Prepared by the State Board of Education TEKS Review Committees

Final Recommendations, October 2014

These draft proposed revisions reflect the changes to the career and technical education (CTE) Texas Essential Knowledge and Skills (TEKS) that have been recommended by State Board of Education-appointed TEKS review committees for courses in the **Agriculture, Food and Natural Resources Career Cluster**. Proposed additions are shown in green font with underlines (additions) and proposed deletions are shown in red font with strikethroughs (~~deletions~~).

Comments in the right-hand column provide explanations for the proposed changes. The following notations were used as part of the explanations:

CRS—information added or changed to align with the Texas College and Career Readiness Standards (CCRS)

MV—multiple viewpoints from within the committee

VA—information added, changed, or deleted to increase vertical alignment

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§130.3. Livestock Production (~~One Half to~~ One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in the field of animal science, students need to attain academic skills and knowledge, acquire 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 their knowledge and skills in a variety of settings. Animal species to be addressed in this course may include, but are not limited to, beef cattle, dairy cattle, swine, sheep, goats, and poultry.	
(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.	
(c)	**Knowledge and skills**.	
(1)	(1) The student demonstrates professional standards/employability skills as required by business and industry ~~learns the employability characteristics of a successful employee~~. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the field of animal systems;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems;	
(C)	demonstrate knowledge of personal and occupational safety and health practices in the workplace; ~~and~~	
(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities~~, and good citizenship skills.~~	Removed good citizenship to break out into its own TEKS

(E)	demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership; and	Added to ensure community and leadership involvement
(F)	research career topics using technology such as the Internet.	Computer resources can be utilized to research all TEKS
(2)	The student demonstrates technical skills relating to the interrelated human, scientific, and technological dimensions of animal systems. The student is expected to:	
(A)	assess the importance of the United States impact on world commodity markets;	
(B)	apply the principles of livestock breeding and nutrition in predicting the impact of current advances in genetics; and	
(C)	examine the interrelationship of plants and animals such as forage identification, rotational grazing, and grass protein levels.	
(3)	The student performs technical skills related to livestock production. The student is expected to:	
(A)	gather performance data;	
(B)	describe common veterinary procedures and skills;	
(C)	practice proper animal restraint techniques;	
(D)	demonstrate identification techniques; and	
(E)	demonstrate effective management strategies such as financial planning and managing government regulations.	Needed a more specific explanation of effective management strategies
(4)	The student explains anatomy and physiology related to nutrition, reproduction, health, and management of ~~domesticated animals~~ livestock species. The student is expected to:	Domesticated animals can be small or large so we specified to livestock species.
(A)	explain the skeletal, muscular, respiratory, reproductive, and circulatory systems of animals; and	
(B)	evaluate vital signs and normal behavior.	
(5)	The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	
(A)	describe the digestive system;	
(B)	identify sources of nutrients and classes of feed;	
(C)	identify vitamins, minerals, and feed additives;	
(D)	formulate rations; and	
(E)	discuss feeding practices and feed quality issues.	

(6)	The student explains animal genetics and reproduction. The student is expected to:	
(A)	describe the reproductive system;	
(B)	explain the use of genetics in animal agriculture such as Expected Progeny Differences (EPD's), phenotype and genotype;	Provide educators specific examples.
(C)	identify systems of animal breeding; and	
(D)	research current and emerging technologies in animal reproduction such as cloning, embryo transfer, in vitro fertilization, and artificial insemination.	Provide educators specific examples.
(E)	design and conduct experiments to support known principles of genetics.	Students need to use the scientific method for basic genetic knowledge.
(7)	The student identifies animal pests and diseases. The student is expected to:	
(A)	identify and describe the role of bacteria, fungi, viruses, genetics, and nutrition in disease; and	Students need to first know each of the diseases before describing them.
(B)	identify methods of disease control, treatment, and prevention.	
(C)	classify internal and external parasites including treatment and prevention	Internal and external parasites need to be addressed separately.
(8)	The student knows the factors impacting commodity prices and costs. The student is expected to:	
(A)	evaluate the relationship between livestock commodity markets; and	
(B)	formulate rations based on least-cost factors. ~~; and~~	
~~(C)~~	~~design and conduct experiments to support known principles of genetics and feed efficiency.~~	Split and relocated to 5(F) and 6(E)
(9)	The student plans for dynamic changes in business operation. The student is expected to:	
(A)	design, conduct, and complete research to ~~solve self-identified~~ identify and solve livestock management problems; and	Clarification of specific TEKS.
(B)	use charts, tables, or graphs to prepare written summaries of data obtained in a laboratory activity and an individual scientific research project such as nutrition, digestion and reproduction.	Providing specific examples for educators.
(10)	The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	

(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.4. Small Animal Management (One-Half ~~to One~~ Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades ~~9~~10-12.	Left Half Credit because there are only 7 TEKS Public comment from administrators and teachers expressing need for half credit courses.
(b)	**Introduction.**	
(1)	CTE 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 & 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)	To be prepared for careers in the field of animal science, students need to enhance academic knowledge and skills, acquire knowledge and skills related to 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. Suggested small animals which may be included in the course of study include, but are not limited to, small mammals, amphibians, reptiles, avian, dogs, and cats.	
(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.	
(c)	**Knowledge and skills**.	
~~(6)~~ (1)	~~The student learns the employability characteristics of a successful employee.~~ The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the field of specialty agricultural enterprises;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in specialty agricultural enterprises;	
(C)	demonstrate knowledge of personal and mechanical safety and health practices in the	

	workplace; and	
(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities~~., and good citizenship skills.~~	Removed good citizenship to break out into its own TEKS
(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership.	Added to ensure community and leadership involvement
(F)	Research career topics using technology such as the Internet.	Computer resources can be utilized to research all TEKS
~~(1)~~(2)	The student describes the importance of responsible small animal ownership. The student is expected to:	
(A)	explain the domestication and use of small animals;	
(B)	identify the influence small animals have on society;	
(C)	describe the importance of the small animal industry;	
(D)	describe the obligations and benefits of small animal ownership; and	
(E)	discuss the use and services provided by small animals.	
~~(2)~~(3)	The student learns the hazards associated with working in the small animal industry. The student is expected to:	
(A)	explain the importance of safe practices when working with small animals;	
(B)	Identify zoonotic diseases that can be transmitted from small animals to humans;	Corrected terminology.
(C)	describe methods of preventing the spread of disease;	
(D)	follow guidelines for safety when handling dangerous chemicals and when working with small animals; and	
(E)	demonstrate the proper use of laboratory equipment.	
~~(3)~~(4)	The student evaluates current topics in animal rights and animal welfare. The student is expected to:	
(A)	compare and contrast animal rights and animal welfare;	
(B)	research important persons, organizations, and groups involved in the animal rights movement;	
(C)	create a timeline of dates and acts of legislation related to animal welfare; and	
(D)	analyze current issues in animal rights and animal welfare.	
~~(4)~~(5)	The student knows the care and management requirements for a variety of small animals. The student is expected to:	

(A)	discuss the physical characteristics for each species studied;	
(B)	list the breeds or types of each species studied as appropriate;	
(C)	discuss the habitat, housing, and equipment needs for each species studied;	
(D)	compare and contrast nutritional requirements for each species studied;	
(E)	explain health maintenance in each species studied, including the prevention and control of diseases and parasites;	
(F)	describe and practice common methods of handling each species studied; and	
(G)	use available laboratory equipment to perform procedures such as fecal test, blood testing, and basic grooming procedures.	
~~(5)~~(6)	The student examines career opportunities in small animal care. The student is expected to:	
(A)	identify, describe, and compare career opportunities in small animal care and management; and	
(B)	describe the nature of the work, salaries, and educational requirements for careers in small animal care.	
(7)	The student develops a supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.5. Equine Science (One-Half ~~to One~~ Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	Made ½ credit because it only has 5 TEKS Public comment from administrators and teachers expressing need for half credit courses.
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in the field of animal science, students need to enhance academic knowledge and skills, acquire knowledge and skills related to 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 their knowledge and skills in a variety of settings. Suggested animals which may be included in the course of study include, but are not limited to, horses, donkeys, and mules.	
(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.	
(c)	**Knowledge and skills**.	
~~(5)~~ (1)	The student ~~learns the employability characteristics of a successful employee~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the field of equine science;	
(B)	demonstrate competencies related to resources, information, interpersonal skills, and systems of operation in equine science;	
(C)	demonstrate knowledge of personal and occupational health and safety practices in the workplace;	
(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities.~~, and good citizenship skills.~~	Removed good citizenship to break out into its own TEKS

(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership.	Added to ensure community and leadership involvement
~~(E)~~(F)	Research career topics using technology such as the Internet.	Internet resources can be utilized to research all TEKS
~~(1)~~(2)	The student analyzes equine science as it relates to the selection of horses. The student is expected to:	
(A)	recognize the importance of the equine industry such as equestrian, racing, rodeo, therapy and the global food market; and	Clarification of multiple industries within the equine discipline.
(B)	evaluate and select horses based on purpose.	Horses are evaluated and selected differently based upon purposes of various industries.
~~(2)~~(3)	The student knows how to provide proper nutrition using accepted protocols and processes to maintain animal performance. The student is expected to:	
(A)	determine nutritional requirements of horses;	
(B)	describe the anatomy and physiology of horses including the skeletal, muscular, respiratory, reproductive, and circulatory systems; and	All major systems need to be addressed.
(C)	explain methods of maintaining horse health and soundness.	
~~(3)~~(4)	The student analyzes equine science as it relates to the management of horses. The student is expected to:	
(A)	select equipment and facilities for horses;	
(B)	demonstrate methods of handling horses safely; and	
(C)	identify the procedures for breeding horses per industry standards.	Procedures are different for different breeds.
(5)	The student identifies animal pests and diseases. The student is expected to:	Pests and diseases are not specifically mentioned.
(A)	identify and describe the role of bacteria, fungi, viruses, genetics, and nutrition in disease; and	
(B)	identify methods of disease control, treatment, and prevention.	
(C)	classify internal and external parasites including treatment and prevention	
(D)	Identify behavioral diseases such as cribbing, heaving, and wind sucking.	
~~(4)~~(6)	The student compares and contrasts issues affecting the equine industry. The student is expected to:	
(A)	describe issues concerning biotechnology related to the equine industry; and	
(B)	identify animal welfare policy pertaining to the equine industry such as equestrian, racing, rodeo, therapy, the global food market and pharmaceutical research.	Many industries need to be addressed.

~~(6)~~ (7)	The student develops an improved supervised agricultural experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.6. Veterinary Medical Applications (One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades ~~10~~11-12. Prerequisite: Equine Science, Small Animal Management, or Livestock Production.	Certification and age requirements. Foundational needs prior to this course.
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in the field of animal science, students need to attain academic 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. Topics covered in this course include, but are not limited to, veterinary practices as they relate to both large and small animal species.	
(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.	
(c)	**Knowledge and skills**.	
~~(1)~~	~~The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:~~	
~~(A)~~	~~demonstrate safe practices during laboratory and field investigations; and~~	

(B)	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	
(2)	The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	
(A)	know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;	
(B)	know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	
(C)	know 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;	
(D)	distinguish between scientific hypotheses and scientific theories;	
(E)	plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;	
(F)	collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, animal restraints, stereoscopes, electronic balances, micropipettors, hand lenses, surgical and imagining equipment, thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, and models, diagrams, or samples of biological specimens or structures;	
(G)	analyze, evaluate, make inferences, and predict trends from data; and	
(H)	communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	
(3)	The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A)	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational	

	~~testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;~~	
~~(B)~~	~~communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;~~	
~~(C)~~	~~draw inferences based on data related to promotional materials for products and services;~~	
~~(D)~~	~~evaluate the impact of scientific research on society and the environment;~~	
~~(E)~~	~~evaluate models according to their limitations in representing objects or events; and~~	
~~(F)~~	~~research and describe the history of veterinary medicine and contributions of scientists in that field.~~	
~~(4)~~ (1)	~~The student learns the employability characteristics of a successful employee.~~ The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the field of veterinary science;	
(B)	demonstrate competencies related to resources, information, interpersonal skills, and systems of operation in veterinary science;	
(C)	demonstrate knowledge of personal and occupational health and safety practices in the workplace; and	
(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities~~., and good citizenship skills~~.	Removed good citizenship to break out into its own TEKS
(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership.	Added to ensure community and leadership involvement
(F)	Research career topics using technology such as the Internet.	Internet resources can be utilized to research all TEKS
~~(5)~~ (2)	The student researches current topics in veterinary medicine, recognizes the importance of animals in society, and discusses professional ethics and laws that relate to veterinary medicine. The student is expected to:	
(A)	explain the human-animal bond and how to interact with clients and their animals;	
(B)	identify trends, issues, and historical events that have influenced animal use and care;	
(C)	describe the legal aspects of animal welfare and animal rights;	

(D)	evaluate the principals of veterinary medical ethics; and	
(E)	review policies and procedures in veterinary medicine that are considered a reflection of various local, state, and federal laws.	
~~(6)~~ (3)	The student evaluates veterinary hospital management and marketing to determine its importance to the success of veterinary clinics and hospitals. The student is expected to:	
(A)	identify skills needed to communicate effectively with clients and pet owners in the community;	
(B)	identify vital information and demonstrate effective communication skills necessary to solve problems;	
(C)	explain the role and importance of marketing and its affects on the success of a veterinary hospital; and	
(D)	develop skills involving the use of electronic technology commonly found in a veterinary hospital such as centrifuge, autoclave, and radiography positions.	Providing examples to expand in the classroom.
~~(7)~~ (4)	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 veterinary terms to discover their meanings and recognize common Greek and Latin prefixes, suffixes, and roots;	
(B)	develop appropriate use of directional anatomical terms;	
(C)	identify anatomical structures of animals;	
(D)	describe the major body systems by using appropriate medical terminology; and	
(E)	recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals.	
~~(8)~~ (5)	The student explores the area of animal management as it relates to animal identification, animal characteristics, and behavioral temperament. The student is expected to:	
(A)	identify a variety of animal species according to common breed characteristics such as companion, exotic and large animals;	Need to cover all areas for certification and testing.
(B)	recognize common animal behavioral problems within companion, exotic and large animals as per industry standard;	Behavioral problems should be addressed consistently per industry standards to those specific species.
(C)	identify correct handling protocols and discuss the relevance to veterinary	

	medical staff; and	
(D)	demonstrate appropriate methods of handling a variety of animal behavioral situations.	
~~(9)~~ (6)	The student investigates the body systems and gains a working knowledge of each system's purpose and functions and how each system is affected by disease. The student is expected to:	
(A)	identify the parts of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems;	
(B)	describe the functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems;	
(C)	identify appropriate anatomical sites for injections, measuring vital signs, and collecting blood samples for various animal species; and	
(D)	use medical terminology to describe normal animal behavior and vital signs compared to sick animals.	
~~(10)~~ (7)	The student performs mathematical calculations used in veterinary medicine. The student is expected to:	
(A)	add, subtract, multiply, and divide whole numbers, fractions, and decimals as related to veterinary medicine;	
(B)	apply mathematical skills needed for accurate client assessment such as measurement, conversion, and data analysis;	
(C)	find solutions to veterinary problems by calculating percentages and averages;	
(D)	convert between English and metric units;	
(E)	use scientific calculations to determine weight, volume, and linear measurements;	
(F)	solve word problems using ratios and dimensional analysis;	
(G)	interpret data using tables, charts, and graphs; and	
(H)	use mathematical equations to calculate and prepare chemical concentrations.	
~~(11)~~ (8)	The student evaluates animal diseases and identifies internal, ~~and~~ external, and protozoal parasites. The student is expected to:	All types of diseases need to be covered.
(A)	identify factors that influence the health of animals;	
(B)	identify pathogens and describe the effects that diseases have on various body systems;	

(C)	explain courses of treatment for common viral and bacterial diseases;	
(D)	describe the process of immunity and disease transmission;	
(E)	identify internal,~~and~~ external, and protozoal parasites using common and scientific names;	All types of diseases need to be covered.
(F)	describe life cycles of common parasites;	
(G)	explain how parasites are transmitted and their effect on the host;	
(H)	conduct parasitic diagnostic procedures; and	
(I)	describe types of treatments for diseases and parasites.	
~~(12)~~ (9)	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 animal;	
(B)	recognize examples of abnormalities and relate them to the associated problems and illnesses;	
(C)	take temperature, pulse, and respiration for a variety of animals;	
(D)	describe effects of age, stress, and environmental factors on vital signs of animals;	
(E)	explain procedures for physical examinations; and	
(F)	explain the regional approach to assess an animal's health.	
~~(13)~~ (10)	The student identifies imaging equipment and demonstrates how to safely operate and maintain equipment. The student is expected to:	
(A)	identify imaging equipment such as ultrasonograph, endoscope, electrocardiograph, and radiograph;	
(B)	explain safety procedures, maintenance, and operation of imaging equipment; and	
(C)	demonstrate patient restraint and positioning methods used for imaging purposes.	
~~(14)~~ (11)	The student determines nutritional requirements for ruminant and non-ruminant animals and communicates the importance of animal nutrition in maintaining a healthy animal. The student is expected to:	
(A)	identify the anatomy of the digestive system of ruminant and non-ruminant animals;	

(B)	describe the process of digestion in ruminant and non-ruminant animals;	
(C)	identify types and sources of nutrients and classes of feeds;	
(D)	identify feed additives and describe how additives affect the food supply;	
(E)	evaluate animal dietary needs and feeding factors;	
(F)	calculate energy requirements and formulate rations;	Included in the CVA 1 test
(G)	discuss feeding practices and feed-quality issues; and	
(H)	analyze the quality of commercially prepared feeds.	
~~(15)~~ (12)	The student examines various aspects of clinical hematology. The student is expected to:	
(A)	describe laboratory tests and explain the importance of proper laboratory procedures;	
(B)	demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens;	
(C)	discuss normal and abnormal results obtained in complete blood counts;	
(D)	explain sensitivity testing and how to read testing results; and	
(E)	prepare microscope slides, preserve specimens, and perform several of the most common laboratory tests such as fecal flotations, microfilira smear, pac cell volume.	Providing examples for educator on common skills.
~~(16)~~ (13)	The student identifies hospital procedures, skills, and objectives that are included in the job description of an animal care assistant. The student is expected to:	
(A)	explain the care, maintenance, and use of equipment and instruments found in veterinary practice;	
(B)	explain appropriate hospital procedures	All clinics can approach things differently with hospital protocol.
(C)	discuss emergency protocols and describe first aid procedures for small and large animals, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock;	
(D)	demonstrate animal care skills such as administering medications, nail trimming, bathing, grooming, ear cleaning, expressing anal sacs, dental prophylaxis, enema administration, and identification of animals;	
(E)	demonstrate therapeutic care such as patient observation, maintaining and administering fluids, applying bandages, caring for open wounds, and	

	managing hydrotherapy and physical therapy; and	
(F)	describe skills involved in the reproductive and genetic evaluation of animals.	
~~(17)~~ (14)	The student identifies and discusses surgical-assisting procedures, skills, and objectives that are included in the job description of an animal care assistant. The student is expected to:	All clinics can approach things differently with hospital protocol.
(A)	explain the protocol for pre-surgical and post-surgical care of a patient;	
(B)	describe methods used in the sterilization and preparation of small and large animal surgery packs;	
(C)	review skills involved in patient and surgical room preparation;	
(D)	describe surgical skills such as castration, dehorning, and docking;	
(E)	describe care of newborn, orphan, and recumbent patients; and	
(F)	identify and monitor equipment used in surgical procedures.	All tech and CVAs need to be able to identify and monitor equipment
~~(18)~~ (15)	The student identifies pharmacology-assisting procedures, skills, and objectives that are included in the job description of an animal care assistant. The student is expected to:	
(A)	identify medications according to their classification, form, routes, and methods of administration;	
(B)	explain handling and distribution, protocol, and laws for controlled substances including United States Drug Enforcement Agency;	Provide examples for educator.
(C)	calculate dosage using factors such as concentration of drug, weight of animal, and required dosage;	
(D)	complete a prescription label with identifiers that are required by the United States Food and Drug Administration; and	
(E)	select equipment and instruments used to give medications.	
~~(19)~~ (16)	The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	

