

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.2. Principles of Agriculture, Food, and Natural Resources (One Credit)
(a) General Requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Principles of Agriculture, Food, and Natural Resources will allow students to develop knowledge and skills regarding career and educational opportunities, personal development, globalization, industry standards, details, practices, and expectations. To prepare for careers in agriculture, food, and natural resources, students must attain academic skills and knowledge in agriculture. To prepare for success, students need opportunities to learn, reinforce, experience, apply, and transfer their knowledge and skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of agriculture, food, and natural resources
(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	(ii) identify education opportunities in the field of agriculture, food, and natural resources
(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	(iii) identify entrepreneurship opportunities in the field of agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(i) apply competencies related to resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(ii) apply competencies related to information

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(iii) apply competencies related to interpersonal skills
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(iv) apply competencies related to problem solving
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(v) apply competencies related to critical thinking
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(vi) apply competencies related to systems of operation in agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(i) demonstrate knowledge of personal safety in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(ii) demonstrate knowledge of occupational safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(iii) demonstrate knowledge of health in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(iv) demonstrate knowledge of environmental regulations in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(v) demonstrate knowledge of first-aid policy in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, such as appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(i) analyze employers' expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) Identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and social studies	(i) Identify careers in agriculture, food, and natural resources with required aptitudes in science

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) Identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and social studies	(ii) Identify careers in agriculture, food, and natural resources with required aptitudes in technology
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) Identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and social studies	(iii) Identify careers in agriculture, food, and natural resources with required aptitudes in engineering
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) Identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and social studies	(iv) Identify careers in agriculture, food, and natural resources with required aptitudes in mathematics
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) Identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and social studies	(v) Identify careers in agriculture, food, and natural resources with required aptitudes language arts
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) Identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and social studies	(vi) Identify careers in agriculture, food, and natural resources with required aptitudes in social studies

Knowledge and Skill Statement	Student Expectation	Breakout
(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 supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(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 supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(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 supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(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 supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(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 supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student analyzes concepts related to global diversity. The student is expected to:	(A) compare and contrast global agricultural markets, currency, and trends	(i) compare and contrast global agricultural markets
(3) The student analyzes concepts related to global diversity. The student is expected to:	(A) compare and contrast global agricultural markets, currency, and trends; and	(ii) compare and contrast global currency
(3) The student analyzes concepts related to global diversity. The student is expected to:	(A) compare and contrast global agricultural markets, currency, and trends; and	(iii) compare and contrast global trends
(3) The student analyzes concepts related to global diversity. The student is expected to:	(B) evaluate marketing factors and practices that impact the global markets	(i) evaluate marketing factors that impact global markets
(3) The student analyzes concepts related to global diversity. The student is expected to:	(B) evaluate marketing factors and practices that impact the global markets	(ii) evaluate marketing practices that impact global markets

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(A) define the scope of agriculture	(i) define the scope of agriculture
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(B) analyze the scope of agriculture, food, and natural resources and its effect upon society	(i) analyze the scope of agriculture, food, and natural resources
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(B) analyze the scope of agriculture, food, and natural resources and its effect upon society	(ii) analyze the scope of agriculture, food, and natural resources' effect upon society
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(C) evaluate significant historical and current agriculture, food, and natural resource developments	(i) evaluate significant historical agriculture, food, and natural resource developments
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(C) evaluate significant historical and current agriculture, food, and natural resource developments	(ii) evaluate significant current agriculture, food, and natural resource developments
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(D) identify potential future scenarios for agriculture, food, and natural resources systems, including global impacts	(i) identify potential future scenarios for agriculture, food, and natural resources systems, including global impacts

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(E) describe how emerging technologies and globalization impacts agriculture, food, and natural resources	(i) describe how emerging technologies impact agriculture, food, and natural resources
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(E) describe how emerging technologies and globalization impacts agriculture, food, and natural resources	(ii) describe how globalization impacts agriculture, food, and natural resources
(4) The student explains the historical, current, and future significance of the agricultural, food, and natural resources industry. The student is expected to:	(F) compare and contrast issues impacting agriculture, food, and natural resources such as biotechnology, employment, safety, environment, and animal welfare issues	(i) compare and contrast issues impacting agriculture, food, and natural resources
(5) The student analyzes the structure of agricultural, food, and natural resources leadership in organizations. The student is expected to:	(A) develop and demonstrate leadership skills and collaborate with others to accomplish organizational goals and objectives	(i) develop leadership skills
(5) The student analyzes the structure of agricultural, food, and natural resources leadership in organizations. The student is expected to:	(A) develop and demonstrate leadership skills and collaborate with others to accomplish organizational goals and objectives	(ii) demonstrate leadership skills
(5) The student analyzes the structure of agricultural, food, and natural resources leadership in organizations. The student is expected to:	(A) develop and demonstrate leadership skills and collaborate with others to accomplish organizational goals and objectives	(iii) collaborate with others to accomplish organizational goals and objectives

