item total costs;
- (E) demonstrate proper customer service skills for a floral business;
- (F) identify business relationships with a variety of vendors such as wedding venues, funeral homes, wholesale florists, and wire services; and
- Comment ¹¹(G) analyze basic marketing principles and procedures used in the floral industry such as displays and advertisements.

⁷ TEA recommendation

⁸ TEA recommendation

⁹ TEA recommendation

¹⁰ Subcommittee recommendation for change in the SE

¹¹ TEA recommendation

- (9) 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.

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§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.

Comment ¹(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.

Comment ²(3) Advanced Plant and Soil Science provides a way of learning about the natural world.

Students should know 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 and knowledge*, 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

¹ Subcommittee recommends to keep it as it is.

² TEA recommendation

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) analyze the importance of exhibiting good citizenship and describe the effects of good citizenship on the development of home, school, workplace, and community.
 - (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;
 - (B) use appropriate record-keeping skills in a supervised agricultural experience program;
 - (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.
- (7) The student understands interrelationships between plants, soil, and people in historical and current contexts. The student is expected to:
- Comment ³(A) research and document ~~identify~~ major historical milestones of plants and soil 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.
- (8) The student identifies how plants grow and how specialized cells, tissues, and organs develop. The student is expected to:
- Comment ⁴(A) describe ~~identify~~ 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.
- (9) 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;
- Comment ⁵(B) compare ~~differentiate~~ 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.
- (10) 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;
- Comment ⁶(B) describe ~~identify~~ 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.
- (11) The student analyzes soil science as it relates to plant and human activity. The student is expected to:
- (A) explain soil formation;
- Comment ⁷(B) investigate and document ~~evaluate~~ the properties of soils, including texture, horizons, structure, color, parent materials, and fertility;
- (C) identify and classify soil orders;

³ Subcommittee recommendation

⁴ Subcommittee recommendation

⁵ TEA recommendation

⁶ TEA recommendation

⁷ Advisory Group recommendation

- Comment ⁸(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;
- Comment ⁹(H) evaluate and determine soil health through soil testing; and
- (I) analyze concepts of soil ecology.
- (12) 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:
- Comment ¹⁰(A) illustrate ~~or model~~ the role of weathering in soil formations;
- Comment ¹¹(B) distinguish between chemical weathering and ~~from~~ mechanical weathering;
- (C) identify geological formations that result from differing weathering processes; and
- Comment ¹²(D) describe ~~identify~~ the role of biotic factors in soil formation.
- (13) 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;
- Comment ¹³(B) distinguish between ~~identify~~ native and introduced plants in an ecosystem;
- Comment ¹⁴(C) investigate and describe characteristics of ~~assess~~ native and introduced plants;
- (D) make observations and compile data about fluctuations in abiotic cycles;
- Comment ¹⁵(E) describe ~~evaluate~~ the effects of fluctuations in abiotic cycles on local ecosystems; and
- Comment ¹⁶(F) debate ~~evaluate~~ the impact of human activity such as pest control, hydroponics, monoculture planting, and sustainable agriculture on ecosystems.
- (14) The student evaluates components of plant science as they relate to crop production and advancements. The student is expected to:
- (A) analyze genetics and evolution of various crops;
- (B) identify and classify plants according to taxonomy;
- Comment ¹⁷(C) identify characteristics related to seed quality including ~~such as~~ mechanical damage, viability, and grade;

⁸ TEA recommendation

⁹ Advisory Group recommendation

¹⁰ TEA recommendation

¹¹ TEA recommendation

¹² TEA recommendation

¹³ Subcommittee recommendation

¹⁴ TEA and Advisory Group recommendation

¹⁵ Subcommittee recommendation

¹⁶ Subcommittee recommendation

¹⁷ TEA recommendation

- (D) identify plant pests and diseases using laboratory equipment such as microscopes, test kits, and technology;
- Comment ¹⁸(E) ~~investigate perform~~ and evaluate plant management practices including such as germination tests, plant spacing trials, and fertilizer tests;
- Comment ¹⁹(F) ~~analyze measure~~-trends in crop species and varieties grown locally in Texas and the United States and how trends affect producers and consumers; and
- Comment ²⁰(G) investigate and identify recent advancements in plant and soil science such as biotechnology, artificial intelligence, drone technology, infrared, and sensor technology.
- (15) 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;
- Comment ²¹(E) ~~debate evaluate~~ the impact of human activity and technology on soil health and plant productivity;
- Comment ²²(F) research and summarize ~~evaluate~~ 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.
- (16) 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.
- (17) 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; and
- Comment ²³(B) compare ~~evaluate~~ soil and plants in agricultural and urban settings.
- (18) 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;

¹⁸ TEA & Advisory Group recommendation

¹⁹ TEA recommendation

²⁰ Advisory Group recommendation

²¹ Subcommittee recommendation

²² Subcommittee recommendation

²³ Subcommittee recommendation

Comment ²⁴(C) illustrate the development of new crop varieties that are developed overtime through the origin of agriculture;

Comment ²⁵(D) design and conduct investigations to test ~~known~~ principles of genetics; and

(E) identify and test alternative growing methods such as hydroponics and aquaponics used in plant production.

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²⁴ TEA recommendation

²⁵ TEA recommendation