(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.7. Advanced Animal Science (One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grade 11 and 12. ~~Recommended prerequisite: a minimum of one credits from the courses in the Agriculture, Food, and Natural Resources cluster~~. To receive credit in science, students must meet the 40% laboratory and fieldwork requirement identified in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum).Courses required to enroll in Advanced Animal Science are Biology and Chemistry or IPC. Math courses required Algebra and Geometry. Required Pathway course in small animal management, equine science, or livestock production; Veterinary Medical Applications is recommended. This course satisfies a high school science graduation requirement.	
(b)	**Introduction**.	
(1)	CTE 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 & 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. To be prepared for careers in the field of animal science, students need to attain academic 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. This course examines the interrelatedness of human, scientific, and technological dimensions of livestock production. Instruction is designed to allow for the application of scientific and technological aspects of animal science through field and laboratory experiences.	
(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 inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are ~~experimental, descriptive, or comparative~~ descriptive, comparative, and experimental. The method chosen should be appropriate to the question being asked.	Recommendation from TSEL

(6)	Science and social ethics. Scientific decision making is a way of answering questions about the natural world. 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).	
(7)	Science, systems, and models. A system is a collection of cycles, structures, and processes that interact. 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. 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.	
(8)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(9)	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.	
(c)	**Knowledge and skills**.	
~~(4)~~ (1)	~~The student evaluates the employability characteristics of an employee.~~ The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the field of animal systems;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems;	
(C)	demonstrate knowledge of personal and occupational safety and health practices in the workplace; and	
(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities, ~~and good citizenship skills.~~	
(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership.	
(F)	Research career topics using technology such as the Internet.	
~~(1)~~(2)	The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to:	
(A)	demonstrate safe practices during field and laboratory investigations; and	
(B)	demonstrate an understanding of the use and conservation of resources and the proper	

	disposal or recycling of materials.	
~~(2)~~(3)	~~The student uses scientific methods and equipment during field and laboratory investigations. The student is expected to:~~ Scientific processes. The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	
(A)	Know the definition of science and understand that it has limitations, as specified in subsection (b)(~~2~~4) of this section;	
(B)	know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	
(C)	Know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are experimentally supported through rigorous testing methods, but they may be subject to change as new areas of science are created and new technologies ~~are developed~~ emerge;	
(D)	Distinguish and differentiate between scientific hypotheses and scientific theories;	
(E)	plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;	
(F)	collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools and equipment;	
(G)	analyze, evaluate, make inferences, and predict trends from data; and	
(H)	~~communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports~~. Formulate and communicate valid conclusions through use of data analysis, lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	Recommendation from TSEL
~~(3)~~(4)	The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A)	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;	
(B)	communicate and apply scientific information extracted from validated and peer reviewed sources such as accredited scientific journals, institutions of higher learning, current events, news reports, and marketing materials;	

(C)	Identify bias and draw inferences based on data related to promotional materials for products and services;	Recommendation from TSEL
(D)	evaluate the impact of scientific research on society and the environment;	
(E)	evaluate models according to their limitations in representing biological objects or events in representing accuracy and validity; and	
(F)	research and describe the history of science and contributions of scientists.	
(5)	The student demonstrates principles relating to the human, scientific, and technological dimensions of scientific animal agriculture and the resources necessary for producing domesticated animals. The student is expected to:	
(A)	evaluate market classes and grades of livestock;	
(B)	identify animal products and consumption patterns relative to human diet and health issues such as organic and farm-raised; and	TSEL recommendation
(C)	describe the growth and development of livestock as a global commodity.	
(6)	The student applies the principles of reproduction and breeding to livestock improvement. The student is expected to:	
(A)	describe reproductive cycles and relate them to breeding systems;	
(B)	explain the embryo transfer process and how it can impact the livestock industries;	
(C)	recognize the significance of meiosis to sexual reproduction; and	
(D)	evaluate animal behavior and its relationship to livestock management.	
(7)	The student applies the principles of molecular genetics and heredity. The student is expected to:	
(A)	explain Mendel's laws of inheritance by predicting genotypes and phenotypes of offspring using the Punnett square;	Recommendation from TSEL
(B)	~~explain the inheritance of sex-linked characteristics and provide some examples found in animals;~~ predict genotypes and phenotypes of animal offspring using Mendelian and or non-Mendelian patterns of inheritance in various forms of livestock and use Punnet Square and assign alleles to justify all predictions.	
(C)	identify ~~and compare the three parts of nucleic acids~~ the parts of the nucleotide , know the difference between the nucleotides found in Deoxyribonucleic Acid (DNA) versus Ribonucleic Acid (RNA);	
(D)	explain the functions of ~~nucleic acids~~ DNA and RNA;	

(E)	describe how heredity is used in the selection of livestock for example knowing the difference between outbreeding and inbreeding/linebreeding; and	
(F)	explain how traits are passed from parent to offspring through genetic transfer and the implications of breeding practices.	
(8)	The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	
(A)	identify and compare the external anatomy of ~~a variety of~~ livestock species;	
(B)	compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genito-urinary, respiratory, nervous, immune and endocrine systems of animals;	Recommendation from TSEL
(C)	describe interactions among various body systems such as circulatory, respiratory, and muscular systems; and	
(D)	identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate these to animal body systems.	Recommendation from TSEL
(9)	The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	
(A)	describe the structures and functions of the digestive system of ruminant and non-ruminant animals, including poultry and cattle;	
(B)	identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals;	
(C)	identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals;	
(D)	formulate rations based on different nutritional requirements;	
(E)	analyze feeding practices in relation to nutritional requirements of animals; and	
(F)	analyze feed quality issues and determine their effect on animal health.	
(10)	The student evaluates animal diseases and parasites. The student is expected to:	
(A)	identify factors that influence the health of animals such as geographic location, age, genetic composition, and inherited diseases to a particular species;	
(B)	identify pathogens and describe the effects that diseases have on various body systems;	
(C)	explain the methods of prevention, control, and treatment for diseases;	
(D)	describe the process of immunity and disease transmission;	
(E)	explain how external and internal parasites are transmitted and the effect they have on the	

	host;	
(F)	explain the methods of prevention, control, and treatment of internal and external parasites;	
(G)	describe the life cycles of various parasites and relate them to animal health issues; and	
(H)	conduct parasite diagnostic tests.	
(11)	The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to:	
(A)	compare cells from different parts of animals, including epithelia, muscles, and bones, to show specialization of structure and function;	
(B)	describe and explain cell differentiation in the development of organisms; and	
(C)	sequence the levels of organization in animals and relate the parts to each other and to the whole.	
(12)	The student recognizes policies and issues in animal science. The student is expected to:	
(A)	discuss the impacts of biotechnology on the production of livestock such as cloning, artificial insemination, and freezing of semen and embryos;	
(B)	analyze the issues surrounding animal welfare and the humane treatment of livestock;	
(C)	apply principles of nutrition to maximize feed efficiency for livestock; and	
(D)	design, conduct, and complete research to solve a self-identified problem in scientific animal agriculture.	
(E)	analyze the issues surrounding the impact on the environment by livestock production	Recommendation from TSEL
(13)	The student discusses livestock harvesting operations. The student is expected to:	
(A)	map the stages of animal growth and development as it relates to market readiness;	
(B)	describe the harvesting process;	
(C)	describe federal and state meat inspection standards such as safety, hygiene, and quality control; and	
(D)	identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups.	
(14)	The student explores methods of marketing livestock. The student is expected to:	
(A)	compare various methods of marketing livestock; and	
(B)	describe methods of marketing meat and meat products.	
(15)	The student develops an advanced supervised agriculture experience program as it relates to	

	agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan~~-~~ in agriculture.	

§130.8. Professional Standards in Agribusiness (One-Half ~~to One~~ Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades ~~9~~10-12.	
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in agribusiness systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to leadership development and the workplace, 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. This course primarily focuses on leadership, communication, employer-employee relations, and problem solving as they relate to agribusiness.	
(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.	
(c)	**Knowledge and skills**.	
(1)	~~The student learns the employability characteristics of a successful contributor to the modern agricultural workplace~~ The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career and entrepreneurship opportunities related to agribusiness;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in agriculture, food, and natural resource industries;	
(C)	demonstrate employers' expectations, appropriate work habits, and good citizenship skills; and	

(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities., and good citizenship skills.	Removed good citizenship to break out into its own TEKS
(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership.	Added to ensure community and leadership involvement
(F)	Research career topics using technology such as the Internet.	Internet resources can be utilized to research all TEKS
(2)	The student demonstrates professional development related to effective leadership in agribusiness. The student is expected to:	
(A)	describe the importance of positive self-concept, social skills, and maintaining a professional image with respect to cultural diversity;	
(B)	identify leadership styles;	
(C)	prepare personal resumés, letters of interest, and employment applications; and	Letters of interest are a vital part of obtaining a job.
(D)	use positive interpersonal skills to work cooperatively with others from different cultures, genders, and backgrounds.	
(3)	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)	demonstrate methods for working effectively with others;	
(C)	practice job interview and evaluation skills; and	
(D)	outline complaint and appeal processes.	
(4)	The student communicates effectively with groups and individuals. The student is expected to:	
(A)	understand the elements of communication both in informal group discussions, and formal presentations, and business related technical forms of communication such as accuracy, relevance, rhetorical features, and organization of information by:	Technology plays a vital role in all aspects of business and leadership and all students should know how to use it properly.
(B)	describing how style and content of spoken language varies in different contexts and influences the listener's understanding; and	
(C)	modifying presentations such as delivery, vocabulary, length, audience needs, and purposes;	
(D)	identify appropriate written and verbal communications in agribusiness;	
(E)	demonstrate effective listening in a variety of settings;	

(F)	demonstrate nonverbal communications skills and effective listening strategies; and	
(G)	discuss the importance of relationships and group organization.	
(5)	The student identifies professional agricultural communications in relation to using appropriate spoken communication techniques and procedures. The student is expected to:	
(A)	identify the importance of verbal and nonverbal communications;	
(B)	know the importance of communicating factual and unbiased data and information obtained from reliable sources;	
(C)	demonstrate speech preparation and delivery skills such as a presentation software and additional technology etiquette ; and	Technology plays a large role in speech preparation to ensure a professional presentation.
(D)	plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning.	
(6)	The student demonstrates the factors of group and individual efficiency. The student is expected to:	
(A)	define the significance of personal and group goals;	
(B)	exhibit traits such as empowerment, risk, communication, focusing on results, decision making, problem solving, and investment in individuals when leading a group in solving a problem;	
(C)	discuss the importance of time management and teamwork;	
(D)	list the steps in the decision-making and problem-solving processes; and	
(E)	demonstrate a working knowledge of parliamentary law.	
(7)	The student identifies involvement opportunities in agribusiness professional organizations. The student is expected to:	
(A)	discuss the role of agricultural organizations in formulating public policy;	
(B)	develop strategies for effective participation in agricultural organizations; and	
(C)	identify and discuss the purpose of various agricultural organizations such as Texas Farm Bureau, The Association of Soil and Water Conservation Districts, Texas and Southwestern Cattle Raisers Association, Independent Cattlemen's Association, agricultural cooperatives, commodity associations, and breed associations.	Students need to know the purpose of each organization they are identifying.
(8)	The student identifies and researches current agribusiness issues. The student is	

	expected to:	
(A)	compare and contrast the marketing of agricultural and non-agricultural products; and	
(B)	describe the effects of urbanization on traditional agriculture.	
(9)	The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	employ youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.9. Agribusiness Management and Marketing (~~One-Half to~~ One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in agribusiness systems, students need to 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. This course 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.	
(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.	
(c)	**Knowledge and skills**.	
(1)	The student ~~learns the employability characteristics of a successful employee in the field of agriculture, food, and natural resources~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in agribusiness systems;	
(B)	apply competencies related to resources, information, interpersonal skills, and	

	systems of operation in agribusiness systems;	
(C)	demonstrate knowledge of personal and occupational health and safety practices in the workplace; and	
(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities.~~, and good citizenship skills.~~	Removed good citizenship to break out into its own TEKS
(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership.	Added to ensure community and leadership involvement
(F)	Research career topics using technology such as the Internet.	Internet resources can be utilized to research all TEKS
(2)	The student recognizes roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The student is expected to:	
(A)	identify how key organizational systems affect organizational performance and the quality of products and services related to agriculture, food, and natural resources;	
(B)	understand the global context of agricultural industries and careers; and	
(C)	describe the nature and types of agribusiness organizations to build an understanding of the scope of organizations.	
(3)	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 and interpret information for one or more careers in agriculture, food, or natural resources; and	
(B)	identify educational and credentialing requirements for one or more careers in agriculture, food, and natural resources.	
(4)	The student defines and examines agribusiness management and marketing and its importance to the local and international economy. The student is expected to:	
(A)	describe the roles and functions of management and leadership in agribusiness;	Leadership is an important characteristic in all managers.
(B)	identify key economic principles of free enterprise; and	
(C)	analyze the economic opportunities of agribusiness.	
(5)	The student defines the importance of records and budgeting in agribusiness. The student is expected to:	
(A)	maintain appropriate agribusiness records such as payroll, employee benefits, journals, inventories, income and expense logs, financial statements, and	

	balance sheets;	
(B)	identify methods of obtaining agribusiness loans and financing; and	
(C)	compare methods of capital resource acquisition as it pertains to agriculture.	
(6)	The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	
(A)	analyze methods of decision making;	
(B)	examine the effects of government policies and regulations in making management decisions;	
(C)	describe the management of human resources with respect to cultural diversity;	
(D)	identify laws pertaining to land and property ownership and uses, taxes, wills, and liabilities; and	
(E)	develop a personal economic philosophy.	
(7)	The student defines key issues of agribusiness success and failure. The student is expected to:	
(A)	use the decision-making process for budgeting issues;	
(B)	analyze business records and record-keeping procedures;	
(C)	determine methods of financing agribusiness~~; and~~	
(D)	identify methods of obtaining capital resources~~.~~; and	
(E)	analyze agricultural commodity markets.	Futures markets play an important role in the success of all agricultural businesses.
(8)	The student describes the marketing of agricultural products. The student is expected to:	
(A)	describe the purpose and importance of marketing;	
(B)	develop a marketing plan;	
(C)	identify the competitive environment and the impact of foreign markets;	
(D)	compare types of markets and influence factors; and	
(E)	identify methods of managing risk such as hedging and crop insurance.	
(9)	The student knows the efficiency aspects of agribusiness management. The student is expected to:	
(A)	use management software and information technology such as spreadsheets	

	and databases;	
(B)	develop an entrepreneurial plan based on personal economic philosophy;	
(C)	develop a financial management plan; and	
(D)	present a business proposal.	
(10)	The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.10. Mathematical Applications in Agriculture, Food, and Natural Resources (One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades ~~9-12~~10-12. Prerequisite: Algebra 1 ~~Recommended prerequisite:~~ and a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources cluster. This course satisfies a high school mathematics graduation requirement.	
(b)	**Introduction.**	
(1)	CTE 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 & 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)	To be prepared for careers in agriculture, food, and natural resources, students must acquire technical knowledge in the discipline as well as apply academic skills in mathematics. Students should apply knowledge and skills related to mathematics, including algebra, geometry, and data analysis in the context of agriculture, food, and natural resources. To prepare for success, students are afforded opportunities to reinforce, apply, and transfer their knowledge and skills related to mathematics in a variety of contexts.	
(4)	The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and	

	communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	
(5)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(6)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(c)	**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 and entrepreneurship opportunities in the field of equine science;	
(B)	demonstrate competencies related to resources, information, interpersonal skills, and systems of operation in equine science;	
(C)	demonstrate knowledge of personal and occupational health and safety practices in the workplace;	
(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities.	
(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership.	
(F)	Research career topics using technology such as the Internet.	
(2)	Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	
(A)	apply mathematics to problems arising in everyday life, society, and the workplace;	
(B)	use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;	
(C)	select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;	

(D)	communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;	
(E)	create and use representations to organize, record, and communicate mathematical ideas;	
(F)	analyze mathematical relationships to connect and communicate mathematical ideas; and	
(G)	display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	
(3)	The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to:	To develop a foundation for all math related to agricultural mathematics.
(A)	add, subtract, multiply, and divide whole numbers, fractions, and decimals as related to agriculture, food and natural resources.;	
(B)	apply mathematical skills needed for agriculture, food and natural resources such as measurement, conversion, and data analysis;	
(C)	find solutions to agriculture, food and natural resources problems by calculating percentages and averages;	
(D)	convert between English and metric units;	
(E)	use scientific calculations to determine weight, volume, and linear measurements;	
(F)	solve word problems using ratios and dimensional analysis;	
(G)	interpret data using tables, charts, and graphs; and	
~~(1)~~(4)	The student demonstrates mathematics knowledge and skills required to solve problems related to the agriculture, food, and natural resources industries. The student is expected to:	
(A)	demonstrate use of relational expressions in agribusiness, animal, environmental service, food products and processing, natural resources, plant, and power, structural, and technical systems such as equal to, not equal, greater than, and less than;	
(B)	apply statistical and data analysis to solve problems in agribusiness, animal, environmental service, food products and processing, natural resources, plant, or power, structural, and technical systems;	
(C)	analyze mathematical problem statements for missing or irrelevant data essential to agribusiness, animal, environmental service, food products and processing, natural resources, plant, and power, structural, and technical systems;	

(D)	construct and analyze charts, tables, and graphs from functions and data generated in agribusiness, animal, environmental service, food products and processing, natural resources, plant, and power, structural, and technical systems;	
(E)	analyze data using measures of central tendency when interpreting operational documents in agribusiness, animal, environmental service, food products and processing, natural resources, plant, and power, structural, and technical systems; and	
(F)	use mathematic operations and knowledge of relationships to solve problems inherent to systems of agriculture and agribusiness such as the calculation of gallons of water from inches of rain, acres of ground water, liquid and gaseous volumes, and conversion of units; calculation of caloric value, parts per million of restricted ingredients, conversion of measurements, and United States Department of Agriculture (USDA) grades; and estimation of wildlife populations, pulpwood yields, and calculation of mapping data.	
~~(2)~~(5)	The student demonstrates mathematics knowledge and skills to solve problems related to agribusiness systems and career opportunities. The student is expected to:	
(A)	use mathematic operations and knowledge of relationships to solve daily problems inherent to agribusiness systems such as record keeping, profit/loss statements, income statements, capital asset inventories, insurance, risk management, lease agreements, loan documentation, employee payroll, benefits, investments, tax documentation, and real estate contract documentation;	
(B)	demonstrate knowledge of algebraic applications linear and exponential functions related to agribusiness systems concepts such as simple interest, compound interest, maturity value, tax rates, depreciation, production analysis, market trends, investments, and price determination; and	
(C)	demonstrate use of statistical and data analysis for the evaluation of agribusiness systems such as the collection of demographic, production, consumption, weather, market data for analysis through counts, percentages, central tendency, and prediction. Data is to be reported numerically or graphically on concepts such as pricing, market trends, commodity prices, exports and imports, supply and demand, and production yields.	
~~(3)~~(6)	The student demonstrates mathematics knowledge and skills to solve problems related to animal systems and career opportunities. The student is expected to:	
(A)	use mathematic operations and knowledge of relationships to solve problems inherent to animal systems such as the calculation of purchasing and marketing, housing requirements, conversion of units, average daily gain, topical and	

	injectable medications, USDA grade calculation, feeding schedules, volumes, production cost, stocking rates, breeding, and gestation;	
(B)	demonstrate knowledge of algebraic applications related to animal systems concepts such as ration calculation using the Pearson Square, percent homozygosity, heritability, USDA grade calculation, gene frequency, cost per unit of nutrient, and weaning weight ratio;	
(C)	use geometric principles to solve problems inherent to animal systems such as square footage for housing requirements; acreage calculation for normal and irregular shaped pastures; the use of right triangles for perpendicular cross fencing; calculation of feed bin volume based upon shape such as cylinder, cone, cube, or pyramid; and housing volume calculations for ventilation; and	
(D)	demonstrate use of statistical and data analysis in animal systems such as the collection and analysis of production data to be reported numerically or graphically on concepts such as birth weight, weaning weights, days to market weight, expected progeny differences, feed efficiencies, birth type, litter size, presence or absence of genetic abnormality, milk production, sow productivity index, and veterinary costs or records.	
~~(4)~~(7)	The student demonstrates mathematical knowledge and skills to solve problems related to environmental service systems and career opportunities. The student is expected to:	
(A)	demonstrate knowledge of algebraic applications to create solutions to problems related to environmental service systems concepts such as the calculation of acre feet of water, water volume in ponds, water well volume, water pressure friction loss, flow rate, total head pressure, pump efficiency, soil solids volume, and soil degree of saturation;	
(B)	use geometric principles to solve problems inherent to environmental service systems such as acreage calculation for normal and irregular shaped pastures, calculating slope of land, planning runoff drainage structures, and applying differential leveling techniques; and	
(C)	demonstrate use of statistical and data analysis in environmental service systems such as the collection and analysis of environmental data to be reported numerically or graphically on concepts such as rainfall, soil classifications, groundwater levels, recycling activities, and pollution rates.	
~~(5)~~(8)	The student demonstrates mathematics knowledge and skills required to solve problems related to food products and processing systems and career opportunities. The student is expected to:	