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student analyzes the structure of agricultural, food, and natural resources leadership in organizations. The student is expected to:	(B) develop and demonstrate personal growth skills and collaborate with others to accomplish organizational goals and objectives	(i) develop personal growth skills
(5) The student analyzes the structure of agricultural, food, and natural resources leadership in organizations. The student is expected to:	(B) develop and demonstrate personal growth skills and collaborate with others to accomplish organizational goals and objectives	(ii) demonstrate personal growth skills
(5) The student analyzes the structure of agricultural, food, and natural resources leadership in organizations. The student is expected to:	(B) develop and demonstrate personal growth skills and collaborate with others to accomplish organizational goals and objectives	(iii) collaborate with others to accomplish organizational goals and objectives
(6) The student demonstrates appropriate personal and communication skills. The student is expected to:	(A) demonstrate written and oral communication skills appropriate for formal and informal situations such as prepared and extemporaneous presentations	(i) demonstrate written communication skills appropriate for formal situations
(6) The student demonstrates appropriate personal and communication skills. The student is expected to:	(A) demonstrate written and oral communication skills appropriate for formal and informal situations such as prepared and extemporaneous presentations	(ii) demonstrate written communication skills appropriate for informal situations
(6) The student demonstrates appropriate personal and communication skills. The student is expected to:	(A) demonstrate written and oral communication skills appropriate for formal and informal situations such as prepared and extemporaneous presentations	(iii) demonstrate oral communication skills appropriate for formal situations

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student demonstrates appropriate personal and communication skills. The student is expected to:	(A) demonstrate written and oral communication skills appropriate for formal and informal situations such as prepared and extemporaneous presentations	(iv) demonstrate oral communication skills appropriate for informal situations
(6) The student demonstrates appropriate personal and communication skills. The student is expected to:	(B) demonstrate effective listening skills appropriate for formal and informal situations	(i) demonstrate effective listening skills appropriate for formal situations
(6) The student demonstrates appropriate personal and communication skills. The student is expected to:	(B) demonstrate effective listening skills appropriate for formal and informal situations	(ii) demonstrate effective listening skills appropriate for informal situations
(7) The student applies appropriate research methods to agriculture, food, and natural resources topics. The student is expected to:	(A) discuss major research and developments in the fields of agriculture, food, and natural resources	(i) discuss major research in the fields of agriculture, food, and natural resources
(7) The student applies appropriate research methods to agriculture, food, and natural resources topics. The student is expected to:	(A) discuss major research and development fields of agriculture, food, and natural resources;	(ii) discuss major developments in the fields of agriculture, food, and natural resources
(7) The student applies appropriate research methods to agriculture, food, and natural resources topics. The student is expected to:	(B) use a variety of resources for research and development	(i) use a variety of resources for research
(7) The student applies appropriate research methods to agriculture, food, and natural resources topics. The student is expected to:	(B) use a variety of resources for research and development	(ii) use a variety of resources for development

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(7) The student applies appropriate research methods to agriculture, food, and natural resources topics. The student is expected to:	(C) describe scientific methods of research	(i) describe scientific methods of research
(8) The student applies problem-solving, mathematical, and organizational skills in order to maintain financial and logistical records. The student is expected to:	(A) develop a formal business plan	(i) develop a formal business plan
(8) The student applies problem-solving, mathematical, and organizational skills in order to maintain financial and logistical records. The student is expected to:	(B) develop, maintain, and analyze records	(i) develop records
(8) The student applies problem-solving, mathematical, and organizational skills in order to maintain financial and logistical records. The student is expected to:	(B) develop, maintain, and analyze records	(ii) maintain records
(8) The student applies problem-solving, mathematical, and organizational skills in order to maintain financial and logistical records. The student is expected to:	(B) develop, maintain, and analyze records	(iii) analyze records
(9) The student uses information technology tools to access, manage, integrate, and create information related to agriculture, food, and natural resources. The student is expected to:	(A) apply technology applications such as industry-relevant software and Internet applications	(i) apply technology applications

