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.

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[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.

§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 ~~use~~ 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.

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[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.

§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.

[24] TEA recommendation
[25] TEA recommendation