(A)	demonstrate knowledge of algebraic applications related to food products and processing systems concepts such as the calculation of exponential growth of bacteria, contribution margin in processing, percentage of weight loss in packaged food, percentage of water absorption in packaged food, and microbe analysis following pasteurization;	
(B)	use geometric principles to solve problems inherent to food products and processing systems such as the calculation of packaging requirements, construction of food storage structures and containers, liquid transfer materials, and vessels design and volume; and	
(C)	demonstrate use of statistical and data analysis in food products and processing systems data to be reported numerically or graphically on concepts such as governmental regulations, hazard analysis, critical control points data, taste tests, quality assurance data, and industry packing practices.	
~~(6)~~(9)	The student demonstrates mathematics knowledge and skills to solve problems related to natural resources systems and career opportunities. The student is expected to:	
(A)	demonstrate knowledge of algebraic applications related to natural resource systems concepts such as the calculation of mean harvest area, calibration of pesticides, and the Doyle Log Rule;	
(B)	use geometric principles to solve problems inherent to natural resource systems such as planning and construction of structures related to wildlife and fisheries management, determination of lumber volume in given tree stock, and calculation of tank volume for chemical application; and	
(C)	demonstrate use of statistical and data analysis for the evaluation of natural resource systems data to be reported numerically or graphically for resource data analysis, analysis of Geographic Information Systems and Global Positioning Systems data, analysis of weather-related data, and analysis of data related to wildlife and habitat.	
~~(7)~~(10)	The student demonstrates mathematics knowledge and skills to solve problems related to plant systems and career opportunities. The student is expected to:	
(A)	use mathematic operations and knowledge of relationships to solve problems inherent to plant systems such as the calculation of crop yields, crop loss, grain drying requirements, grain weight shrinkage, germination rates, greenhouse heating, and cooling and fertilizer application rates;	
(B)	demonstrate knowledge of algebraic applications related to plant systems concepts such as the calculation of grain handling efficiency, harvesting	

	capacity, crop rotation, seeding rates, fertilizer nutrient requirements, and greenhouse ventilation;	
(C)	use geometric principles for the analysis of problems inherent to plant systems such as plan grain storage structures, volume of grain storage vessels, grain handling volume, greenhouse capacity, and regular and irregular shaped planting bed size; and	
(D)	demonstrate use of statistical and data analysis in plant systems such as crop yields, Global Information Systems data, plant growth data, and climate data.	
~~(8)~~(11)	The student demonstrates mathematics knowledge and skills to solve problems related to power, structural, and technical systems education and career opportunities. The student is expected to:	
(A)	use mathematic operations and knowledge of relationships to solve problems inherent to power, structural, and technical systems such as the calculation of gear ratio, fuel efficiency, construction costs, project layout, energy costs, unit conversions, bid preparation, and labor-related calculations;	
(B)	demonstrate knowledge of algebraic applications related to power, structural, and technical systems concepts such as the calculation of strength of magnetism, chain or belt tension, horsepower, Ohm's Law, hydraulic multiplication of force, and Mohr's Circle tensile strength test;	
(C)	use geometric principles for the evaluation of problems inherent to power, structural, and technical systems such as rafter length, land measurement, differential leveling, concrete volume, heating, ventilating, and air conditioning requirements and creation of structural drawings;	
(D)	use statistical and data analysis to evaluate power, structural, and technical systems problems such as construction cost data; equipment maintenance; heating, ventilating, and air conditioning efficiencies; engine performance; and labor costs; and	
(E)	use geometry concepts to develop and implement a plan for construction of a project such as a trailer, an agricultural structure, a storage facility, or a fence.	
~~(9)~~(12)	The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	

(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.13. Food Technology and Safety (~~One-Half to~~ One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in value-added and food processing systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to value-added and food processing and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings. This course examines the food technology industry as it relates to food production, handling, and safety.	
(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.	
(c)	**Knowledge and skills**.	
~~(10)~~ (1)	The student ~~learns the employability characteristics of a successful employee~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	locate and identify career opportunities that appeal to personal career goals;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation of value-added and food processing;	
(C)	demonstrate knowledge of personal and occupational health and safety practices in the workplace;	
(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities~~., and good citizenship skills.~~	Removed good citizenship to break out into its own TEKS
(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and	Added to ensure community and leadership

	community leadership.	involvement
(F)	Research career topics using technology such as the Internet.	Internet resources can be utilized to research all TEKS
~~(1)~~(2)	The student explains the impact of food science systems. The student is expected to:	
(A)	know the significance of food science systems;	
(B)	define trends in food production, world population, and supply and demand for food products;	
(C)	research trends in animal and food science research; and	
(D)	evaluate the relationship between biotechnology and the food science industry.	
~~(2)~~(3)	The student analyzes the nutritive value of food constituents. The student is expected to:	
(A)	define the terms used in food technology;	
(B)	compare and contrast the nutritive value of food groups; and	
(C)	apply data and measurements to solve a problem related to food processing.	
~~(3)~~(4)	The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	
(A)	identify food industry inspection standards, including hazard analysis and critical control points;	
(B)	describe procedures for insect and rodent control;	
(C)	identify appropriate chemicals used in the food industry~~; and~~	
(D)	assess conditions with regard to safety and health; and	
(E)	identify specific regulation for organic animal products, grains, and produce.	The organic industry is very different from traditional production agriculture, as well as a major food market.
~~(4)~~(5)	The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	
(A)	research regulations dealing with preserving red meat, poultry, and fish;	
(B)	describe packaging, labeling, and storage requirements for red meat, poultry, and fish;	
(C)	explain the impact of temperature in food preservation; ~~and~~	
(D)	compare and contrast packaging requirements~~.~~; and	

(E)	evaluate cultural practices and exotic species in food harvesting and processing.	The large demand in cultural diversity of food processes has changed, and also exotic regulations for food processing are very different than traditional methods.
~~(5)~~(6)	The student compares and contrasts issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare, to demonstrate an understanding of the trends and issues important to careers in the food science industry. The student is expected to:	
(A)	select solutions for different environmental issues;	
(B)	identify issues affecting food science;	
(C)	research history and policies related to ~~the~~ food science issues;	Clarification to the educator.
(D)	analyze and defend solutions for different environmental issues; and	
(E)	learn economic principles in order to apply them to food science systems such as supply, demand, and profit.	
~~(6)~~(7)	The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	
(A)	describe preparing livestock carcasses for market;	
(B)	describe United States Department of Agriculture inspection and grading procedures;	
(C)	identify wholesale and retail cuts;	
(D)	evaluate and grade beef, pork, ~~and~~ lamb, and goat carcasses and wholesale cuts; and	Goat meat has become a staple in the Texas meat market.
(E)	identify methods of fabricating and marketing processed meats.	
~~(7)~~(8)	The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	
(A)	describe processing techniques;	
(B)	demonstrate poultry and retail cuts evaluation;	
(C)	identify grades and classes of eggs, poultry, fish, and seafood;	
(D)	fabricate specialty and value-added products;	
(E)	know quality and portion control procedures; and	
(F)	describe marketing procedures for eggs, poultry, fish, and seafood.	
~~(8)~~(9)	The student describes the processing, packaging, quality analysis, and marketing of fruits,	

	nuts, and vegetables and their by-products. The student is expected to:	
(A)	identify, classify, and grade fruits, nuts, and vegetables;	
(B)	demonstrate trimming, washing, waxing, peeling, blanching, and other marketing techniques;	
(C)	research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables; and	
(D)	discuss preserving, packaging, and storing fruits, nuts, and vegetables.	
~~(9)~~(10)	The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:	
(A)	describe methods of preparing milk for processing;	
(B)	evaluate methods of processing milk and dairy products;	
(C)	identify cultured milk products and frozen dairy desserts;	
(D)	process, classify, and grade cheese; and	
(E)	identify dairy products.	
(11)	The student develops an ~~improved~~ supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.14. Food Processing (One ~~to Two~~ Credit~~s~~).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12. Recommended prerequisite: Food Technology and Safety	
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in food products and processing systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to natural resources and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings. This course focuses on the food processing industry with special emphasis on the handling, processing, and marketing of food products.	
(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.	
(c)	**Knowledge and skills**.	
~~(5)~~ (1)	The student ~~learns the employability characteristics of a successful employee~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the value-added and food processing industry;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in the value-added and food processing industry;	
(C)	demonstrate knowledge of personal and occupational safety practices in the workplace;	

(D)	identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities~~., and good citizenship skills.~~	Removed good citizenship to break out into its own TEKS
(E)	Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership; and	Added to ensure community and leadership involvement
~~(E)~~(F)	~~access and navigate the Internet for research~~. Research career topics using technology such as the Internet.	Computer resources can be utilized to research all TEKS
~~(1)~~(2)	The student knows the relationship of the food processing industry to the free enterprise system. The student is expected to:	
(A)	explain the importance of the food processing industry in the free enterprise system; and	
(B)	explain trends in the consumption of food products.	
~~(2)~~(3)	The student understands consumer satisfaction issues. The student is expected to:	
(A)	practice equipment maintenance and sanitation procedures;	
(B)	explain the factors that affect food palatability;	
(C)	fabricate red meat, poultry, game, and fish into wholesale and retail cuts; and	
(D)	demonstrate work ethics, customer relations skills, and management competencies consistent with industry standards.	
~~(3)~~(4)	The student understands quality control issues in food processing. The student is expected to:	
(A)	practice procedures relating to the safe manufacture of foods through hygienic food handling and processing;	
(B)	develop and maintain sanitation schedules;	
(C)	describe hazard analysis and critical control point implementation issues;	
(D)	research food safety laws; and	
(E)	describe solutions for different environmental issues.	
~~(4)~~(5)	The student identifies marketing considerations for food processing. The student is expected to:	
(A)	practice methods of merchandising red meat, poultry, game, fish, and their by-products;	
(B)	identify, select, and grade meat;	
(C)	develop food preservation programs using appropriate food preservation methods	

(D)	explain~~ing~~ the impact of temperature in food preservation; and	
(E)	compare~~ing~~ and contrast~~ing~~ packaging preservation such as film, plastic, and can; ~~and~~	
~~(D)~~ (F)	describe harvest and inspection techniques to process food products and analyze food product options~~.~~; and	
(G)	identify specific criteria for various organic food processing and marketing.	
(6)	The student develops an ~~improved~~ supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper record-keeping skills related to a supervised experience;	
(C)	design and use a customized record-keeping system for the individual supervised experience;	
(D)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(E)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	

§130.2. Principles of Agriculture, Food, and Natural Resources (~~One-half to~~ One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 9-12	VA
(b)	**Introduction.**	CCRS
(1)	CTE 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 & 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)	To be prepared for careers in agriculture, food, and natural resources, students must attain academic skills and knowledge in agriculture. This course allows students to develop knowledge and skills regarding career and educational opportunities, personal development, globalization, industry standards, details, practices, and expectations. To prepare for success, students need to have 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.	
(c)	**Knowledge and skills.**	
(1)	The student ~~learns the employability characteristics of a successful employee~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	Streamline language
(A)	identify career development, education, and entrepreneurship opportunities in the field of agriculture, food, and natural resources, ~~including how to~~ such as how to seek ~~search for~~ and obtain employment, what qualifications are required for varying career fields, and how to advance in a position, ~~including:~~ such as licenses, certifications, endorsements and degrees;	MV, VA, CCRS
~~(B)~~	~~identify careers in agriculture, food, and natural resources with required aptitudes in science, mathematics, language arts, and social studies;~~	MV, CCRS See 1E
~~(C)~~ (B)	apply competencies related to resources, information, interpersonal skills, problem	

	solving, critical thinking, and systems of operation in agriculture, food, and natural resources;	
~~(D)~~ (C)	demonstrate knowledge of personal and occupational safety, ~~health~~, environmental regulations, and first-aid policy in the workplace; and	Streamline for redundant see 15.F
~~(E)~~	~~develop response plans to emergency situations; and~~	MV: redundant see 1.D
~~(F)~~ (D)	~~identify~~ analyze employers' expectations, ~~including~~ such as appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.	CCRS rigor
~~(B)~~ (E)	identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and social studies;	MV, CCRS
(2)	The student develops a supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document, and evaluate a ~~entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified,~~ supervised agricultural~~, food, and natural resources~~ experience as a~~n experiential~~ learning activity;	MV: scope too broad and allow for broader scope
(B)	apply proper record-keeping skills as they relate to the supervised agricultural experience;	
~~(C)~~	~~design and use a customized record-keeping system for the individual supervised agricultural experience~~;	MV: scope too broad
(C)	participate in youth leadership opportunities to create a well-rounded experience program ~~in AFNR;~~ and	MV: narrow scope
~~(E)~~ (D)	produce and participate in an ~~challenging~~ approach for a local program of activities in agriculture, food, and natural resources utilizing a strategic planning process.	MV: allowed for broader scope and include redundant TEK 5.F
(3)	The student ~~identifies~~ analyzes concepts related to ~~cultural~~ global diversity. The student is expected to:	CCRS: rigor Modern language
(A)	~~discuss significant similarities and differences in international agriculture~~, compare and contrast global agricultural markets, currency, and trends;	MV: redundant, rigor, and modernize language
~~(B)~~	~~explain the variety of world markets; and~~	MV: redundant
~~(C)~~ (B)	~~describe~~ evaluate marketing factors and practices that impact ~~other cultures~~ the global markets.	MV: modernize language
(4)	The student ~~describes~~ explains the historical, current, and future significance of the	MV: rigor, allow for broader scope, and see

	agricultural, food, and natural resources industry. The student is expected to:	redundant 6
(A)	~~define agriculture~~ define the scope agriculture;	MV: redundant and narrow in scope
(B)	~~identify~~ analyze the scope of agriculture, food, and natural resources and its effect upon society;	MV: rigor and allow for broader scope
(C)	~~identify~~ evaluate significant historical and current agriculture, food, and natural resource developments;	CCRS rigor
(D)	identify potential future scenarios for agriculture, food, and natural resource systems, including global impacts;	VA
(E)	describe how emerging technologies and globalization impacts agriculture, food, and natural resources; and	
(F)	compare and contrast issues impacting agriculture, food, and natural resources such as biotechnology, employment, safety, environmental, and animal welfare.	
(5)	The student analyzes the structure of agricultural, food, and natural resources leadership in organizations. The student is expected to:	MV: Allow for broader scope
(A)	develop and demonstrate premiere leadership skills and collaborate with others to accomplish organizational goals and objectives ~~through the demonstration of characteristics such as empowerment, risk, communication, focusing on results, decision making, problem solving, investment in individuals, resource use and access, service, listening, coaching, developing others, team development, understanding and appreciating others, enthusiasm, creativity, conviction, mission, courage, focus, principles, change, integrity, values, ethics, humility, perseverance, self-discipline, responsibility, community, diversity, global awareness and knowledge, innovation, intuition, adaptation, lifelong learning, and coachability~~;	CCRS MV, redundant
(B)	develop and demonstrate personal growth skills and collaborate with others to accomplish organizational goals and objectives; and ~~through the demonstration of characteristics such as attitude, exercise, goal setting, planning, self-discipline, sense of balance, persistence, respect, friendship, integrity, morals, values, etiquette, citizenship, cross-cultural awareness, acceptance of change, respect for differences, decision making, principles, dependability, loyalty, trustworthiness, communication, learning, critical thinking, reasoning, creative thinking, problem solving, self-discovery, coping, friendship, self-reliance, sense of balance, empathy, compassion, ethics, coping, courage, and self-image or worth;~~	CCRS MV: redundant
~~(C)~~	~~identify opportunities for leadership development and personal growth;~~	MV: redundant
~~(D)~~ (C)	demonstrate democratic principles in conducting effective meetings~~;~~.	