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student uses information technology tools to access, manage, integrate, and create information related to agriculture, food, and natural resources. The student is expected to:	(B) utilize collaborative, groupware, and virtual meeting software	(i) utilize collaborative software
(9) The student uses information technology tools to access, manage, integrate, and create information related to agriculture, food, and natural resources. The student is expected to:	(B) utilize collaborative, groupware, and virtual meeting software	(ii) utilize groupware software
(9) The student uses information technology tools to access, manage, integrate, and create information related to agriculture, food, and natural resources. The student is expected to:	(B) utilize collaborative, groupware, and virtual meeting software	(iii) utilize virtual meeting software
(9) The student uses information technology tools to access, manage, integrate, and create information related to agriculture, food, and natural resources. The student is expected to:	(C) analyze the benefits and limitations of emerging technology such as online mapping systems, drones, and robotics	(i) analyze the benefits of emerging technology
(9) The student uses information technology tools to access, manage, integrate, and create information related to agriculture, food, and natural resources. The student is expected to:	(C) analyze the benefits and limitations of emerging technology such as online mapping systems, drones, and robotics	(ii) analyze the limitations of emerging technology

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student uses information technology tools to access, manage, integrate, and create information related to agriculture, food, and natural resources. The student is expected to:	(D) explain the benefits of computer based and mobile application equipment in agriculture, food, and natural resources	(i) explain the benefits of computer based equipment in agriculture, food, and natural resources
(9) The student uses information technology tools to access, manage, integrate, and create information related to agriculture, food, and natural resources. The student is expected to:	(D) explain the benefits of computer based and mobile application equipment in agriculture, food, and natural resources	(ii) explain the benefits of mobile application equipment in agriculture, food, and natural resources
(10) The student develops technical knowledge and skills related to soil systems. The student is expected to:	(A) identify the components and properties of soils	(i) identify the components of soils
(10) The student develops technical knowledge and skills related to soil systems. The student is expected to:	(A) identify the components and properties of soils	(ii) identify the properties of soils
(10) The student develops technical knowledge and skills related to soil systems. The student is expected to:	(B) identify and describe the process of soil formation	(i) identify the process of soil formation
(10) The student develops technical knowledge and skills related to soil systems. The student is expected to:	(B) identify and describe the process of soil formation	(ii) describe the process of soil formation

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student develops technical knowledge and skills related to soil systems. The student is expected to:	(C) conduct experiments related to soil chemistry	(i) conduct experiments related to soil chemistry
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(A) describe the structure and functions of plant parts	(i) describe the structure of plant parts
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(A) describe the structure and functions of plant parts	(ii) describe the function of plant parts
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(B) discuss and apply plant germination, growth, and development	(i) discuss plant germination
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(B) discuss and apply plant germination, growth, and development	(ii) discuss plant growth
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(B) discuss and apply plant germination, growth, and development	(iii) discuss plant development
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(B) discuss and apply plant germination, growth, and development	(iv) apply plant germination

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(B) discuss and apply plant germination, growth, and development	(v) apply plant growth
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(B) discuss and apply plant germination, growth, and development	(vi) apply plant development
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(C) describe plant reproduction, genetics, and breeding	(i) describe plant reproduction
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(C) describe plant reproduction, genetics, and breeding	(ii) describe plant genetics
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(C) describe plant reproduction, genetics, and breeding	(iii) describe plant breeding
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(D) identify plants of importance to agriculture, food, and natural resources	(i) identify plants of importance to agriculture, food, and natural resources
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(E) use tools, equipment, and personal protective equipment common to plant systems	(i) use tools common to plant systems

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(E) use tools, equipment, and personal protective equipment common to plant systems	(ii) use equipment common to plant systems
(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:	(E) use tools, equipment, and personal protective equipment common to plant systems	(iii) use personal protective equipment common to plant systems
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(A) describe animal growth and development	(i) describe animal growth
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(A) describe animal growth and development	(ii) describe animal development
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(B) identify animal anatomy and physiology	(i) identify animal anatomy
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(B) identify animal anatomy and physiology	(ii) identify animal physiology
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(C) identify and evaluate breeds and classes of livestock	(i) identify breeds of livestock