~~(E)~~	~~describe team dynamics; and~~	MV: redundant
~~(F)~~	~~describe the development of organizational vision, mission, and goals through strategic planning processes~~.	MV: redundant added to 2.E
~~(6)~~	~~The student explains agriculture, food, and natural resource systems at the local, state, national, and international levels. The student is expected to:~~	MV: redundant added to 4
~~(A)~~	~~identify reasons for world trade~~;	
~~(B)~~	~~identify the political impact of agriculture, food, and natural resources~~;	
~~(C)~~	~~identify the interdependency of agriculture and the environment~~;	
~~(D)~~	~~explain ethical stewardship practices that reduce negative impacts of agriculture upon land, air, and water resources~~;	
~~(E)~~	~~review regulations and major laws to evaluate their impact on agriculture, food, and natural resources management~~;	
~~(F)~~	~~analyze appropriate written material to stay abreast of current issues impacting agriculture, food, and natural resources management~~;	
~~(G)~~	~~collect and analyze public opinion and data in order to make informed decisions; and~~	
~~(H)~~	~~use critical thinking skills to identify, organize alternatives, and evaluate public policy issues related to agriculture, food, and natural resources~~.	
~~(7)~~ (6)	The student demonstrates appropriate personal and communication skills. The student is expected to:	
~~(A)~~	~~describe professional, ethical, and legal responsibilities~~;	MV: redundant see 1.F
~~(B)~~	~~demonstrate the uses of proper etiquette and behavior;~~	MV: redundant see 1.F
~~(C)~~	~~identify appropriate personal appearance and health habits;~~	MV: redundant see 1.F
~~(D)~~ (A)	~~practice~~ demonstrate written and oral communication skills ~~and employ effective listening skills in~~ appropriate for formal and informal situations,~~ including~~ such as prepared and extemporaneous presentations;	CCRS: rigor MV: separate for clarification see 7.E
~~(E)~~ (B)	~~analyze written materials common to the agricultural industry;~~ demonstrate effective listening skills appropriate for formal and informal situations;	MV: redundant see 4 and separation from 7.D
~~(F)~~	~~demonstrate sound writing and preparation skills for oral presentations, including prepared and extemporaneous presentations; and~~	MV: redundant see 7.D
~~(G)~~	~~demonstrate effective speaking skills~~.	MV: redundant see 7.D

~~(8)~~ (7)	The student applies appropriate research methods to agriculture, food, and natural resources topics. The student is expected to:	
(A)	~~define apply~~ discuss major research and development fields of agriculture, food, and natural resources;	MV: rigor and incorporates redundant 8.B
~~(B)~~	~~identify and apply research in the food and fiber products industries~~;	MV: redundant see 8.A
~~(C)~~ (B)	~~use~~ utilize a variety of resources for ~~both~~ research and development; and	MV: streamline language
~~(D)~~ (C)	describe scientific methods of research.	Committee recommends moving to (A) in sequence
~~(9)~~ (8)	The student applies problem-solving, mathematical, and organizational skills in order to ~~plan and propose supervised agricultural experience programs as well as~~ maintain financial and logistical records. The student is expected to:	MV: redundant see 2 and align with scope of expectations
(A)	develop a formal business plan ~~project proposals by using business strategies which may include identifying learning objectives; describing project logistics, methodologies, and background; forecasting expenses and potential income through budgeting; and planning for major project timeline events through calendar implementation and documentation~~; and	MV: streamline language
(B)	develop, ~~and~~ maintain, and analyze records ~~appropriate to project type following project approval;~~	MV: rigor and streamline language
~~(C)~~	~~maintain appropriate financial records through use and management of appropriate journals, inventories, income and expense logs, financial statements, and balance sheets; and~~	MV: redundant see 9.B
~~(D)~~	~~conduct formative and summative reflective and financial analyses on project learning objectives and records in order to plan for the future.~~	MV: redundant see 9.A and 9.B
~~(10)~~ (9)	The student uses information technology tools ~~specific to agriculture, food, and natural resource~~ to access, manage, integrate, and create information related to agriculture, food, and natural resource. The student is expected to:	MV: clarify definition of language
(A)	~~identify utilize personal management software, electronic mail applications, word-processing, spreadsheet, and presentation software, and Internet applications;~~ apply technology using applications such as industry relevant software and Internet applications	MV: CCRS, rigor, incorporate redundant 10.B
~~(B)~~	~~use word-processing, spreadsheet, and presentation software;~~	MV: redundant see 10.A
~~(C)~~ (B)	~~identify~~ utilize collaborative, groupware, and virtual meeting software;	CCRS rigor
~~(D)~~(C)	~~explain the benefits of Geographic Information Systems and Global Positioning Systems; and~~ analyze the benefits and limitations of emerging technology such as online mapping systems, and drones and robotics;	MV: redundant see 10.E

~~(E)~~ (D)	~~recognize~~ explain the benefits of ~~other~~ computer-based and mobile application equipment in agriculture, food, and natural resources.	CCRS rigor and modern technology
~~(11)~~ (10)	The student develops technical knowledge and skills related to ~~plant~~ soil systems. The student is expected to:	Clarify strand of expectations
(A)	identify the components and properties of soils;	
(B)	identify and describe the process of soil formation;	Clarification of expectation
(C)	~~classify soil formations;~~ conduct experiments related to soil chemistry.	Rigor and clarification of scope
(11)	The student develops technical knowledge and skills related to plant systems. The student is expected to:	Clarify strand of expectations
~~(D)~~ (A)	describe the structure and functions of plant parts;	
~~(E)~~ (B)	discuss and apply plant germination, growth, and development;	CCRS rigor
~~(F)~~ (C)	describe plant reproduction, genetics, and breeding;	
~~(G)~~ (D)	identify plants of importance to agriculture, food, and natural resources;	Committee recommends moving to (A)
~~(H)~~	~~identify technological needs for improved capacity in transportation, improved production, increased product quality and operation, and specialized skills specific to plant systems; and~~	
~~(I)~~ (E)	~~select, maintain, operate, and use~~ utilize tools, equipment, and personal protective equipment common to plant systems.	Streamline language
(12)	The student develops technical knowledge and skills related to animal systems. The student is expected to:	
(A)	describe animal growth and development;	
(B)	identify animal anatomy and physiology;	
(C)	identify and evaluate breeds and classes of livestock; and	CCRS rigor
(D)	~~discuss~~ explain animal selection, reproduction, breeding, and genetics.	MV
(13)	The student describes the principles of food products and processing systems. The student is expected to:	
(A)	~~identify the importance of~~ evaluate food products and processing systems;	CCRS rigor
(B)	determine trends in world food production;	
(C)	~~identify technological needs for improved capacity in transportation, improved production, increased product quality and operation, and specialized skills specific to food products and processing systems; and~~ discuss current issues in food	Outside of course scope CCRS rigor

	production;	
(D)	~~select, maintain, operate, and use~~ utilize tools, equipment, and personal protective equipment common to food products and processing systems.	Streamline language
(14)	The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	
(A)	identify major areas of power, structural, and technical systems ~~as well as their impact on world agricultural production;~~	MV: scope to broad
(B)	~~understand~~ utilize safe and appropriate laboratory procedures and policies;	CCRS rigor
(C)	create proposals that include bill of materials, budget, schedule, drawings, and technical skills developed for basic power, structural, and technical system projects or structures;	
(D)	identify building materials and fasteners ~~common to power, structural, and technical systems~~; and	Streamline language
~~(E)~~	~~use basic tools, skills, and common building materials to construct projects or structures;~~	Redundant see 14.F
~~(F)~~ (E)	~~select, maintain, operate, and use~~ utilize tools, equipment, and personal protective equipment common to power, structural, and technical systems~~; and.~~	Streamline language
~~(G)~~	~~identify technological needs for improved capacity in transportation, improved production, increased product quality and operation, and specialized skills specific to power, structural, and technical systems.~~	Outside course scope
(15)	The student explains the relationship between agriculture, food, and natural resources ~~and safety, health,~~ and the environment. The student is expected to:	Clarify strand of expectations
(A)	determine the effects of agriculture, food, and natural resources upon safety, health, and the environment;	
(B)	identify regulations relating to safety, health, and environmental systems in agriculture, food, and natural resources;	
(C)	~~describe~~ identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources;	CCRS rigor
(D)	~~identify~~ research and analyze alternative energy sources that stem from or impact agriculture, food, and natural resources; and	CCRS rigor
(E)	evaluate energy and water conservation methods~~;~~ ~~and~~	End of expectations
~~(F)~~	~~describe the importance of safety, health, and environmental regulations and procedures in the workplace.~~	redundant see 1.D

§130.15. Wildlife, Fisheries, and Ecology Management (~~One-Half to~~ One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements.** This course is recommended for students in Grades 9-12.	
(b)	**Introduction.**	
(1)	CTE 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 & 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)	To be prepared for careers in natural resource systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings. This course examines the management of game and non-game wildlife species, fish, and aquacrops and their ecological needs as related to current agricultural practices.	
(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.	
(c)	**Knowledge and skills.**	
(1)	~~The student learns the employability characteristics of a successful employee. The student is expected to:~~ The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	Common language
(A)	identify career development, education, and entrepreneurship opportunities in the field of natural resources, including: licenses, certifications, endorsements and degrees;	MV, CCRS, VA
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in natural resources;	

(C)	demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace; and	Consistency in language
(D)	~~identify~~ analyze employers' expectations, such as ~~including~~ appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.	CCRS rigor
(2)	The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	Moved all of 2 from 10 or 11
(A)	plan, propose, conduct, document, and evaluate a supervised agricultural experience as a learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	participate in youth leadership opportunities to create a well-rounded experience program;	
(D)	produce and participate in a local program of activities utilizing a strategic planning process;	
(3) ~~(2)~~	The student analyzes the importance of wildlife, with an emphasis on use and management. The student is expected to:	
(A)	analyze the importance of wildlife, fisheries, and ecology management;	
(B)	discuss the history of wildlife, fisheries, and ecology management;	Depth of scope
(C)	discuss policies, laws, and the administration of wildlife, fisheries, and ecology management; and	
(D)	~~describe how public recreation use is a product~~ analyze the economic impact of public recreation.	CCRS and clarity of scope
(4) ~~(3)~~	The student knows the scientific basis ~~for~~ and applies concepts related to wildlife management. The student is expected to:	CCRS and clarity of scope
(A)	~~identify~~ analyze the basic ecological concepts of game management;	CCRS
(B)	identify ~~game, non-game, and fish species;~~ game, non-game, upland game birds, fur bearers, migratory game birds and water fowl, protected ~~and~~ endangered ~~species~~, predator ~~and prey~~, freshwater and salt water species;	MV: Clarity of Scope
(C)	describe and assess the management of wildlife populations;	CCRS
(D)	identify ~~observable~~ diseases and parasites impacting ~~plants and animals~~ wildlife species; ~~and~~	Depth of scope
(E)	~~describe how to~~ discuss the appropriate method of reporting ~~observance of~~	Depth of scope

	disease ~~infestations~~ and parasite outbreaks;	
(F)	identify plants impacting aquacultural and wildlife management practices; and	
(G)	discuss habitat and food plot management to benefit aquacultural and wildlife species.	
(5) ~~(4)~~	The student knows the interrelationships between the various aspects of wildlife and outdoor public use management. The student is expected to:	
(A)	~~identify special areas of importance in wildlife and public use~~; discuss the importance and role of the Wildlife Management Areas of Texas in the management of private and public lands;	Clarity of scope
(B)	identify laws and regulations regarding the use of wildlife resources;	
(C)	~~discuss~~ apply laws and regulations regarding recreation safety; such as: Angler Education, Hunter Safety, Boater Safety, Outdoor Education, and Archer Education;	CCRS and clarity of Scope
(D)	~~list factors involved in landowner and property rights~~ compare and contrast public and private land use;	Clarity of TEK
(E)	~~demonstrate specific~~ identify appropriate safety certification requirements;	Appropriate application of TEK
(F)	~~demonstrate~~ recognize precautions to use when interfacing with the public concerning regulations and law enforcement;	Depth of scope
(G)	describe security issues for closed and restricted areas;	
~~(H)~~	~~describe solutions to issues concerning public protection;~~	Redundant
(H) ~~(I)~~	recognize potential threat situations for the public ~~and other users~~ of dangers on public and private lands;	Clarity of TEK
(I) ~~(J)~~	~~identify the appropriate~~ recognize the role of law enforcement ~~authority~~; and	Clarity of TEK
(J) ~~(K)~~	~~describe~~ summarize wildlife and fish harvest techniques and procedures~~; and~~	Depth of scope
~~(L)~~	~~describe fish harvest techniques and procedures.~~	Streamline scope and sequence
(6) ~~(5)~~	The student examines natural cycles and ecological concepts. The student is expected to:	
(A)	explain the hydrologic, nitrogen, carbon, and nutrient cycles;	
(B)	~~describe~~ evaluate the impact of natural cycles on succession;	CCRS rigor
(C)	~~describe~~ analyze the effects of natural cycles on population dynamics;	CCRS rigor and clarity of scope
(D)	distinguish between primary and secondary producers;	

(E)	~~describe~~ compare and contrast predator-prey relationships;	CCRS rigor
(F)	~~identify potential~~ evaluate the effects of pollution sources; and	CCRS rigor and streamline of scope
(G)	~~define watershed boundaries~~ evaluate riparian zones;	Relevancy
~~(H)~~	~~use the stream classification system; and~~	Outside of scope
~~(I)~~	~~describe the influence of weather and climatic factors.~~	Redundant TEK, see 5.B-C
(7) ~~(6)~~	The student applies cartographic skills to natural resource activities. The student is expected to:	
(A)	~~describe~~ compare and contrast ~~different~~ types of maps;	CCRS rigor
(B)	interpret map features and legends;	
(C)	~~determine~~ compare map scale to ~~and~~ actual distance;	CCRS rigor
~~(D)~~	~~determine direction from map;~~	Streamline of scope
~~(E)~~ (D)	~~determine~~ evaluate elevation and terrain features from topographic maps;	Streamline of language
~~(F)~~	~~use directional tools with maps to locate position;~~	Redundant TEK, see 6.B
~~(G)~~ (E)	use land survey and coordinate system; and	
~~(H)~~ (F)	Locate position and interpret images using a geospatial interface. ~~use a Geographic Information System to interface geospatial data and interpret photos and images.~~	Clarity and streamline of TEK
(8) ~~(7)~~	The student evaluates planning data by monitoring natural resource status. The student is expected to:	CCRS rigor
(A)	~~describe~~ identify resource inventory and population studies;	Clarity for TEK strand
(B)	devise sample plots and points;	
(C)	identify and locate resources;	
(D)	interpret data concerning resource availability and health;	
(E)	organize databases of resource data; and	
~~(F)~~	~~use a Geographic Information System to analyze resource data;~~	Redundant, see 6.H
~~(G)~~ (F)	create a technical report~~; and~~.	Committee recommends moving to 7.H
~~(H)~~	~~describe the relationship of harvest levels to long-term availability of resources.~~	Redundant, see 4.K
(9) ~~(8)~~	The student analyzes various natural resource enhancement techniques using	Depth of scope

	scientific knowledge. The student is expected to:	
(A)	~~demonstrate stream~~ develop riparian zone enhancement techniques ~~plan~~;	Scope of course
(B)	~~demonstrate~~ evaluate wildlife habitat enhancement plans ~~techniques~~; and	CCRS rigor
(C)	~~demonstrate~~ evaluate public use and recreation area enhancement ~~techniques~~ plan.	Scope of course
~~(9)~~	~~The student demonstrates the concepts related to the importance of facilities, harvest, processing, and marketing of aquaculture products. The student is expected to:~~	Depth of course
~~(A)~~	~~discuss the importance and progress of aquaculture as an emerging industry; and~~	
~~(B)~~	~~identify and classify plant and animal aquaculture species.~~	
(10)	The student demonstrates concepts related to optimum production. The student is expected to:	
(A)	discuss the importance and progress of aquaculture as an emerging industry; and	
(B)	describe determine nutritional aspects requirement of aquaculture production	
~~(A)~~	~~describe nutritional aspects of aquaculture production;~~	CCRS and clarity of language
~~(B)~~ (C)	identify requirements for optimum growth of species-specific aqua crops/aquaculture products; and	Consistent language
~~(C)~~	~~plan and administer determine appropriate treatments for diseases, parasites, predators, and pests of species-specific aquacropsaquaculture products;~~	Scope of course and consistent language
~~(D)~~	~~recognize weather-related dangers;~~	Redundant, see 9.D
~~(E)~~	~~recognize hazards as they relate to terrain;~~	Redundant, see 9.D
~~(F)~~	~~identify poisonous plants and animals;~~	Redundant, see 9.D
~~(G)~~	~~recognize hazardous situations; and~~	Redundant, see 9.D
(D)	identify appropriate treatments for diseases and parasites impacting aquacultural and wildlife species.	
~~(H)~~	~~demonstrate personal fire prevention precautions while working in natural environments.~~	Redundant, see 9.D
~~(11)~~	~~The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:~~	

~~(A)~~	~~plan, propose, conduct, and evaluate an entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, agricultural experience as an experiential learning activity;~~	Scope too broad
~~(B)~~	~~apply proper record-keeping skills as they relate to a supervised experience;~~	
~~(C)~~	~~design and use a customized record-keeping system for the individual supervised experience;~~	Scope too broad
~~(D)~~	~~participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and~~	MV: scope too narrow
~~(E)~~	~~produce and participate in an challenging approach for a local program of activities in agriculture.~~	MV: Allow for broader scope and include redundant 11.D

§130.16. Range Ecology and Management (~~One-Half to~~ One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	
(b)	**Introduction.**	
(1)	CTE 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 & 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)	To be prepared for careers in environmental and natural resource systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to environmental and natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings. This course is designed to develop students' understanding of rangeland ecosystems and sustainable forage production.	
(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.	
(c)	**Knowledge and skills.**	
~~(2)~~ (1)	The student ~~learns the employability characteristics of a successful employee~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	Streamline
(A)	identify career development, education, and entrepreneurship opportunities in the field of environmental and natural resources, such as licenses, certifications, endorsements and degrees;	MV, CCRS, VA
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in environmental and natural resources;	
(C)	demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace; and	Common language

(D)	~~identify~~ analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.	CCRS rigor
(1) (2)	The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document, and evaluate a ~~entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified,~~ supervised agricultural, food, and natural resources experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to a supervised experience;	MV: scope too broad
~~(C)~~	~~design and use a customized record-keeping system for the individual supervised experience;~~	MV: scope too narrow
(C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	MV: allowed for broader scope and include redundant TEK 1.D
(D)	produce and participate in an ~~a challenging~~ approach for a local program of activities in agriculture, food, and natural resources utilizing a strategic planning process.	
(3)	The student develops an understanding of the rangeland ecosystem. The student is expected to:	
(A)	describe ecology, photosynthesis, energy flow, and climax vegetation;	
(B)	describe the impact of rangeland on the water cycle and water quality; and	
(C)	determine capabilities and limitations of rangelands.	
(4)	The student ~~gains~~ develops an understanding of rangeland as a dynamic, living, and changeable ~~resource~~ system. The student is expected to:	Clarify language
(A)	explain the relationship of rangeland to the environment;	
(B)	discuss the interrelationships of water, alternative use, carrying capacity, and population;	
(C)	identify and classify ~~range plants and their importance~~ native, non-native, and invasive plants and animals in the rangeland ecosystem;	Rigor and clarify depth of scope
(D)	explore the use of rangeland plants as alternative energy sources; ~~and~~	Committee recommends moving to 6
(E)	develop an understanding of the role of rangeland in water recharge and conservation~~.~~; and	
(F)	recognize the importance of success as it relates to rangeland ecology.	Rigor and clarify depth of scope

(5)	The student analyzes the biotic and abiotic components of a rangeland. The student is expected to:	
(A)	discuss ~~abiotic~~ components of rangeland with an emphasis on soil;	Broaden scope
(B)	determine ~~abiotic~~ components of rangeland with an emphasis on topography; and	Broaden scope
(C)	~~understand the importance of~~ classify~~ing~~ range sites by ~~shape,~~ soil ~~types, and depth~~ properties;	Clarify language
~~(D)~~	~~identify important range plants; and~~	Redundant see 4.C
~~(E)~~	~~recognize plant characteristics that impact rangeland ecology.~~	Redundant see 4.C
(6)	The student develops an understanding of the dynamic process of a renewable rangeland resource. The student is expected to:	
(A)	determine range condition based on plant populations;	
(B)	compare and contrast rangeland condition trends; and	
(C)	~~describe~~ ~~ways and means~~ formulate methods to improve range conditions.	CCRS rigor
(7)	The student ~~applies rangeland ecology concepts as related to domestic livestock~~ identifies methods of maintaining and improving rangeland for livestock management. The student is expected to:	Clarify and streamline language
(A)	~~recognize~~ identify plants beneficial to ~~domestic~~ livestock;	CCRS rigor and streamline language
(B)	identify harmful plants species ~~poisonous~~ to ~~domestic~~ livestock;	Streamline language
(C)	~~describe~~ analyze how livestock ~~use~~ utilize range plants; and	CCRS rigor and common language
(D)	~~select a proper mixture of domestic livestock appropriate for specific range sites~~. discuss livestock grazing management.	Depth of scope and committee recommends moving to 7.C
(8)	The student identifies methods of maintaining and improving rangeland for wildlife ~~production~~ management. The student is expected to:	Consistency of scope
(A)	~~recognize~~ identify plants beneficial to wildlife;	CCRS rigor
(B)	~~recognize~~ identify harmful plants species ~~poisonous~~ to wildlife;	CCRS and streamline language
(C)	~~understand~~ analyze how wildlife species ~~use~~ utilize range plants; and	CCRS rigor and common language
(D)	~~determine proper species of wildlife used to develop for specific range sites.~~ discuss wildlife grazing management.	Depth of scope and committee recommends moving to 8.C
(9)	The student develops an understanding of rangeland management as it relates to ~~worldwide~~ global concerns. The student is expected to:	Modernize and common language

(A)	~~predict the effect of rangeland as recharge zones for~~ examine how rangeland characteristics effect aquifers;	Broaden scope
(B)	~~draw conclusions on the effect of rangeland management on the carbon footprint of agriculture products~~ analyze how rangeland characteristics effect the environment;	Rigor and common language
(C)	~~draw conclusions concerning the impact of rangeland management on global warming~~ analyze how rangeland management effect the environment; and	Rigor and common language
(D)	~~develop an understanding of rangeland's management's role in energy production, including wind and ethanol production as well as fossil fuels~~ evaluate the impact of energy production systems on rangelands.	Streamline and rigor