Knowledge and Skill Statement	Student Expectation	Breakout
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(C) identify and evaluate breeds and classes of livestock	(ii) identify classes of livestock
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(C) identify and evaluate breeds and classes of livestock	(iii) evaluate breeds of livestock
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(C) identify and evaluate breeds and classes of livestock	(iv) evaluate classes of livestock
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(D) explain animal selection, reproduction, breeding, and genetics	(i) explain animal selection
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(D) explain animal selection, reproduction, breeding, and genetics	(ii) explain animal reproduction
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(D) explain animal selection, reproduction, breeding, and genetics	(iii) explain animal breeding
(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:	(D) explain animal selection, reproduction, breeding, and genetics	(iv) explain animal genetics

Knowledge and Skill Statement	Student Expectation	Breakout
(13) The student describes the principles of food products and processing systems. The student is expected to:	(A) evaluate food products and processing systems	(i) evaluate food products and processing systems
(13) The student describes the principles of food products and processing systems. The student is expected to:	(B) determine trends in world food production	(i) determine trends in world food production
(13) The student describes the principles of food products and processing systems. The student is expected to:	(C) discuss current issues in food production	(i) discuss current issues in food production
(13) The student describes the principles of food products and processing systems. The student is expected to:	(D) use tools, equipment, and personal protective equipment common to food products and processing systems	(i) use tools common to food products and processing systems
(13) The student describes the principles of food products and processing systems. The student is expected to:	(D) use tools, equipment, and personal protective equipment common to food products and processing systems	(ii) use equipment common to food products and processing systems
(13) The student describes the principles of food products and processing systems. The student is expected to:	(D) use tools, equipment, and personal protective equipment common to food products and processing systems	(iii) use personal protective equipment common to food products and processing systems
(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	(i) identify major areas of power, structural, and technical systems

Knowledge and Skill Statement	Student Expectation	Breakout
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(B) use safe and appropriate laboratory procedures and policies	(i) use safe laboratory procedures
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(B) use safe and appropriate laboratory procedures and policies	(ii) use safe laboratory policies
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(B) use safe and appropriate laboratory procedures and policies	(iii) use appropriate laboratory procedures
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(B) use safe and appropriate laboratory procedures and policies	(iv) use appropriate laboratory policies
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(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	(i) create proposals that include bill of materials developed for basic power, structural, and technical system projects or structures
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(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	(ii) create proposals that include budget developed for basic power, structural, and technical system projects or structures

Knowledge and Skill Statement	Student Expectation	Breakout
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(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	(iii) create proposals that include schedule developed for basic power, structural, and technical system projects or structures
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(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	(iv) create proposals that include drawings developed for basic power, structural, and technical system projects or structures
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(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	(v) create proposals that include technical skills developed for basic power, structural, and technical system projects or structures
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(D) identify building materials and fasteners	(i) identify building materials
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(D) identify building materials and fasteners	(ii) identify fasteners

Knowledge and Skill Statement	Student Expectation	Breakout
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(E) use tools, equipment, and personal protective equipment common to power, structural, and technical systems	(i) use tools common to power, structural, and technical systems
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(E) use tools, equipment, and personal protective equipment common to power, structural, and technical systems	(ii) use equipment common to power, structural, and technical systems
(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:	(E) use tools, equipment, and personal protective equipment common to power, structural, and technical systems	(iii) use personal protective equipment common to power, structural, and technical systems
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(A) determine the effects of agriculture, food, and natural resources upon safety, health, and the environment	(i) determine the effects of agriculture, food, and natural resources upon safety
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(A) determine the effects of agriculture, food, and natural resources upon safety, health, and the environment	(ii) determine the effects of agriculture, food, and natural resources upon health
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(A) determine the effects of agriculture, food, and natural resources upon safety, health, and the environment	(iii) determine the effects of agriculture, food, and natural resources upon the environment

Knowledge and Skill Statement	Student Expectation	Breakout
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(B) identify regulations relating to safety, health, and environmental systems in agriculture, food, and natural resources	(i) identify regulations relating to safety in agriculture, food, and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(B) identify regulations relating to safety, health, and environmental systems in agriculture, food, and natural resources	(ii) identify regulations relating to health in agriculture, food, and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(B) identify regulations relating to safety, health, and environmental systems in agriculture, food, and natural resources	(iii) identify regulations relating to environmental systems in agriculture, food, and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(i) identify methods to maintain safety in agriculture, food and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(ii) identify methods to maintain health in agriculture, food and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(iii) identify methods to maintain environmental systems in agriculture, food and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(iv) identify methods to improve safety in agriculture, food and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(v) identify methods to improve health in agriculture, food and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(vi) identify methods to improve environmental systems in agriculture, food and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(vii) design methods to maintain safety in agriculture, food and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(viii) design methods to maintain health in agriculture, food, and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(ix) design methods to maintain environmental systems in agriculture, food, and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(x) design methods to improve safety in agriculture, food, and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(xi) design methods to improve health in agriculture, food, and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(C) identify and design methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources	(xii) design methods to improve environmental systems in agriculture, food and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(D) research and analyze alternative energy sources that stem from or impact agriculture, food, and natural resources	(i) research alternative energy sources that stem from or impact agriculture, food, and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(D) research and analyze alternative energy sources that stem from or impact agriculture, food, and natural resources	(ii) analyze alternative energy sources that stem from or impact agriculture, food, and natural resources
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(E) evaluate energy and water conservation methods	(i) evaluate energy conservation methods

Knowledge and Skill Statement	Student Expectation	Breakout
(15) The student explains the relationship between agriculture, food, and natural resources and the environment. The student is expected to:	(E) evaluate energy and water conservation methods	(ii) evaluate water conservation methods

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.3. Professional Standards in Agribusiness (One-Half Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one-half credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Professional Standards in Agribusiness primarily focuses on leadership, communication, employer-employee relations, and problem solving as they relate to agribusiness. To prepare for careers in agribusiness systems, students must attain academic skills 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.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(A) identify career and entrepreneurship opportunities related to agribusiness	(i) identify career opportunities related to agribusiness
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(A) identify career and entrepreneurship opportunities related to agribusiness	(ii) identify entrepreneurship opportunities related to agribusiness
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agriculture, food, and natural resource industries	(i) apply competencies related to resources in agriculture, food, and natural resource industries
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agriculture, food, and natural resource industries	(ii) apply competencies related to information in agriculture, food, and natural resource industries
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agriculture, food, and natural resource industries	(iii) apply competencies related interpersonal skills in agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agriculture, food, and natural resource industries	(iv) apply competencies related to systems of operations in agriculture, food, and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations, including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate employers' expectations and appropriate work habits	(i) demonstrate employers' expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate employers' expectations and appropriate work habits	(ii) demonstrate appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership	(i) demonstrate characteristics of good citizenship

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) research career topics using technology such as the Internet	(i) research career topics using technology
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) 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	(i) describe the importance of positive self-concept with respect to cultural diversity
(3) 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	(ii) describe the importance of social skills with respect to cultural diversity

Knowledge and Skill Statement	Student Expectation	Breakout
(3) 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	(iii) describe the importance of maintaining a professional image with respect to cultural diversity
(4) The student evaluates employer and employee responsibilities for occupations in agriculture, food, and natural resources. The student is expected to:	(A) identify and discuss work-related and agribusiness-related ethics	(i) identify work-related ethics
(4) The student evaluates employer and employee responsibilities for occupations in agriculture, food, and natural resources. The student is expected to:	(A) identify and discuss work-related and agribusiness-related ethics	(ii) identify agribusiness-related ethics
(4) The student evaluates employer and employee responsibilities for occupations in agriculture, food, and natural resources. The student is expected to:	(A) identify and discuss work-related and agribusiness-related ethics	(iii) discuss work-related ethics
(4) The student evaluates employer and employee responsibilities for occupations in agriculture, food, and natural resources. The student is expected to:	(A) identify and discuss work-related and agribusiness-related ethics	(iv) discuss agribusiness-related ethics
(5) The student communicates effectively with groups and individuals. The student is expected to:	(A) understand elements of communication such as accuracy, relevance, rhetoric, and organization in informal, group discussions; formal presentations; and business-related, technical communication	(i) understand elements of communication