§130.17. Forestry and Woodland Ecosystems (~~One-Half to~~ One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in natural resource systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills in a variety of settings. This course examines current management practices for forestry and woodlands. Special emphasis is given to management as it relates to ecological requirements and how these practices impact the environment.	
(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.	
(c)	**Knowledge and skills**.	
(1)	~~The student learns the employability characteristics of a successful employee. The student is expected to:~~ The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	Streamline and common language

(A)	identify career development, education, and entrepreneurship opportunities in the field of forestry and woodland ecosystems, including: licenses, certifications, endorsements and degrees;	MV, VA, CCRS
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in forestry and woodland ecosystems;	
(C)	demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace; and	Common language
(D)	~~identify~~ analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.	CCRS rigor
(2) ~~(9)~~	The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate a ~~entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified,~~ supervised agricultural, experience;	MV: scope too broad
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
(C)	~~design and use a customized record-keeping system for the individual supervised experience;~~	MV: scope too broad
(D)	participate in youth leadership opportunities to create a well-rounded experience program ~~in agriculture;~~ and	MV: scope too narrow
(E)	produce and participate in an ~~challenging~~ approach for a local program of activities in agriculture, food, and natural resources utilizing a strategic planning process.	MV: allowed for broader scope and include redundant TEK 9.E
(3) ~~(2)~~	The student describes the principles of forestry and woodland ecosystems. The student is expected to:	Depth of scope
(A)	describe the historical and economic significance of forestry;	
(B)	illustrate tree anatomy and ~~growth~~ morphology;	Clarity of SE
(C)	~~identify~~ differentiate between species of trees;	CCRS rigor
(D)	~~identify~~ classify forest and woodland soils;	Scope of course
(E)	describe silviculture;	
(F)	~~define~~ compare and contrast forest and woodland ecosystems;	Depth of scope

(G)	describe photosynthesis and respiration as it relates to forest and woodland species;	Clarification of scope
(H)	describe watershed management as it relates to the forest and woodland ecosystems;	Clarification of scope
(I)	describe sexual and asexual reproduction in forest and woodland species;	Depth of scope
~~(I)~~ (J)	define succession; and	
(K) ~~(J)~~	compare natural and managed forests and woodlands ~~forests and woodlands.~~	Depth of course
(4) ~~(3)~~	The student demonstrates forestry biometrics skills. The student is expected to:	
(A)	calculate tree volume;	
(B)	estimate timber growth and yield;	
(C)	evaluate forest and woodland quality by cruising timber stands; and	Clarification of SE
(D)	calculate quality and volume by scaling logs.	
(5) ~~(4)~~	The student ~~performs~~ demonstrates knowledge of forestry management skills. The student is expected to:	Within scope of course
(A)	identify forestry management ~~options~~ techniques;	Clarity of SE
(B)	~~define~~ discuss multiple-use possibilities for forest and woodlands areas; and	Clarification of SE
(C)	~~demonstrate~~ develop the control plan for ~~of~~ destructive agents such as fire, insects, and disease.	Within scope of course
(6) ~~(5)~~	The student identifies softwood and hardwood forest management and utilization practices. The student is expected to:	
(A)	identify principles of forestry economics;	
(B)	research sources of forestry management assistance;	
(C)	identify harvesting practices and equipment;	
(D)	describe merchandising practices; and	
(E)	~~identify~~ evaluate research in forestry and wood technology.	CCRS: rigor
(7) ~~(6)~~	The student describes the role of wood technology in forest product development. The student is expected to:	
(A)	compare timber manufacturing processes and products; and	
(B)	~~identify~~ discuss research and development issues in forestry and wood technology.	CCRS: rigor

(8) ~~(7)~~	The student applies cartographic skills to natural resource activities. The student is expected to:	
(A)	~~describe~~ compare and contrast ~~different~~ types of maps;	CCRS: rigor
(B)	interpret map features and legends;	
(C)	~~determine~~ compare map scale to ~~and~~ actual distance;	CCRS: rigor
~~(D)~~	~~determine direction from map;~~	Streamline of scope
(D) ~~(E)~~	~~determine~~ evaluate elevation and terrain features from topographic maps;	Streamline of language
~~(F)~~	~~use directional tools with maps to locate position;~~	Redundant, see 7.B
(E) ~~(G)~~	use land survey and coordinate systems; and	
(F) ~~(H)~~	~~use a Geographic Information System to interface geospatial data; and~~ locate position and interpret images using a geospatial interface.	Streamline and clarify language
~~(I)~~	~~interpret photos and images.~~	Redundant, see 7.H
~~(8)~~	~~The student identifies and distinguishes ethical practices in the field of natural resource systems. The student is expected to:~~	Redundant TEK, see 1.D
~~(A)~~	~~identify and evaluate ethical guidelines;~~	
~~(B)~~	~~evaluate how advances in science and technology have raised concerns about ethical issues; and~~	
~~(C)~~	~~identify a national organization or institution that seeks to promote ethical behavior and analyze its success and impact.~~	

§130.11. ~~Advanced Environmental~~ Energy and Natural Resource Technology (One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades ~~11-12~~ 10-12. Recommended prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources cluster.	
(b)	**Introduction.**	
(1)	CTE 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)~~	~~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.~~	
(2)	The Agriculture, Food & 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)~~	~~Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.~~	Science process skills were removed. This course is not being recommended for science credit.
(1) (3)	To be prepared for careers in environmental service systems, students need to attain academic skills and knowledge, acquire advanced technical knowledge and skills related to environmental service systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings. This course examines the interrelatedness of environmental issues and production agriculture. Students evaluate sustainable resources and green technologies which will provide environmental benefits. Instruction is designed to allow for the application of science and technology to measure environmental impacts resulting from production agriculture through field and laboratory experiences.	

~~(4)~~	~~Science and social ethics. Scientific decision making is a way of answering questions about the natural world. 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).~~	Science process skills were removed. This course is not being recommended for science credit.
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
~~(5)~~	~~Science, systems, and models. A system is a collection of cycles, structures, and processes that interact. 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. 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.~~	Science process skills were removed. This course is not being recommended for science credit.
(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.	
(c)	**Knowledge and skills.**	
~~(1)~~	~~The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:~~	Science process skills were removed. This course is not being recommended for science credit.
~~(A)~~	~~demonstrate safe practices during laboratory and field investigations; and~~	
~~(B)~~	~~demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.~~	
~~(2)~~	~~The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:~~	Science process skills were removed. This course is not being recommended for science credit.
~~(A)~~	~~know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;~~	
~~(B)~~	~~know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;~~	
~~(C)~~	~~know 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;~~	
~~(D)~~	~~distinguish between scientific hypotheses and scientific theories;~~	
~~(E)~~	~~plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;~~	
~~(F)~~	~~collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, animal restraints, stereoscopes, electronic balances, micropipettors, hand lenses, surgical and imagining equipment, thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, and models, diagrams, or samples of biological specimens or structures;~~	
~~(G)~~	~~analyze, evaluate, make inferences, and predict trends from data; and~~	
~~(H)~~	~~communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.~~	
~~(3)~~	~~The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:~~	Science process skills were removed. This course is not being recommended for science credit.
~~(A)~~	~~in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;~~	
~~(B)~~	~~communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;~~	
~~(C)~~	~~draw inferences based on data related to promotional materials for products and services;~~	
~~(D)~~	~~evaluate the impact of scientific research on society and the environment;~~	
~~(E)~~	~~evaluate models according to their limitations in representing objects or events; and~~	
~~(F)~~	~~research and describe the history of environmental science and contributions of environmental scientists.~~	

~~(4)~~ (1)	The student ~~learns the employability characteristics of a successful employee~~ 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 energy and natural resources such as licenses, certifications, endorsements and degrees;	MV, VA, CCRS, common language
(B)	apply competencies ~~related to~~ such as resources, information, interpersonal skills, and systems of operation in energy and natural resources;	Common language
(C)	demonstrate knowledge of personal and occupational safety, ~~health,~~ environmental regulations, and first-aid policy in the workplace; and	Common language
(D)	~~identify~~ analyze employers' expectations, ~~including~~ such as appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.~~; and~~	CCRS rigor
~~(E)~~	~~demonstrate leadership skills to accomplish organizational goals and objectives.~~	Redundant. Not course appropriate
~~(5)~~ (2)	The student develops a~~n advanced~~ supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document, and evaluate a ~~entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an~~ supervised agriculture~~al, food, and natural resources~~ experience as a~~n experiential~~ learning activity;	MV: scope too broad
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
~~(C)~~	~~design and use a customized record-keeping system for the individual supervised experience;~~	MV: scope too broad
~~(D)~~ (C)	participate in youth leadership opportunities to create a well-rounded experience program; and ~~in agriculture~~	MV: narrow scope
~~(E)~~ (D)	produce and participate in an ~~a challenging~~ approach for a local program of activities in agriculture utilizing a strategic planning process.	MV: allowed for broader scope
~~(6)~~ (3)	The student uses ~~a minimum of 40% of~~ instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a documented supervised experience. The student is expected to:	This course is not being recommended for science credit.
(A)	demonstrate safe practices during field and laboratory investigations in a documented supervised experience; and	
(B)	use accepted procedures for the use and conservation of resources and for the	

	safe handling of materials.	
~~(7)~~ (4)	The student ~~determines~~ discusses the importance and scope of natural resources. The student is expected to:	Consistent and appropriate language for course level
(A)	identify various types of natural resources;	
(B)	discuss renewable and non-renewable energy resources and the impact on the environment;	
(C)	analyze the impacts of natural resources and their effects on the agricultural economy; and	
(D)	map the geographic and demographic ~~distribution~~ utilization of natural resources.	Consistent language
~~(8)~~ (5)	The student identifies water use and management in agricultural settings. The student is expected to:	
(A)	identify the distribution and properties of water in the hydrologic cycle;	
(B)	identify agricultural uses of water, ~~including~~ such as the benefits of recycling;	Broaden scope
(C)	discuss how agricultural uses may impact water resources;	
(D)	define point source and non-point source pollution;	
(E)	identify sources of point source and non-point source pollution associated with agriculture;	
~~(F)~~	~~identify effective management practices commonly used to abate point and non-point sources of pollution;~~	Outside scope of course
~~(G)~~	~~explain the impact of agriculture production on water quality as related to the functioning of watersheds;~~	Outside scope of course
~~(H)~~ (F)	evaluate how the different agricultural water uses may impact water availability; and	
~~(I)~~ (G)	research water use legislation; ~~and~~	
~~(J)~~	~~research water quality policy, including the agricultural storm water exclusion, and how it affects the decisions made in agricultural production.~~	Too broad of scope
~~(9)~~	~~The student knows biotic factors associated with agricultural production. The student is expected to:~~	These topics are covered elsewhere in the course.
~~(A)~~	~~describe the role of plants and animals, including insects and microorganisms;~~	
~~(B)~~	~~understand the interaction of biotic and abiotic factors, including the relationships between soil composition and microorganisms, water quantity~~	

	~~and crop selection, and air quality and human health;~~	
~~(C)~~	~~identify issues related to biodiversity such as invasive species, chemical applications, and crop selection; and~~	
~~(D)~~	~~research and explain the causes of species diversity and predict changes that may occur in an ecosystem if species and genetic diversity is increased or reduced.~~	
~~(10)~~ (6)	The student describes air quality associated with agricultural production. The student is expected to:	
(A)	describe the ~~anatomy~~ components of the atmosphere and the atmospheric cycle;	Appropriate content language
(B)	define air pollution;	
(C)	analyze air quality legislation;	
(D)	identify sources and effects of air pollution from agricultural production;	
(E)	discuss different emission management strategies; and	
(F)	identify common air pollution controls used in agricultural production.	
~~(11)~~ (7)	The student examines soil erosion as related to agricultural production. The student is expected to:	
~~(A)~~	~~describe the components, dynamics, properties, and functions of soils;~~	Scope of course
~~(B)~~ (A)	identify agriculture production practices that can contribute to soil erosion;	
~~(C)~~ (B)	~~graph harmful~~ analyze effects of soil erosion;	Scope of course
~~(D)~~ (C)	discuss the legal aspects of soil erosion; and	
~~(E)~~ (D)	~~explain~~ identify soil erosion control methods and programs~~; and~~	Scope of course
~~(F)~~	~~identify how soil erosion affects the environment~~.	Redundant, see 7.C
~~(12)~~ (8)	The student explains the ~~use and abuse~~ effects of natural resource~~s~~ use. The student is expected to:	Flow of language
(A)	identify the progression of use of natural resources leading to environmental degradation;	
(B)	explain the impact of human population dynamics on the environment;	
(C)	discuss the abuse of natural resources; and	
(D)	communicate the resulting environmental consequences, ~~including~~ such as those on living organisms.	Content language

§130.11. Advanced Energy and Natural Resources Technology (~~One Half to~~ One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades ~~10~~11-12. Recommended prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources cluster and successful completion of Energy and Natural Resource Technology.	Provides for coherent sequence and vertical alignment
(b)	**Introduction**.	
(1)	CTE 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 & 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)	To be prepared for careers in the field of energy and natural resource systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to energy and natural resources and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need to have opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings. This course is designed to explore the interdependency of the public and natural resource systems related to energy production. In addition, renewable, sustainable, and environmentally friendly practices will be explored.	
(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.	
(c)	**Knowledge and skills.**	
~~(3)~~ (1)	The student ~~learns the employability characteristics of a successful employee~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	Consistent language
(A)	identify career development, education, and entrepreneurship opportunities in the fields of energy and natural resources such as licenses, certifications, endorsements and degrees;	CCRS, VA, MV
(B)	apply competencies ~~related to~~ such as resources, information, interpersonal skills, and systems of operation in energy and natural resources;	Consistent language

(C)	demonstrate knowledge of personal and occupational ~~health~~ safety ~~practices~~, environmental regulations, and first aid policy in the workplace; and	Streamline and consistent language see redundant 11
(D)	~~identify~~ analyze employers' expectations, ~~including~~ such as appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills; ~~and~~	CCRS rigor, Consistent language
~~(E)~~	~~demonstrate leadership skills to accomplish organizational goals and objectives.~~	Irrelevant to course content
(2) ~~(1)~~	The student develops a~~n~~ ~~improved~~ supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	Streamline
(A)	plan, propose, conduct, document, and evaluate a ~~entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified,~~ supervised agricultural~~, food, and natural resources~~ experience ~~as an experiential learning activity;~~	Scope too broad Consistent language with other AFNR courses
(B)	apply proper record-keeping skills as they relate to a supervised experience;	
~~(C)~~	~~design and use a customized record-keeping system for the individual supervised experience;~~	Scope too broad
(C)	~~participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and~~ participate in youth leadership opportunities to create a well-rounded-experience program in agriculture; and	MV: scope to narrow
~~(E)~~ (D)	~~produce~~ participate in an ~~a challenging~~ approach for a local program of activities in agriculture~~, food, and natural resources~~ utilizing a strategic planning process.	MV: allowed for broader scope and include redundant TEK 1.D Consistent language
~~(2)~~ (3)	The student uses instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a documented supervised experience. The student is expected to:	
(A)	demonstrate safe practices during field and laboratory investigations in a documented supervised experience; and	
(B)	use accepted procedures for the use and conservation of resources and for the safe handling of materials.	
(4)	The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	Increase rigor
(A)	identify various types of natural resources;	
(B)	~~discuss~~ identify renewable, non-renewable, and sustainable energy resources and determine their availability;	CCRS rigor
(C)	~~define~~ evaluate the impacts of energy production on natural resources and the ~~effect on~~	CCRS rigor

	~~the~~ agricultural economy; and	
(D)	analyze the geographic and demographic ~~distribution~~ utilization of natural resources.	Clarification of expectation
(5)	The student analyzes ethical issues related to natural resource management and energy production. The student is expected to:	
(A)	compile examples of different lease agreements used for leasing minerals and natural resources;	
(B)	~~understand landowner and leasing company relationships~~ interpret legal documents related to natural resource management and energy production; and	CCRS rigor
(C)	~~review~~ compare and contrast public and industry interest in natural resource management.~~; and~~.	Clarify scope
~~(D)~~	~~understand the impacts of natural resource management on the landowner.~~	Redundant see 5.C
(6)	The student understands the role of natural resource management and energy production ~~energy and natural resource~~ policies at the local, state, and national level. The student is expected to:	
(A)	identify policy affecting the use of natural resources;	
(B)	identify policy affecting energy production;	
(C)	research ~~ecological~~ controls that protect ~~of~~ Earth's natural resources;	Clarification of SE
(D)	identify state and federal agencies that have natural resource management and energy production responsibilities; and	Common language
(E)	define the roles of government, society, and property owners in the development of ~~energy and natural resource~~ natural resource management and energy production policy.	Committee recommends moving to (A) Common language
(7)	The student recognizes the purpose of land use planning for natural resource management and energy production. The student is expected to:	Clarification of scope
~~(A)~~	~~identify the major categories of land use;~~	Scope too broad
~~(B)~~	~~evaluate considerations for land use planning, including ecological benefits;~~	Redundant see 7.C.D.
~~(C)~~ (A)	discuss advantages and disadvantages of land use planning for natural resource management and energy production; and	Clarification of scope
~~(D)~~ (B)	compare and contrast land use ~~policy~~ trends within the state.~~;~~ ~~and~~	Clarification and streamlining of language
~~(E)~~	~~discuss the advantages and disadvantages of land use planning for energy production.~~	Redundant see 7.C.D.
(8)	The student identifies water utilization and wastewater ~~use~~ ~~and~~ management. The student is expected to:	Common language

(A)	identify municipal, industrial, and agricultural uses of water, ~~including recycling opportunities;~~	Added to 8.B
(B)	~~discuss how different types of water uses pollute water resources;~~ explore and develop water recycling opportunities;	Redundant see 8.C CCRS: rigor, recommend move to last
~~(C)~~	~~define point source and non-point source pollution~~	Redundant
~~(D)~~ (C)	~~identify~~ evaluate sources of point source and non-point source pollution associated with municipal, industrial, and agricultural uses;	CCRS rigor, move to 8.B
~~(E)~~ (D)	describe effective management practices commonly used to abate point and non-point sources of pollution;	
~~(F)~~ (E)	~~discuss~~ analyze how ~~the different types of~~ water use~~s~~ impact~~s~~ water availability;	CCRS rigor and streamline
~~(G)~~ (F)	research water use legislation;	
~~(H)~~ (G)	~~review~~ discuss water quality policy~~, including the agricultural storm water exclusion,~~ and how it affects the decisions made in agricultural production; and	Scope too narrow
~~(I)~~ (H)	discuss the ~~potential impacts~~ interaction of energy production ~~on~~ and water resources.	Clarification of scope
(9)	The student describes air quality associated with natural resource management and energy production ~~energy production~~. The student is expected to:	
~~(A)~~	~~define air pollution;~~	Redundant see 9.C
~~(B)~~ (A)	research air quality legislation;	
~~(C)~~ (B)	identify sources and effects of air pollution ~~from energy production~~;	Streamline language, and recommend move top of TEK
~~(D)~~ (C)	discuss different emission management strategies; and	
~~(E)~~ (D)	identify air pollution controls used in energy production.	
(10)	The student examines soil erosion as related to natural resource management and energy production. The student is expected to:	Common language
(A)	~~identify~~ examine ~~sources~~ the effects of natural resource management and energy production on ~~that can contribute to~~ soil erosion;	CCRS: rigor and common language
(B)	~~illustrate harmful effects of soil erosion;~~ analyze the components and functions of soils;	Redundant, see 10.A and scope of course
(C)	~~discuss legal aspects of soil erosion; and~~ appraise soil and water conservation programs;	Relevancy
(D)	~~list~~ compare soil erosion control methods ~~and programs~~.	CCRS: rigor
(11)	The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	Committee recommends becoming 4 in order