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student communicates effectively with groups and individuals. The student is expected to:	(B) describe how the style and content of spoken language varies in different contexts and influences the listener's understanding	(i) describe how the style of spoken language varies in different contexts
(5) The student communicates effectively with groups and individuals. The student is expected to:	(B) describe how the style and content of spoken language varies in different contexts and influences the listener's understanding	(ii) describe how the style of spoken language influences the listener's understanding
(5) The student communicates effectively with groups and individuals. The student is expected to:	(B) describe how the style and content of spoken language varies in different contexts and influences the listener's understanding	(iii) describe how the content of spoken language varies in different contexts
(5) The student communicates effectively with groups and individuals. The student is expected to:	(B) describe how the style and content of spoken language varies in different contexts and influences the listener's understanding	(iv) describe how the content of spoken language influences the listener's understanding
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(A) identify the importance of verbal and nonverbal communication	(i) identify the importance of verbal communication
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(A) identify the importance of verbal and nonverbal communication	(ii) identify the importance of nonverbal communication

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(B) demonstrate the importance of communicating factual and unbiased data and information obtained from reliable sources	(i) demonstrate the importance of communicating factual data obtained from reliable sources
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(B) demonstrate the importance of communicating factual and unbiased data and information obtained from reliable sources	(ii) demonstrate the importance of communicating factual information obtained from reliable sources
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(B) demonstrate the importance of communicating factual and unbiased data and information obtained from reliable sources	(iii) demonstrate the importance of communicating unbiased data obtained from reliable sources
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(B) demonstrate the importance of communicating factual and unbiased data and information obtained from reliable sources	(iv) demonstrate the importance of communicating unbiased information obtained from reliable sources
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(C) demonstrate speech preparation and delivery skills such as using presentation software and technology etiquette	(i) demonstrate speech preparation skills

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(C) demonstrate speech preparation and delivery skills such as using presentation software and technology etiquette	(ii) demonstrate speech delivery skills
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(i) plan focused presentations that convey clear perspectives
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(ii) plan focused presentations that convey distinct perspectives
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(iii) plan focused presentations that demonstrate solid reasoning
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(iv) plan coherent presentations that convey clear perspectives

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(v) plan coherent presentations that convey distinct perspectives
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(vi) plan coherent presentations that demonstrate solid reasoning
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(vii) deliver focused presentations that convey clear perspectives
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(viii) deliver focused presentations that convey distinct perspectives
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(ix) deliver focused presentations that demonstrate solid reasoning

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(x) deliver coherent presentations that convey clear perspectives
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(xi) deliver coherent presentations that convey distinct perspectives
(6) The student identifies professional agricultural communications using appropriate spoken communication techniques and procedures. The student is expected to:	(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning	(xii) deliver coherent presentations that demonstrate solid reasoning
(7) The student demonstrates the factors of group and individual efficiency. The student is expected to	(A) define the significance of personal and group goals	(i) define the significance of personal goals
(7) The student demonstrates the factors of group and individual efficiency. The student is expected to	(A) define the significance of personal and group goals	(ii) define the significance of group goals
(7) The student demonstrates the factors of group and individual efficiency. The student is expected to	(B) demonstrate leadership traits when solving a problem such as risk-taking, focusing on results, decision making, and empowering and investing in individuals when leading a group	(i) demonstrate leadership traits when solving a problem

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student demonstrates the factors of group and individual efficiency. The student is expected to	(C) discuss the importance of time management and teamwork	(i) discuss the importance of time management
(7) The student demonstrates the factors of group and individual efficiency. The student is expected to	(C) discuss the importance of time management and teamwork	(ii) discuss the importance of teamwork
(7) The student demonstrates the factors of group and individual efficiency. The student is expected to	(D) list the steps in the decision-making and problem-solving processes	(i) list the steps in the decision-making process
(7) The student demonstrates the factors of group and individual efficiency. The student is expected to	(D) list the steps in the decision-making and problem-solving processes	(ii) list the steps in the problem-solving process
(7) The student demonstrates the factors of group and individual efficiency. The student is expected to	(E) demonstrate a working knowledge of parliamentary law	(i) demonstrate a working knowledge of parliamentary law
(8) The student identifies opportunities for involvement in agribusiness professional organizations. The student is expected to:	(A) discuss the role of agricultural organizations in formulating public policy	(i) discuss the role of agricultural organizations in formulating public policy
(8) The student identifies opportunities for involvement in agribusiness professional organizations. The student is expected to:	(B) develop strategies for effective participation in agricultural organizations	(i) develop strategies for effective participation in agricultural organizations

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student identifies opportunities for involvement in agribusiness professional organizations. The student is expected to:	(C) identify and discuss the purpose of various agricultural organizations such as the Texas Farm Bureau, Association of Soil and Water Conservation Districts, Texas and Southwestern Cattle Raisers Association, and Independent Cattlemen's Association and agricultural cooperatives, commodity associations, and breed associations	(i) identify the purpose of various agricultural organizations
(8) The student identifies opportunities for involvement in agribusiness professional organizations. The student is expected to:	(C) identify and discuss the purpose of various agricultural organizations such as the Texas Farm Bureau, Association of Soil and Water Conservation Districts, Texas and Southwestern Cattle Raisers Association, and Independent Cattlemen's Association and agricultural cooperatives, commodity associations, and breed associations	(ii) discuss the purpose of various agricultural organizations
(9) 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	(i) compare and contrast the marketing of agricultural and non-agricultural products
(9) The student identifies and researches current agribusiness issues. The student is expected to:	(B) describe the effects of urbanization on traditional agriculture	(i) describe the effects of urbanization on traditional agriculture

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.4. Agribusiness Management and Marketing (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Agribusiness Management and Marketing is designed to provide a foundation to agribusiness management and the free enterprise system. Instruction includes the use of economic principles such as supply and demand, budgeting, record keeping, finance, risk management, business law, marketing, and careers in agribusiness. To prepare for careers in agribusiness systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to agribusiness marketing and management and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 agribusiness systems	(i) identify career development opportunities in agribusiness systems
(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 agribusiness systems	(ii) identify entrepreneurship opportunities in agribusiness systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agribusiness systems	(i) apply competencies related to resources in agribusiness systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agribusiness systems	(ii) apply competencies related to information in agribusiness systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agribusiness systems	(iii) apply competencies related to interpersonal skills in agribusiness systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agribusiness systems	(iv) apply competencies related to systems of operation in agribusiness systems

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(i) demonstrate knowledge of personal health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(ii) demonstrate knowledge of personal safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iii) demonstrate knowledge of occupational health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iv) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations, including legal responsibilities

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership	(i) demonstrate good citizenship characteristics
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) research career topics using technology such as the Internet	(i) research career topics using technology
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) 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	(i) identify how key organizational systems affect organizational performance
(3) 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	(ii) identify how key organizational systems affect the quality of products related to agriculture, food, and natural resources
(3) 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	(iii) identify how key organizational systems affect the quality of services related to agriculture, food, and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student recognizes roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The student is expected to:	(B) demonstrate an understanding of the global context of agricultural industries and careers	(i) demonstrate an understanding of the global context of agricultural industries
(3) The student recognizes roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The student is expected to:	(B) demonstrate an understanding of the global context of agricultural industries and careers	(ii) demonstrate an understanding the global context of agricultural careers
(3) The student recognizes roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The student is expected to:	(C) describe the nature and types of agribusiness organizations to build an understanding of the scope of organizations	(i) describe the nature of agribusiness organizations to build an understanding of the scope of organizations
(3) The student recognizes roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The student is expected to:	(C) describe the nature and types of agribusiness organizations to build an understanding of the scope of organizations	(ii) describe the types of agribusiness organizations to build an understanding of the scope of organizations
(4) The student examines critical aspects of career opportunities in one or more agriculture, food, and natural resources careers. The student is expected to:	(A) research and interpret information for one or more careers in agriculture, food, or natural resources	(i) research information for one or more careers in agriculture, food, or natural resources
(4) The student examines critical aspects of career opportunities in one or more agriculture, food, and natural resources careers. The student is expected to:	(A) research and interpret information for one or more careers in agriculture, food, or natural resources	(ii) interpret information for one or more careers in agriculture, food, or natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student examines critical aspects of career opportunities in one or more agriculture, food, and natural resources careers. The student is expected to:	(B) identify educational and credentialing requirements for one or more careers in agriculture, food, and natural resources	(i) identify educational requirements for one or more careers in agriculture, food, and natural resources
(4) The student examines critical aspects of career opportunities in one or more agriculture, food, and natural resources careers. The student is expected to:	(B) identify educational and credentialing requirements for one or more careers in agriculture, food, and natural resources	(ii) identify credentialing requirements for one or more careers in agriculture, food, and natural resources
(5) The student defines and examines agribusiness management and marketing and its importance to the local and international economy. The student is expected to:	(A) describe the roles and functions of management and leadership in agribusiness	(i) describe the roles of management in agribusiness
(5) 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	(ii) describe the roles of leadership in agribusiness
(5) 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	(iii) describe the functions of management in agribusiness
(5) 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	(iv) describe the functions of leadership in agribusiness