(A)	~~identify~~ classify types of waste and hazardous materials;	Scope of course
(B)	research legislation related to waste and hazardous materials;	
(C)	~~identify~~ select appropriate entities responsible for waste and hazardous material management; and	CCRS: rigor
(D)	describe safe handling, storing, and disposal of waste materials, ~~including:~~ such as composting and recycling.	
(12)	The student learns the processes for producing energy and green products from agricultural crops, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	Relevancy
(A)	identify agricultural crops, ~~and~~ silvicultural crops, and bio-products suitable for renewable ~~energy~~ production;	Relevancy
(B)	discuss production processes for agricultural~~–~~and silvicultural~~-~~based ~~biofuels~~ bio-products;	Relevant
(C)	describe the fundamentals for ~~oil, gas, and coal~~ non-renewable resource recovery;	Consistent language
(D)	~~compare and contrast~~ analyze the effects of ~~oil and gas drilling~~ non-renewable resource recovery methods and the environmental considerations associated with each, ~~including~~ such as environmentally friendly alternatives;	CCRS, rigor, relevancy, consistent language
~~(E)~~	~~compare and contrast coal mining methods and the environmental considerations associated with each;~~	Redundant, see 12.D
~~(F)~~ (E)	analyze the advantages and disadvantages of wind-generated energy;	Flow of language
~~(G)~~ (F)	identify public policy considerations associated with transmission line construction to move wind-generated energy;	
~~(H)~~ (G)	locate areas in the state that have geothermal energy production potential;	
~~(I)~~ (H)	explain the benefits of geothermal energy;	
~~(J)~~ (I)	identify solar energy systems and describe the function of each; and	
~~(K)~~ (J)	identify the environmental considerations associated with biofuels ~~and wind energy~~.	Redundant, see 12.F

Oil and Gas Production I (1 credit)		
	TEKS with edits	Committee Comments
(a)	**General requirements.** This course is recommended for students in Grade 9-12	
(b)	**Introduction.**	
(1)	CTE 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 & 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)	Students enrolled in this course will identify specific career opportunities and skills, abilities, tools, certification, and safety measures associated with each career. Students will also understand components, systems, equipment, and production and safety regulations associated with oil and gas wells.	
(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.	
(c)	**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 oil and gas production such as licenses, certifications, endorsements and degrees;	
(B)	apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation	
(C)	demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace; and	
(D)	analyze employers' expectations, such as: appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.	
(E)	Demonstrate leadership skills to accomplish organizational goals and objectives,	
(2)	The student develops a supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document, and evaluate a supervised agricultural experience	
(B)	apply proper record-keeping skills as they relate to the supervised agricultural experience;	

(C)	participate in youth leadership opportunities to create a well-rounded-experience program in agriculture; and	
(D)	produce and participate in an approach for a local program of activities in agriculture utilizing a strategic planning process.	
(3)	The student will understand the history and process for drilling a well. The student is expected to:	
(A)	describe the history of drilling for petroleum in the United States and abroad;	
(B)	describe and appraise routine drilling operations, offshore drilling and new drilling technologies;	
(C)	describe the tools and techniques for directional drilling;	
(D)	examine the differences between fishing, retrieving, and repairing pipe;	
(E)	describe the methods for completing a well for production to begin;	
(F)	assess fluid pressure;	
(G)	determine how the flow is initiated in a new well;	
(H)	differentiate between major components and discuss the purpose, design and operation of each component;	
(I)	describe activities associated with completing a well;	
(J)	describe the completion well processes and equipment;	
(K)	summarize the instruments and techniques used when logging and testing a well during drilling and completion;	
(L)	list the factors that are analyzed when studying a poorly producing well; and	
(M)	identify the responsibilities, characteristics, abilities, and work behaviors of personnel that are involved in well service.	
(4)	The student will discuss and identify components, systems, equipment, production and safety regulations associated with oil and gas wells. The student is expected to:	
(A)	identify the major systems and equipment used in the production of oil and gas;	
(B)	identify and describe the wellhead equipment that controls fluid flow;	
(C)	trace the process flow through the oil and gas production systems and equipment;	
(D)	discuss the purpose of the wellhead and identify the major components;	
(E)	describe the purpose, design and operation of each wellhead component;	
(F)	compare and contrast the major differences in wellhead construction	

(G)	compare and contrast onshore and offshore facilities,	
(H)	compare and contrast oil and gas regions within the United States;	
(I)	describe the safety, health and environmental concerns associated with working around a wellhead;	
(J)	explain how the wellhead system affects other production systems tied to the wellhead;	
(K)	describe the activities associated with monitoring and regulating well flow;	
(L)	describe the wellhead maintenance activities performed by the production technician;	
(M)	given a computer simulator, pilot plant or tabletop unit, operate and troubleshoot a wellhead; and	
(N)	list the operating conditions that would warrant a manual or automatic shut-in of a well and steps involved in a manual shut-in of a well.	
(5)	The students will discuss safety issues related to the oil and gas industry. The student is expected to:	
(A)	describe the safety, health and environmental concerns associated with drilling, production and maintenance; and	
(B)	research safety standards in the oil and gas industry, such as the Bureau of Safety and Environmental Enforcement (BSEE), United States Coast Guard (USCG), American Petroleum Institute (API), Department of Transportation (DOT), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI) and others.	

Oil and Gas Production II (1 credit)		
TEKS with edits		Committee Comments
(a)	**General requirements.** This course is recommended for students in Grade 10-12 Prerequisites: Oil and Gas Production Systems I. Students will participate in work-based learning activities such as internships or co-ops.	
(b)	**Introduction.**	
(1)	CTE 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 & 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)	Students enrolled in this course will gain knowledge of the specific requirements for entry into post-secondary education and employment in the oil industry; research and discuss petroleum economics; research and discuss the modes of transportation and environmental, health, safety concerns, different energy sources and prepare for industry certification.	
(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.	
(c)	**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, such as how to seek and obtain employment, what qualifications are required for varying career fields, and how to advance in a position, such as licenses, certifications, endorsements and degrees;	
(B)	identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and/or social studies;;	
(B)	apply technology skills to create an electronic portfolio of skills and abilities;	
(C)	apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	

(D)	demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace; and	
(E)	analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.	
(2)	The student develops a supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document, and evaluate a supervised agricultural, food, and natural resources experience as an experiential learning activity;	
(B)	apply proper record-keeping skills as they relate to the supervised agricultural experience;	
(C)	participate in youth leadership opportunities to create a well-rounded-experience program in agriculture; and	
(D)	produce and participate in an approach for a local program of activities in agriculture, food, and natural resources utilizing a strategic planning process.	
(3)	The student will research and discuss the modes of transportation and environmental, health, and safety concerns. The student is expected to:	
(A)	describe evolution of transportation in the petroleum industry;	
(B)	research and access the various ground methods of transportation;	
(C)	survey health and safety policies, procedures, regulations, and practices as they relate to transportation in the oil industry;	
(D)	research and discuss petroleum economics;	
(E)	compare and contrast product marketing, sales, and distribution of petroleum products;	
(F)	identify supply chain businesses that create new supplies of oil and gas;	
(G)	identify supply creation companies and how they operate;	
(H)	discuss the factors in investment decision-making; and	
(I)	calculate rates of return to evaluate prospects.	
(4)	The student will research the different methods of disposing of oil and gas waste and methods of cleanup. The student is expected to:	
(A)	discuss the disposal methods of exploration and production wastes;	
(B)	Identify cleanup methods for blowouts and spills; and	
(C)	Identify refining processes that minimize environmental impact.	

(5)	The student will research and identify the different energy sources and priorities for the oil and gas industry. The student is expected to:	
(A)	research the petroleum industry to identify renewable energy sources;	
(B)	develop presentation of the challenges and priorities of the petroleum industry;	
(C)	research the critical technologies needed in the future; and	
(D)	research the nontechnical solutions to energy needs.	

§130.18. ~~Principles and Elements of~~ Floral Design (One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 9 ~~10~~-12. This course satisfies the fine arts graduation requirement.	
(b)	**Introduction**.	
(1)	Career and Technical Education 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 & 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.	
~~(1)~~(3)	To be prepared for careers in floral design, students need to attain academic skills and knowledge as well as 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. This course is designed to develop students' ability to identify and demonstrate the principles and techniques related to floral design as well as develop an understanding of the management of floral enterprises.	
~~(2)~~ (4)	Through the analysis of artistic floral styles and historical periods, students develop respect for the traditions and 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.	
(5)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(6)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(c)	**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 and entrepreneurship opportunities in the field of floral design and interior landscape development;	

(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development;	
(C)	demonstrate knowledge of personal and occupational health and safety practices in the workplace;	
(D)	identify employer expectations, and appropriate work habits;	
(E)	demonstrate good citizenship characteristics including advocacy, stewardship, and community leadership; and	
(F)	identify training, education, and certification requirements for occupational choice.	
~~(8)~~ (2)	The student develops an improved supervised experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper recordkeeping skills as they relate to a supervised experience;	
~~(C)~~	~~design and use a customized recordkeeping system for the individual supervised experience;~~	
~~(D)~~ (C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
~~(E)~~ (D)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	
~~(1)~~ (3)	The student identifies design principles and techniques in floral art and interiorscapes. The student is expected to:	
(A)	identify the aesthetic benefits and the history of floral art, particularly as it relates to current practice;	
(B)	classify and identify flowers and plants used in floral design; and	
(C)	identify design elements and principles.	
~~(2)~~ (4)	The student demonstrates floral design principles and techniques. The student is expected to:	
(A)	understand and implement the design process through the medium of floral materials;	
(B)	evaluate and prepare geometric floral designs using cut flowers;	
(C)	evaluate and prepare geometric floral designs using silk flowers;	

(D)	prepare corsages and boutonnieres; and	
(E)	prepare floral designs for specific occasions.	
~~(3)~~ (5)	The student develops and formulates ideas from the environment. The student is expected to:	
(A)	illustrate ideas for floral designs from direct observation, experiences, and imagination;	
(B)	compare and contrast the use of art elements such as color, texture, form, line, and space; and	
(C)	compare and contrast the art principles ~~of art elements~~ such as continuity, pattern, rhythm, balance, proportion, and unity in personal designs.	
~~(4)~~ (6)	The student makes informed judgments about personal designs and the designs of others. The student is expected to:	
(A)	interpret, evaluate, and justify artistic decisions in personal arrangements; and	
(B)	select and analyze original designs, portfolios, and floral exhibitions by peers and others to form precise conclusions about formal qualities, and historical and cultural contexts, intents, and meanings.	
~~(5)~~ (7)	The student demonstrates contemporary designs, business practices, specialty items, and creativity in the floral industry by developing floral design skills. The student is expected to:	
(A)	classify and identify specialty floral items;	
(B)	evaluate and appraise floral designs;	
(C)	prepare cost-effective designs;	
(D)	create specialty designs to expand artistic expression;	
(E)	demonstrate pricing and order-processing skills; and	
(F)	list service delivery options related to effectiveness.	
~~(6)~~ (8)	The student knows the management factors of floral enterprises. The student is expected to:	
(A)	use temperature, preservatives, and cutting techniques to increase keeping quality;	
(B)	identify tools, chemicals, and equipment used in floral design;	
(C)	fertilize, prune, and water tropical plants;	
(D)	manage pests; and	

(E)	demonstrate the technical skills for increasing the preservation of cut flowers and foliage.	
~~(7)~~	~~The student learns the employability characteristics of a successful employee. The student is expected to:~~	
~~(A)~~	~~identify career development and entrepreneurship opportunities in the field of floral design and interior landscape development;~~	
~~(B)~~	~~apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development;~~	
~~(C)~~	~~demonstrate knowledge of personal and occupational health and safety practices in the workplace;~~	
~~(D)~~	~~identify employer expectations, appropriate work habits, and good citizenship skills.~~	
~~(E)~~	~~identify training, education, and certification requirements for occupational choice.~~	

§130.19. Landscape Design and ~~Turf Grass~~ Management (One-Half ~~to One~~ Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	
(b)	**Introduction.**	
(1)	Career and Technical Education 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 & 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.	
~~(b)~~(3)	~~Introduction.~~ To be prepared for careers in horticultural systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings. This course is designed to develop an understanding of landscape design and ~~turf grass~~ management techniques and practices.	
(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.	
(c)	**Knowledge and skills**.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:~~The student learns the employability skills of a successful employee in the modern workplace. The student is expected to:~~	
(A)	identify career development and entrepreneurship opportunities in the field of landscape design and ~~turf grass~~ management, including how to search for and obtain employment, what qualifications are required for varying career fields, and how to advance in a position;	
(B)	apply competencies related to resources, information, interpersonal skills,	

	problem solving, critical thinking, and systems of operation in landscape design~~, construction,~~ and ~~maintenance~~ management;	
(C)	examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements;	
(D)	demonstrate knowledge of personal and occupational health and safety practices in the industry; ~~and~~	
(E)	identify employers' expectations~~, including~~ and appropriate work habits.~~,~~ and ~~ethical conduct, legal responsibilities, and good citizenship skills.~~	
(F)	demonstrate good citizenship characteristics, such as advocacy, stewardship, and community leadership.	
(2)	The student develops an improved supervised ~~agriculture~~ experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper ~~record-keeping~~ recordkeeping skills as they relate to a supervised experience;	
~~(C)~~	~~design and use a customized record-keeping system for the individual supervised experience;~~	Redundant
~~(D)~~ (C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
~~(E)~~ (D)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	
(3)	The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	
(A)	assess soil characteristics and environmental conditions;	
(B)	assess site for local conditions, such as property lines, easement restrictions, and location of public utilities, such as water, electrical, and sewer service;	
~~(B)~~ (C)	complete a site analysis checklist;	
~~(C)~~ (D)	~~observe or operate~~ utilize graphics design equipment or software to produce a site sketch;	
~~(D)~~ (E)	identify plants ~~and structures~~ used in designing landscapes;	

(F)	identify structures and hardscape materials used in designing landscapes.	
(G)	create landscape designs demonstrating the application of design elements and principles; and	
(H)	analyze different landscape design styles and identify the different aesthetic and environmental factors of each style.	
(4)	The student performs landscape business procedures. The student is expected to:	
(A)	interview potential clients;	
(B)	develop landscape ideas from client interview, utilizing client checklists;	
~~(B)~~ (C)	prepare cost estimates and schedules for service, including items such as materials, labor, and ~~administrative~~ business cost; and	
~~(C)~~ (D)	~~execute~~ analyze service contracts.	
(5)	The student analyzes the cost and maintenance of tools~~,~~ and equipment~~, and structures~~ used in the landscape industry. The student is expected to:	
(A)	identify, store, and maintain landscaping hand ~~and power~~ tools and power equipment;	
(B)	~~prepare plant growing sites;~~ analyze costs associated with purchasing and maintaining landscaping hand tools and power equipment;	
(C)	~~install landscape plants and structures;~~ assess different landscape irrigation systems for efficiency, application, and environmental impact;	
(D)	~~select and install landscape irrigation systems~~ identify common irrigation system components and materials; and	
(E)	~~perform turf grass services such as mowing, renovating, fertilizing, pesticide application, weed control, and watering.~~ examine local and state regulations affecting irrigation systems.	
~~(6)~~	~~The student performs turf grass establishment and maintenance techniques. The student is expected to:~~	
~~(A)~~	~~identify, store, and maintain turf grass hand and power tools and equipment;~~	
~~(B)~~	~~identify different varieties of turf grasses and selected use;~~	
~~(C)~~	~~prepare a cost estimate for a turf grass site, including materials and labor;~~	
~~(D)~~	~~prepare turf grass sites for sodding or seeding;~~	
~~(E)~~	~~select the proper turf grass for a site;~~	

~~(F)~~	~~select the method of turf grass installation;~~	
~~(G)~~	~~select and install turf grass irrigation systems; and~~	
~~(H)~~	~~perform turf grass services such as mowing, renovating, fertilizing, pesticide application, weed control, and watering.~~	
(6)	The student performs landscape installation services. The student is expected to:	
(A)	prepare landscape sites for installation; and	
(B)	install landscape plants and structures utilizing proper installation techniques.	
(7)	The student performs landscape maintenance services. The student is expected to:	
(A)	identify and demonstrate proper pruning techniques for different plant materials;	
(B)	recognize methods for renovating existing landscapes;	
(C)	analyze nutritional needs of plants;	
(D)	develop fertilization plans that address plant needs and environmental concerns;	
(E)	examine Integrated Pest Management in assessing an insect, pathogen, or weed problem;	
(F)	properly use pesticide application techniques and equipment; and	
(G)	explain pesticide labeling and safety data sheets;	
(H)	demonstrate lawn management techniques.	

Turf Grass Management (One-Half Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	
(b)	**Introduction.**	
(1)	Career and Technical Education 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 & 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)	To be prepared for careers in horticultural systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings. This course is designed to develop an understanding of turf grass management techniques and practices.	
(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.	
(c)	**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 and entrepreneurship opportunities in the field of turf grass management;	
(B)	apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in turf grass management;	
(C)	examine licensing, certification, and legal requirements to maintain compliance with industry requirements;	
(D)	demonstrate knowledge of personal and occupational health and safety practices in the industry;	

(E)	identify employers' expectations and appropriate work habits; and	
(F)	demonstrate good citizenship characteristics, such as advocacy, stewardship, and community leadership.	
(2)	The student develops an improved supervised experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper recordkeeping skills as they relate to a supervised experience;	
(C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(D)	produce a challenging approach for a local strategic plan in agriculture.	
(3)	The student identifies the environmental, aesthetic and financial benefits of turf grass in residential, commercial and athletic settings. The student is expected to:	
(A)	assess sites for environmental factors that impact turf grass establishment and management such as soil type, soil pH, and elevation differences;	
(B)	develop a site assessment checklist; and	
(C)	develop site preparation plan.	
(4)	The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	
(A)	identify turf grass varieties and cultivars that fulfill site requirements;	
(B)	identify pests and pathogens of turf grasses;	
(C)	identify common weeds found in turf grasses;	
(D)	determine importance of site grading for water movement;	
(E)	determine importance of soil compaction on turf grass establishment;	
(F)	use aeration methods to reduce impact of compaction;	
(G)	compare establishment procedures such as seeding, sodding, sprigging, and hydromulching; and	
(H)	explain the importance of turf grass installation timing.	

(5)	The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	
(A)	explain and demonstrate mowing heights;	
(B)	explain the principle of mowing frequency;	
(C)	compare residential, commercial and athletic turf maintenance needs;	
(D)	determine turf grass irrigation requirements;	
(E)	analyze and address thatch accumulation in turf grass;	
(F)	analyze nutritional needs of turf grass;	
(G)	develop fertilization plans that address turf grass needs and environmental concerns;	
(H)	examine Integrated Pest Management in assessing an insect, pathogen or weed problem;	
(I)	properly use turf grass pesticide application techniques and equipment; and	
(J)	explain turf grass pesticide labeling and safety data sheets.	
(6)	The student performs turf grass management business procedures. The student is expected to:	
(A)	assess the needs of prospective clients;	
(B)	analyze material, labor, and business costs related to turf grass sites;	
(C)	develop and analyze service contracts and maintenance schedules;	
(D)	prepare a cost estimate for establishing a turf grass site, including materials and labor; and	
(E)	prepare a cost estimate for maintaining a turf grass site, including materials and labor.	
(7)	The student manages turf grass maintenance equipment. The student is expected to:	
(A)	identify, store, and maintain turf grass hand tools and power equipment;	
(B)	analyze the costs associated with turf grass hand tools and power equipment; and	
(C)	analyze components of turf grass irrigation systems.	

§130.20. Horticultureal Science (~~One-Half to~~ One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12.	
(b)	**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 & 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.	
~~(b)~~ (3)	~~**Introduction.**~~ To be prepared for careers in horticultural systems, students need to attain academic 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. This course is designed to develop an understanding of common horticultural management practices as they relate to food and ornamental plant production.	
(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.	
(c)	**Knowledge and skills**.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:~~The student learns the employability characteristics of a successful employee. The student is expected to:~~	
(A)	identify career development and entrepreneurship opportunities in the field of horticulture;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in horticulture;	
(C)	demonstrate knowledge of personal and occupational safety practices in the	

	workplace; ~~and~~	
(D)	identify employer expectations~~,~~ and appropriate work habits~~., and good citizenship skills.~~; and	
(E)	demonstrate good citizenship characteristics including advocacy, stewardship and community leadership.	
(2)	The student develops an improved supervised ~~agriculture~~ experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper ~~record keeping~~ recordkeeping skills as they relate to a supervised experience;	
(C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(D)	produce a challenging approach for a local strategic plan in agriculture.	
~~(2)~~(3)	The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	
(A)	classify horticultural plants based on physiology for taxonomic ~~or~~ and other classifications;	
(B)	manage the horticultural production environment;	
(C)	propagate and grow horticultural plants;	
(D)	create a design using plants that demonstrates an application of design elements and principles;	
(E)	design and establish landscapes; ~~and~~	
(F)	describe the processes of fruit, nut, and vegetable production; and	
(G)	demonstrate proper pruning techniques.	See public comment
~~(3)~~(4)	The student identifies structures and physiological processes used in plant production. The student is expected to:	
(A)	examine unique plant properties to identify and describe functional differences in plant structures, including roots, stems, flowers, leaves, and fruit;	
(B)	differentiate between monocots and dicots and male and female plants;	

(C)	germinate seeds and transplant ~~seeds~~ seedlings; and	
(D)	demonstrate asexual propagation techniques.	
~~(4)~~(5)	The student manages and controls common pests of horticultural plants. The student is expected to:	
(A)	identify common horticultural pests and pathogens;	
(B)	demonstrate safe practices in selecting, applying, storing, and disposing of chemicals; and	
(C)	~~develop a plan for integrated pest management.~~ explain parts of a pesticide label.	See public comment
~~(5)~~(6)	The student demonstrates marketing and management skills used in the operation of horticultural businesses. The student is expected to:	
(A)	identify and maintain hand and power tools and equipment;	
(B)	select appropriate tools and equipment;	
(C)	demonstrate safe use of tools and equipment;	
(D)	identify options and opportunities for business ownership; and	
(E)	analyze the role of small business in free enterprise.	
~~(6)(7)~~	~~The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:~~	
~~(A)~~	~~plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;~~	
~~(B)~~	~~apply proper record-keeping recordkeeping skills as they relate to a supervised experience;~~	
~~(C)~~	~~design and use a customized record-keeping recordkeeping system for the individual supervised experience;~~	
~~(D)~~	~~participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and~~	
~~(E)~~	~~produce a challenging approach for a local program of activities in agriculture.~~	

Greenhouse Operation and Production (One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements.** This course is recommended for students in Grades 10-12.	
(b)	**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 & 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)	To be prepared for careers in horticultural systems, students need to attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings. This course is designed to develop an understanding of greenhouse production techniques and practices.	
(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.	
(c)	**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 and entrepreneurship opportunities in the field of greenhouse operations and production;	
(B)	apply competencies related to resources, information, interpersonal skills, problem-solving and critical thinking in greenhouse operations and production;	
(C)	examine licensing, certification, and legal requirements to maintain compliance with industry requirements;	
(D)	demonstrate knowledge of personal and occupational health and safety practices	

	in the industry;	
(E)	identify employers' expectations and appropriate work habits; and	
(F)	demonstrate good citizenship characteristics, such as advocacy, stewardship, and community leadership.	
(2)	The student develops an improved supervised experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper recordkeeping skills as they relate to a supervised experience;	
(C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(D)	produce a challenging approach for a local strategic plan in agriculture.	
(3)	The student identifies and classifies plants used in greenhouse production. The student is expected to:	
(A)	classify greenhouse plants according to taxonomy systems;	
(B)	develop knowledge of plant anatomy, plant structures and functions as basis for identification; and	
(C)	develop plant classification based on cropping schedules and market demand for greenhouse crops.	
(4)	The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	
(A)	select greenhouse coverings;	
(B)	compare greenhouse styles and construction materials;	
(C)	analyze the costs affiliated with greenhouse construction;	
(D)	evaluate greenhouse site orientation and construction concerns;	
(E)	integrate other growing structures, such as cold frames, hotbeds, lath houses, and potting sheds; and	

(F)	investigate local, state, and national regulations affecting greenhouse operations.	
(5)	The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:	
(A)	investigate environmental factors controlled in the greenhouse;	
(B)	determine and calculate factors used in heating and cooling a greenhouse;	
(C)	investigate greenhouse climate conditions, such as ventilation, CO2 generation and humidity on growing plants growth in the greenhouse;	
(D)	explore the importance of light quality, quantity, and duration on the production of greenhouse crops; and	
(E)	compare open and closed environmental systems in the greenhouse, such as misting beds or hydroponics.	
(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 system greenhouse;	
(B)	explain how to operate and maintain electrical systems in a greenhouse; and	
(C)	explain how to operate and maintain various water systems in a greenhouse.	
(7)	The student propagates greenhouse crops. The student is expected to:	
(A)	analyze different methods of propagating greenhouse crops utilizing sexual and asexual propagation methods;	
(B)	propagate greenhouse crops using various methods, such as seeds, seedlings, plugs, cuttings, and tissue culture; and	
(C)	investigate physiological conditions that affect plant propagation, such as seed dormancy and root initiation.	
(8)	The student identifies and investigates greenhouse crop production factors. The student is expected to:	
(A)	explain and demonstrate the chemical and physical differences in greenhouse media components;	
(B)	compare greenhouse growing mixes for factors, such as drainage capabilities and	

	nutrient-holding capacity;	
(C)	compare and contrast different containers, benches, and other production equipment used in greenhouse crop production;	
(D)	evaluate different methods of watering greenhouse crops;	
(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 investigates pest identification and control methods in the greenhouse environment. The student is expected to:	
(A)	assess insect, pathogen, and weed infestations in greenhouse;	
(B)	implement Integrated Pest Management in controlling an insect, pathogen, or weed problems;	
(C)	properly use appropriate greenhouse pesticide application techniques and equipment;	
(D)	research chemicals used to regulate plant growth in the greenhouse; and	
(E)	examine pesticide labeling and safety data sheets.	
(10)	The student performs greenhouse management business procedures. The student is expected to:	
(A)	market greenhouse crops;	
(B)	transport greenhouse crops;	
(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.	

§130.21. Advanced Plant and Soil Science (One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grade 11 or 12. ~~Recommended~~ Prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources cluster. Recommended prerequisites: biology or IPC or chemistry or physics. This course satisfies a high school science graduation requirement.	
(b)	**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 & 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.	
~~(1)~~(3)	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.	
(4)	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 inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.	
(6)	Scientific decision making is a way of answering questions about the natural world. 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).	
(7)	A system is a collection of cycles, structures, and processes that interact. 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. 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.	
~~(4)~~	~~Investigations, Laboratory practices investigations, and field exercises investigations will be used to develop an understanding of current plant and soil science.~~	
~~(5)~~	~~This course is designed to prepare students for careers in the food and fiber industry. Students will learn, reinforce, apply, and transfer their knowledge in a scientific setting.~~	
(8)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(9)	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.	
(c)	**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 and entrepreneurship opportunities in the field of plant systems;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation in plant systems;	
(C)	demonstrate knowledge of personal and occupational safety practices in the workplace;	
(D)	identify employer expectations and appropriate work habits; and	
(E)	demonstrate good citizenship characteristics including advocacy, stewardship and community leadership.	
~~(1)~~ (2)	The student, for at least 40% of instructional time, conducts laboratory and field ~~experiments~~ investigations ~~laboratory investigations, or approved supervised experience programs~~ using safe, environmentally appropriate, and ethical practices. The student is expected to:	
(A)	demonstrate safe practices during field and laboratory investigations; and	
(B)	demonstrate an understanding of the use and conservation of resources and the proper disposal ~~and~~ or recycling of ~~spent resources~~ materials.	

(3)	Scientific processes. The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	
(A)	explain the definition of science and explain that it has limitations, as specified in subsection (b)(2) of this section;	
(B)	explain that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	
(C)	explain how 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;	
(D)	distinguish between scientific hypotheses and scientific theories;	
(E)	plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;	
(F)	collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;	
(G)	analyze, evaluate, make inferences, and predict trends from data; and	
(H)	communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	
(4)	Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A)	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the	

	student;	
(B)	communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;	
(C)	draw inferences based on data related to promotional materials for products and services;	
(D)	evaluate the impact of scientific research on society and the environment;	
(E)	evaluate models according to their limitations in representing biological objects or events; and	
(F)	research and describe the history of biology and contributions of scientists.	
~~(2)~~(5)	The student analyzes plant and soil science as related to plant and soil relationships affecting the production of food, ~~and~~ fiber, and other economic crops. The student is expected to:	
(A)	recognize the importance and interrelationships of soil and plants; and	
(B)	practice soil and plant evaluation as it applies to agricultural and urban settings.	
~~(3)~~	~~The student demonstrates the employability characteristics of a successful employee. The student is expected to:~~	
~~(A)~~	~~identify career development and entrepreneurship opportunities in the field of plant systems;~~	
~~(B)~~	~~apply competencies related to resources, information, interpersonal skills, and systems of operation in plant systems;~~	
~~(C)~~	~~demonstrate knowledge of personal and occupational safety practices in the workplace; and~~	
~~(D)~~	~~identify employer expectations, and appropriate work habits., and good citizenship skills.;and~~	
~~(E)~~	~~demonstrate good citizenship characteristics including advocacy, stewardship and community leadership.~~	
~~(4)~~ (6)	The student develops an advanced supervised experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct,document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural	

	experience as an experiential learning activity;	
(B)	apply proper ~~record-keeping~~ recordkeeping skills as they relate to a supervised experience;	
~~(C)~~	~~design and use a customized record-keeping recordkeeping system for the individual supervised experience;~~	
(C) ~~(D)~~	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(D) ~~(E)~~	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	
~~(5)~~ (7)	The student develops scenarios for advances in plant and soil science. The student is expected to:	
(A)	design, conduct, and complete research in a laboratory or field ~~activity~~ investigation to solve problems in plant and soil science;	
(B)	use charts, tables, and graphs to prepare written summaries of results and data obtained in a laboratory or field ~~activity~~ investigation;	
(C)	organize, analyze, evaluate, make inferences, and predict trends from resulting data; and	
(D)	communicate valid outcomes and solutions.	
~~(6)~~ (8)	The student explains the relationship of biotic and abiotic factors within habitats and ecosystems. The student is expected to:	
(A)	identify native and introduced plants, assess their role in an ecosystem, and compare them to plants in other ecosystems;	
(B)	make observations and compile data about fluctuations in abiotic cycles and evaluate their effects on local ecosystems;	
(C)	evaluate the impact of human activity such as methods of pest control, hydroponics, and sustainable agriculture on ecosystems; and	
(D)	predict how the introduction, removal, or re-introduction of an organism may affect the food chain and existing populations.	
~~(7)~~ (9)	The student analyzes soil science as related to food and fiber production. The student is expected to:	
(A)	explain soil formation;	
(B)	evaluate the properties and nature of soils;	

(C)	recognize the importance of conservation of soil and agencies involved in conservation;	
(D)	recognize the application of soil mechanics to engineering and excavation operations;	
~~(D)~~ (E)	perform soil management practices such as tillage trials and sustainable soil management; and	
~~(E)~~ (F)	practice soil evaluations as related to experiential activities such as land judging.	
~~(8)~~ (10)	The student describes the relationship between resources within environmental systems. The student is expected to:	
(A)	summarize methods of land use and management;	
(B)	identify sources, use, quality, and conservation of water;	
(C)	explore the use and conservation of renewable and non-renewable resources;	
(D)	analyze and evaluate the economic significance and interdependence of components of the environment;	
(E)	evaluate the impact of human activity and technology on soil fertility and productivity;	
(F)	analyze and describe the effects on environments by events such as fire, hurricanes, deforestation, mining, population growth, and urban development; and	
(G)	explain how regional changes in the environment may have a global effect.	
~~(9)~~ (11)	The student describes the origin and use of water in a watershed. The student is expected to:	
(A)	identify sources and calculate the amount of water in a watershed, including ground and surface water;	
(B)	research and identify the type of water used in a watershed;	
(C)	analyze water quality in a watershed; and	
(D)	identify and use methods to evaluate water quantity available in a watershed.	
~~(10)~~ (12)	The student maps the process of soil formation as influenced by weathering, including erosion processes due to water, wind, and mechanical factors influenced by climate. The student is expected to:	
(A)	illustrate the role of weathering in soil formations;	

(B)	distinguish chemical weathering from mechanical weathering; and	
(C)	identify geological formations that result from differing weathering processes.	
~~(11)~~ (13)	The student describes the dynamics of a watershed. The student is expected to:	
(A)	identify 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.	
~~(12)~~ (14)	The student explains how petroleum energy resources affect agriculture. The student is expected to:	
(A)	research and describe the origin of fossil fuels such as coal, oil, and natural gas;	
(B)	analyze issues regarding the use of fossil fuels and other non-renewable energy sources or alternative energy sources; and	
(C)	analyze the significance and economic impact of the use of fossil fuels and alternative energy sources.	
~~(13)~~ (15)	The student evaluates components of plant science as it relates to crop production. The student is expected to:	
(A)	analyze plant physiology, genetics, and reproduction of various crops;	
(B)	recognize characteristics of quality seeds such as mechanical damage, viability, and grade;	
(C)	identify plant pests and diseases and their causes, prevention, and treatment;	
(D)	perform plant management practices such as germination tests, plant spacing trials, and fertilizer tests; and	
(E)	measure trends in crop species and varieties grown locally in Texas and the United States and how this affects agriculture and consumers.	
~~(14)~~ (16)	The student identifies how plants grow and how specialized cells, tissues, and organs develop. The student is expected to:	
(A)	compare cells from different parts of the plant, including roots, stems, and leaves, to show specialization of structures and functions; and	
(B)	sequence the levels of organization in multicellular organisms that relate the parts to each other and the whole.	
~~(15)~~ (17)	The student diagrams the structure and function of nucleic acids in the mechanism	

	of genetics. The student is expected to:	
(A)	describe components of deoxyribonucleic acid and illustrate how information for specifying the traits of an organism is carried in deoxyribonucleic acid;	
(B)	identify and illustrate how changes in deoxyribonucleic acid cause phenotypic or genotypic changes;	
(C)	compare and contrast genetic variations observed in plants and animals; and	
(D)	compare the processes of mitosis and meiosis and their significance.	
~~(16)~~ (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 crops;	
(B)	apply principles of genetics and plant breeding;	
(C)	examine the development of crop varieties through the origin of agriculture; and	
(D)	design and conduct experiments to support known principles of genetics.	
~~(17)~~ (19)	The student explains the chemistry involved in plants at the cellular level. The student is expected to:	
(A)	compare the structures and functions of different types of organic molecules such as carbohydrates, lipids, proteins, and nucleic acids;	
(B)	compare the energy flow in photosynthesis to the energy flow in cellular respiration; and	
(C)	investigate and identify the effect of enzymes on plant cells.	
~~(18)~~ (20)	The student identifies the sources and flow of energy through environmental systems. The student is expected to:	
(A)	summarize forms and sources of energy;	
(B)	explain the flow of energy in an environment;	
(C)	investigate and explain the effects of energy transformations in an ecosystem; and	
(D)	investigate and identify energy interaction in an ecosystem.	

§130.22. Agricultural Mechanics and Metal Technologies (~~One Half to~~ One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12. ~~Students may take this course in Grade 9 if they have met the~~ Recommended prerequisite: ~~of~~ Principles of Agriculture, Food, and Natural Resources.	
(b)	**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 & 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.	
~~(b)~~ (3)	~~**Introduction.**~~ To be prepared for careers in agricultural power, structural, and technical systems, students need to attain academic skills and knowledge; acquire technical knowledge and skills related to power, structural, and technical agricultural systems and the industry; and develop knowledge and skills regarding career opportunities, entry requirements, industry certifications, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills and technologies in a variety of settings. This course is designed to develop an understanding of agricultural mechanics as it relates to safety and skills in tool operation, electrical wiring, plumbing, carpentry, fencing, concrete, and metal working techniques.	
(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.	
(c)	**Knowledge and skills**.	
(1)	The student ~~learns the employability skills of a successful employee to meet current industry standards and society~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the field of power, structural, and technical agricultural systems, including how to search	

	and obtain employment, what qualifications are required for varying career fields, and how to advance in a position;	
(B)	apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation of power, structural, and technical agricultural systems;	
(C)	examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements;	
(D)	demonstrate knowledge of personal and occupational health, safety, and first-aid practices in the industry; ~~and~~	
(E)	identify employer expectations~~,~~ and appropriate work habits~~., and good citizenship skills.~~; and	
(F)	demonstrate good citizenship characteristics including advocacy, stewardship and community leadership.	
(2)	The student develops an improved supervised ~~agriculture~~ experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct,document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper ~~record-keeping~~ recordkeeping skills as they relate to a supervised experience;	
~~(C)~~	~~design and use a customized record-keeping system for the individual supervised experience;~~	Redundant
~~(D)~~ (C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
~~(E)~~ (D)	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	
(3)	The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	
(A)	select ~~and~~ use, maintain, and store ~~the~~ appropriate hand ~~and power~~ tools to perform a given task~~,~~; ~~maintain tools, and store tools; and~~	
(B)	select, use, maintain, and store appropriate power equipment, such as tools powered by electric, pneumatic, and internal combustion engines; and	

~~(B)~~ (C)	select and use measuring and marking devices.	
(4)	The student identifies and performs electric wiring skills. The student is expected to:	
(A)	identify principles of electricity ~~wiring~~ and wiring terminology;	
(B)	~~perform and~~ install electric wiring components and fixtures to comply with government regulations and applicable codes; and	
(C)	maintain electric motors.	
(5)	The student performs plumbing skills. The student is expected to:	
(A)	identify and use ~~select~~ plumbing tools ~~and fixtures~~; and	
(B)	~~install plumbing equipment and fixtures to comply with government regulations and applicable codes; and~~ identify plumbing fixtures.	
~~(C)~~	~~maintain water systems.~~	
(6)	The student performs concrete construction skills. The student is expected to:	
(A)	project cost estimates for materials ~~and construct forms~~; and	
(B)	~~reinforce, place, finish, and cure concrete.~~ form and pour concrete slabs.	
(7)	The student performs carpentry skills. The student is expected to:	
(A)	identify materials used in agricultural construction;	
(B)	identify elements of projected cost estimate and prepare a bid package for a planned project;	
(C)	demonstrate basic carpentry skills; and	
(D)	paint and protect with coatings.	
(8)	The student identifies fencing methods. The student is expected to:	
(A)	select fencing materials; and	
(B)	plan and install fences.	
(9)	The student performs appropriate cold and hot metal techniques. The student is expected to:	
(A)	identify types of metal;	
(B)	cut, file, shape, and drill metal;	
(C)	select and operate oxy-fuel welding and cutting equipment to meet standards;	

(D)	select and operate electric-arc welding equipment to meet standards; and	
(E)	perform specialty welding and cutting techniques to meet standards.	
(10)	The student ~~knows metal merging technology and~~ applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	
(A)	select, use, and maintain appropriate tools, equipment, and facilities; and	
(B)	identify and determine properties, types, and uses of metal.	
(11)	The student plans and performs cost-effective construction techniques. The student is expected to:	
(A)	analyze site, equipment, and permit requirements;	
(B)	~~observe or~~ operate computer-aided drafting design software;	
(C)	develop, read, and interpret designs and sketches;	
(D)	estimate material needs and costs;	
(E)	measure, mark, and cut material; and	
(F)	perform specialized nonmetallic fabrication techniques.	

§130.23. Agricultural ~~Facilities~~ Structures Design and Fabrication (One Credit ~~to Two Credits~~).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 11-12. The recommended prerequisite is Agricultural Mechanics and Metal Technologies	See public comment
(b)	**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 & 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.	
~~(b)~~ (3)	~~**Introduction.**~~ To be prepared for careers in mechanized agriculture and technical systems, students attain knowledge and skills related to agricultural ~~facilities~~ structures design and fabrication. Students explore career opportunities, entry requirements, and industry expectations. To prepare for success, students reinforce, apply, and transfer their academic knowledge and technical skills in a variety of settings.	See public comment
(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.	
(c)	**Knowledge and skills**.	
(1)	The student ~~learns and applies the employability characteristics of a successful employee~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the field of mechanized agriculture;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture;	
(C)	demonstrate knowledge of personal and occupational health and safety practices in the workplace;	

(D)	identify employer expectations~~,~~ and appropriate work habits~~;~~~~., and good citizenship skills.~~; and	
(E)	demonstrate good citizenship characteristics including advocacy, stewardship and community leadership; and	
~~(E)~~ (F)	research licensing, certification, and credentialing requirements.	
(2)	The student develops an advanced supervised experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper recordkeeping skills as they relate to a supervised experience;	
(C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(D)	produce a challenging approach for a local strategic plan in agriculture.	
~~(2)~~ (3)	The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:	
(A)	develop building plans;	
(B)	select site and locate agricultural building placement;	
(C)	estimate materials and costs needed for construction with an emphasis on renewable and eco-friendly materials;	
(D)	select appropriate environmental control systems with a special emphasis on green technology; and	
(E)	use computer-aided design software as appropriate.	
~~(3)~~	~~The student plans, constructs, and maintains fences, corrals, and other agricultural enclosures. The student is expected to:~~	Will move to new course
~~(A)~~	~~select site and locate enclosures;~~	
~~(B)~~	~~estimate materials and building costs; and~~	
~~(C)~~	~~define appropriate construction methods that are friendly to the environment.~~	
(4)	The student explores the different types of power systems used in agricultural ~~facilities~~ structures. The student is expected to:	

(A)	define the terms and principles of electricity;	
(B)	estimate electrical needs and loads;	
(C)	plan installations using local codes and National Electric Code guidelines;	
(D)	demonstrate the use of various meters;	
(E)	select circuit wiring materials and supplies;	
(F)	demonstrate electrical systems repair; and	
(G)	explore alternative power systems, including solar, wind, and biomass.	
(5)	The student constructs agricultural structures using appropriate technology. The student is expected to:	
(A)	demonstrate appropriate use of surveying equipment;	
(B)	demonstrate and apply Geographic Information System (GIS) and Global Positioning System (GPS) principles;	
(C)	~~form and pour concrete slabs;~~ reinforce, place, finish, and cure concrete;	
(D)	plan, establish, and maintain water-management systems;	
(E)	identify non-traditional structural building techniques, including industry trends that are eco-friendly;	
(F)	discuss the use of masonry and drywall construction; ~~and~~	
(G)	install doors, windows, and roofing materials; and	
(H)	install plumbing equipment and fixtures to comply with government regulations and applicable codes.	
(6)	The student demonstrates metal construction techniques related to agricultural design and fabrication of structures. The student is expected to:	
(A)	explain the operations of safe oxy-fuel cutting; and	
(B)	demonstrate safe electrical welding.	
~~(7)~~	~~The student develops an advanced supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:~~	
~~(A)~~	~~plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;~~	

~~(B)~~	~~apply proper record-keeping skills as they relate to a supervised experience;~~	
~~(C)~~	~~design and use a customized record-keeping system for the individual supervised experience;~~	
~~(D)~~	~~participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and~~	
~~(E)~~	~~produce a challenging approach for a local program of activities in agriculture.~~	

Agricultural Equipment Design and Fabrication (One Credit).		
	TEKS with edits	Committee Comments
(a)	**General requirements.** This course is recommended for students in Grades 11-12. The recommended prerequisite for this course is Agricultural Mechanics and Metal Technologies.	
(b)	**Introduction.**	
(1)	Career and Technical Education 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 & 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)	To be prepared for careers in mechanized agriculture and technical systems, students attain knowledge and skills related to agricultural equipment design and fabrication. Students explore career opportunities, entry requirements, and industry expectations. To prepare for success, students reinforce, apply, and transfer their academic knowledge and technical skills in a variety of settings.	
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other 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.	
(c)	**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 and entrepreneurship opportunities in the field of mechanized agriculture;	
(B)	apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture;	
(C)	demonstrate knowledge of personal and occupational health and safety practices in the workplace;	
(D)	identify employer expectations and appropriate work habits;	
(E)	demonstrate good citizenship characteristics including advocacy, stewardship and	

	community leadership; and	
(F)	research licensing, certification, and credentialing requirements.	
(2)	The student develops an advanced supervised experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper recordkeeping skills as they relate to a supervised experience;	
(C)	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(D)	produce a challenging approach for a local strategic plan in agriculture.	
(3)	The student demonstrates principles of design and fabrication related to agricultural machinery & equipment. The student is expected to:	
(A)	develop project construction plans;	
(B)	select appropriate construction and finish materials for different types of agricultural equipment;	
(C)	estimate materials and costs needed for construction with an emphasis on renewable and eco-friendly materials;	
(D)	use measuring and mechanical skills to construct one or more agricultural equipment projects:	
(E)	integrate a logical order of operations into the construction of an agricultural equipment project; and	
(F)	use computer-aided design software.	
(4)	The student plans, constructs, and maintains fences, corrals, and other agricultural enclosures. The student is expected to:	
(A)	select site and locate enclosures;	
(B)	estimate materials and building costs; and	
(C)	define appropriate construction methods that are friendly to the environment.	
(5)	The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:	

(A)	safely operate oxy-fuel and plasma cutting equipment;	
(B)	proficiently demonstrate safe electrical welding; and	
(C)	safely use hand and power tools in the construction and repair of agricultural equipment.	
(6)	The student demonstrates knowledge of laws and regulations related to the construction, design and fabrication of agricultural equipment. The student is expected to:	
(A)	incorporate industry standards developed by entities such as ANSI, ASAE or OSHA into the construction of agricultural equipment; and	
(B)	design and build equipment in compliance with state and federal laws enforced by agencies such as the DOT.	

§130.24. Agricultural Power Systems (~~One to~~ Two Credits).		
	TEKS with edits	Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 10-12. The recommended prerequisite for this class is Principles of Agriculture, Food and Natural Resources.	
(b)	**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 & 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.	
~~(b)~~ (3)	~~**Introduction.**~~ To be prepared for careers in agricultural power, structural, and technical systems, students should attain academic skills and knowledge; acquire technical knowledge and skills related to power, structural, and technical agricultural systems and the workplace; and develop knowledge and skills regarding career opportunities, entry requirements, industry certifications, and industry expectations. To prepare for success, students should have opportunities to learn, reinforce, apply, and transfer their knowledge and technical skills in a variety of settings. This course is designed to develop an understanding of power and control systems as related to energy sources, small and large power systems, and agricultural machinery.	
(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.	
(c)	**Knowledge and skills**.	
(1)	The student ~~outlines the employability skills of a successful employee to meet current industry and societal standards~~ demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify career development and entrepreneurship opportunities in the field of power, structural, and technical systems;	
(B)	apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in power, structural, and technical systems;	

(C)	examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements;	
(D)	demonstrate knowledge of personal and occupational health and safety practices in the workplace; ~~and~~	
(E)	identify employers' expectations~~, including~~ and appropriate work habits~~, ethical conduct, legal responsibilities, and good citizenship skills.~~;and	
(F)	demonstrate good citizenship characteristics including advocacy, stewardship and community leadership.	
(2)	The student develops an improved supervised ~~agriculture~~ experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct,document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper ~~record-keeping~~ recordkeeping skills as they relate to a supervised experience;	
~~(C)~~	~~design and use a customized record-keeping recordkeeping system for the individual supervised experience;~~	
(C) ~~(D)~~	participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(D) ~~(E)~~	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	
(3)	The student connects power generation to differing energy sources. The student is expected to:	
(A)	~~discuss~~ examine benefits and detriments of petroleum and alternative energy sources;	
(B)	compare environmental impacts of varying energy sources;	
(C)	compare efficiency and characteristics of different energy sources; and	
(D)	~~discuss~~ investigate the efficiency of power generation systems that use various energy sources.	
(4)	The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	
(A)	select and identify standard tools, equipment, and safety procedures common to power and control applications;	

(B)	follow operating instructions of specialized tools and equipment such as micrometers, digital multimeters, and ~~dynameters~~ dynamometers;	
(C)	set up and adjust tools and equipment such as ~~dynameters~~ dynamometers, flow meters, torque wrenches, lathes, and mills;	
(D)	maintain and store tools and equipment common to power and control applications; and	
(E)	inventory tools and equipment in a service or maintenance facility.	
(5)	The student selects, operates, and maintains small engines. The student is expected to:	
(A)	describe principles of operation of internal combustion engines ~~and related power systems and parallel them to shared operations and theories in multiple cylinder engines~~;	
(B)	disassemble and reassemble small engines;	
(C)	select, maintain, and troubleshoot small engines; and	
(D)	research small engine industry certifications.	
(6)	The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	
(A)	identify and select agricultural equipment for appropriate tasks such as the selection of tillage equipment to obtain a desired result;	
(B)	identify and maintain component materials on varying types of machines and equipment such as bearings, hydraulics, seals, chains, and drives;	
(C)	ensure the presence and function of safety systems and hardware on machinery and equipment such as guards and shields;	
(D)	calibrate metering, monitoring, and sensing equipment on various equipment such as tillage, harvest, transport, and haying; and	
(E)	perform pre-operation inspection and appropriate start-up procedures, identify causes of malfunctions and failures, perform scheduled preventive maintenance, and safely operate equipment.	
(7)	The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	
(A)	select tractors based upon application and power requirements and describe or perform safe operation of tractors in various applications;	
(B)	maintain intake and exhaust systems, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust~~s~~ scrubbers, and mufflers;	

(C)	select lubricants and apply appropriate lubrication as required by maintenance schedules on varying lubrication systems;	
(D)	identify and maintain varying fuel systems, power trains, and hydraulic systems used on farm tractors;	
(E)	explain charging, starting, operating, and igniting direct current electrical systems; ~~as well as troubleshoot simple problems with a digital multimeter;~~	Redundant
(F)	maintain steering and braking systems;	
(G)	maintain tires and tracks and describe the role of ballasting and traction in farm tractors; and	
(H)	explain the operation of and maintain liquid and air-cooling systems in tractors.	
(8)	The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	
(A)	use various meters and test equipment such as digital multimeters to collect data and troubleshoot electrical systems;	
(B)	employ appropriate techniques for applying devices, controls, and grounding in electrical systems;	
(C)	~~employ~~ apply local and national codes and regulations relevant ~~to varying applications~~ in electrical systems;	
(D)	select and apply electric controls such as motor controls, switches, circuit breakers, timers, sensors, and relays; and	
(E)	interpret data generated by electrical monitoring systems.	
(9)	The student implements control systems as related to agricultural machines and equipment. The student is expected to:	
(A)	~~decipher~~ analyze schematic drawings for electrical control systems;	
(B)	describe uses of various electrical control system components;	
(C)	install control system components such as motor controls, switches, circuit breakers, timers, sensors, and relays and properly use appropriate tools, procedures, and safety practices; and	
(D)	identify system performance problems and apply troubleshooting techniques using monitoring devices or troubleshooting devices.	
(10)	The student describes hydraulic controls and applications as related to agricultural machines and equipment. The student is expected to:	

(A)	describe the operation of open and closed center hydraulic systems;	
(B)	explain the purpose and function of hydraulic controls such as valves, motors, pumps, cylinders, manifolds, and meters; and	
(C)	create basic hydraulic circuits using a variety of hydraulic controls.	
(11)	The student describes additional control systems as related to agricultural machines and equipment. The student is expected to:	
(A)	explain the application of pneumatic systems and controls; and	
(B)	explain the application of water or other fluid control systems as they apply to power and control systems and their component controls.	

Agricultural Laboratory and Field Experience (One Credit).		
TEKS with edits		Committee Comments
(a)	**General requirements.** This course is recommended for students in Grades 11-12. The Laboratory & Field Experience course is an enhancement opportunity for students participating in a coherent sequence of career and technical education courses in the Agriculture, Food, and Natural Resources cluster; it may be paid or unpaid. Prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources cluster. Co-requisite: any course in the Agriculture, Food, and Natural Resources cluster excluding Principles of Agriculture, Food, and Natural Resources. This course may be repeated for credit.	
(b)	**Introduction.**	
(1)	Career and Technical Education 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 & 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)	To be prepared for careers in agriculture, food, and natural resources, students need to acquire knowledge and skills that meet entry requirements, and industry expectations. To prepare for success, students learn, reinforce, apply, and transfer academic knowledge and technical skills in a variety of settings. This course is designed to provide students an opportunity to earn one advanced measure for the Distinguished Achievement Program.	
(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.	
(c)	**Knowledge and skills.**	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	investigate career development and entrepreneurship opportunities in agriculture, food, and natural resources;	
(B)	apply competencies related to resources, information, interpersonal skills;	
(C)	practice personal and occupational health and safety practices in the workplace;	

(D)	examine employer expectations, and exhibit appropriate work habits, and good citizenship skills;	
(E)	develop good citizenship characteristics including advocacy, stewardship and community leadership; and	
(F)	pursue appropriate licensing, certification, and credentialing requirements.	
(2)	The student conducts an advanced supervised experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	independently demonstrate proper recordkeeping skills as they relate to a supervised experience;	
(C)	exhibit leadership in agricultural youth leadership opportunities; and	
(D)	contribute to a challenging approach for a local strategic plan in agriculture.	
(3)	The student uses technology to research a project. The student is expected to:	
(A)	effectively use search engines, databases, and other digital electronic tools to locate information;	
(B)	evaluate quality, accuracy, completeness, reliability, and currency of information from any source;	
(C)	prepare, organize, present and apply independent research; and	
(D)	accept constructive criticism and revise personal views when valid evidence warrants.	
(4)	The student develops an elevated aptitude for the essential skills listed for the co-requisite course. The student is expected to:	
(A)	demonstrate deeper understanding of related course requirements;	
(B)	develop mastery of hands-on skills at an industry accepted standard; and	
(C)	exhibit progress towards achieving industry recognized documentation of specific expertise in an Agriculture, Food, and Natural Resources field or skill.	

§130.25. Practicum in Agriculture, Food, and Natural Resources (Two to Three Credits).		
TEKS with edits		Committee Comments
(a)	**General requirements**. This course is recommended for students in Grades 11-12. The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Agriculture, Food, and Natural Resources cluster. Recommended prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources cluster.	
(1)	A student shall be awarded two credits for successful completion of this course, when the student participates in at least an average of 10 hours, but less than 15 hours, per week of a paid or unpaid, laboratory- or work-based application of previously studied knowledge and skills related to the Agriculture Food and Natural Resources Career Cluster.	
(2)	A student shall be awarded three credits for successful completion of this course, when the student participates in an average of 15 hours per week of a paid or unpaid, laboratory- or work-based application of previously studied knowledge and skills related to the Agriculture Food and Natural Resources Career Cluster.	
(b)	**Introduction.**	
(1)	Career and Technical Education 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 & 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.	
~~(b)~~ (3)	~~**Introduction.**~~ The practicum 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.	
(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.	
(c)	**Knowledge and skills**.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:~~The student demonstrates professional standards as required by business and industry. The student is expected to:~~	

(A)	adhere to policies and procedures;	
(B)	demonstrate positive work behaviors and attitudes, including, punctuality, time management, initiative, and cooperation;	
(C)	~~value and use~~ apply constructive criticism and critical feedback from supervisor and peers;	
(D)	apply ethical reasoning to a variety of situations in order to make ethical decisions;	
(E)	complete tasks with ~~the~~ high~~est~~ standards to ensure quality products and services;	
(F)	model professional appearance, including dress, grooming, and personal protective equipment as appropriate; and	
(G)	comply with practicum setting safety rules and regulations to maintain safe and healthful working conditions and environments.	
(2)	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;	
(B)	critically analyze information to determine value to the problem-solving task;	
(C)	compare and contrast alternatives using a variety of problem-solving and critical-thinking skills; and	
(D)	conduct technical research to gather information necessary for decision making.	
(3)	The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	
(A)	analyze leadership in relation to trust, positive attitude, integrity, and willingness to accept key responsibilities in a work situation;	
(B)	demonstrate teamwork skills through working cooperatively with others to achieve tasks;	
(C)	demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution;	
(D)	demonstrate responsibility for shared group and individual work tasks;	
(E)	establish and maintain effective working relationships in order to accomplish objectives and tasks;	
(F)	demonstrate effective working relationships using interpersonal skills in order to accomplish objectives and tasks;	
(G)	use positive interpersonal skills to negotiate and work cooperatively with others; and	

(H)	demonstrate respect for individuals, including those from different cultures, genders, and backgrounds, and value for diversity.	
(4)	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)	demonstrate the use of content, technical concepts, and vocabulary when analyzing information and following directions;	
(B)	employ verbal skills when obtaining and conveying information;	
(C)	use informational texts, Internet sites, or technical materials to review and apply information sources for occupational tasks;	
(D)	evaluate the reliability of information from informational texts, Internet sites, or technical materials and resources;	
(E)	interpret verbal and nonverbal cues and behaviors to enhance communication;	
(F)	apply active listening skills to obtain and clarify information; and	
(G)	use academic skills to facilitate effective written and oral communication.	
(5)	The student develops management skills for agricultural resources. The student is expected to:	
(A)	discuss the importance of agricultural and natural resources to individuals and society;	
(B)	develop long-range land, water, and air quality management plans;	
(C)	practice equipment maintenance procedures;	
(D)	analyze the cost and maintenance of tools, equipment, and structures used in agriculture;	
(E)	describe and develop marketing strategies for agricultural and natural resources;	
(F)	decide between replacement, maintenance, repair, and reconditioning of agricultural vehicles and machinery; and	
(G)	describe and perform hazard analysis and follow safety laws.	
(6)	The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources cluster. The student is expected to:	
(A)	develop advanced technical knowledge and skills related to the personal occupational objective;	
(B)	evaluate strengths and weaknesses in technical skill proficiency;	
(C)	explain the principles of safe operation of tools and equipment related to the practicum; and	

(D)	pursue opportunities for licensure or certification relating to chosen career path.	
(7)	The student develops an advanced supervised ~~agriculture~~ experience program as it relates to agriculture, food, and natural resources. The student is expected to:	
(A)	plan, propose, conduct, document and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;	
(B)	apply proper ~~record-keeping~~ recordkeeping skills as they relate to a supervised experience;	
~~(C)~~	~~design and use a customized record-keeping recordkeeping system for the individual supervised experience;~~	
(C) ~~(D)~~	employ youth leadership opportunities to create a well-rounded experience program in agriculture; and	
(D) ~~(E)~~	produce a challenging approach for a local ~~program of activities~~ strategic plan in agriculture.	
(8)	The student documents technical knowledge and skills. The student is expected to:	
(A)	~~update~~ create a professional portfolio to include;	
(i)	attainment of technical skill competencies;	
(ii)	licensures or certifications;	
(iii)	recognitions, awards, and scholarships;	
(iv)	extended learning experiences such as community service and active participation in career and technical student organizations and professional organizations;	
(v)	abstract of key points of the practicum;	
(vi)	résumé;	
(vii)	samples of work; and	
(viii)	evaluation from the practicum supervisor; and	
(B)	present the portfolio to all interested stakeholders such as in a poster presentation.	