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student defines and examines agribusiness management and marketing and its importance to the local and international economy. The student is expected to:	(B) identify key economic principles of free enterprise	(i) identify key economic principles of free enterprise
(5) The student defines and examines agribusiness management and marketing and its importance to the local and international economy. The student is expected to:	(C) analyze the economic opportunities of agribusiness	(i) analyze the economic opportunities of agribusiness
(6) The student defines the importance of maintaining 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	(i) maintain appropriate agribusiness records
(6) The student defines the importance of maintaining records and budgeting in agribusiness. The student is expected to:	(B) identify methods of obtaining agribusiness loans and financing	(i) identify methods of obtaining agribusiness loans
(6) The student defines the importance of maintaining records and budgeting in agribusiness. The student is expected to:	(B) identify methods of obtaining agribusiness loans and financing	(ii) identify methods of obtaining agribusiness financing
(6) The student defines the importance of maintaining records and budgeting in agribusiness. The student is expected to:	(C) compare methods of capital resource acquisition as it pertains to agriculture	(i) compare methods of capital resource acquisition as it pertains to agriculture

Knowledge and Skill Statement	Student Expectation	Breakout
(7) 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	(i) analyze methods of decision making
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(B) examine the effects of government policies and regulations in making management decisions	(i) examine the effects of government policies in making management decisions
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(B) examine the effects of government policies and regulations in making management decisions	(ii) examine the effects of government regulations in making management decisions
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(C) describe the management of human resources with respect to cultural diversity	(i) describe the management of human resources with respect to cultural diversity
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(D) identify laws pertaining to land and property ownership and uses, taxes, wills, and liabilities	(i) identify laws pertaining to land ownership
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(D) identify laws pertaining to land and property ownership and uses, taxes, wills, and liabilities	(ii) identify laws pertaining to property ownership
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(D) identify laws pertaining to land and property ownership and uses, taxes, wills, and liabilities	(iii) identify laws pertaining to land uses

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(D) identify laws pertaining to land and property ownership and uses, taxes, wills, and liabilities	(iv) identify laws pertaining to property uses
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(D) identify laws pertaining to land and property ownership and uses, taxes, wills, and liabilities	(v) identify laws pertaining to taxes
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(D) identify laws pertaining to land and property ownership and uses, taxes, wills, and liabilities	(vi) identify laws pertaining to wills
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(D) identify laws pertaining to land and property ownership and uses, taxes, wills, and liabilities	(vii) identify laws pertaining to liabilities
(7) The student describes issues related to government policy and recognizes concepts related to cultural diversity. The student is expected to:	(E) develop a personal economic philosophy	(i) develop a personal economic philosophy
(8) The student defines key issues of agribusiness success and failure. The student is expected to:	(A) apply the decision-making process for budgeting issues	(i) apply the decision-making process for budgeting issues
(8) The student defines key issues of agribusiness success and failure. The student is expected to:	(B) analyze business records and record-keeping procedures	(i) analyze business records

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student defines key issues of agribusiness success and failure. The student is expected to:	(B) analyze business records and record-keeping procedures	(ii) analyze record-keeping procedures
(8) The student defines key issues of agribusiness success and failure. The student is expected to:	(C) determine methods of financing agribusiness	(i) determine methods of financing agribusiness
(8) The student defines key issues of agribusiness success and failure. The student is expected to:	(D) identify methods of obtaining capital resources	(i) identify methods of obtaining capital resources
(8) The student defines key issues of agribusiness success and failure. The student is expected to:	(E) analyze agricultural commodity markets	(i) analyze agricultural commodity markets
(9) The student describes the marketing of agricultural products. The student is expected to:	(A) describe the purpose and importance of marketing	(i) describe the purpose of marketing
(9) The student describes the marketing of agricultural products. The student is expected to:	(A) describe the purpose and importance of marketing	(ii) describe the importance of marketing
(9) The student describes the marketing of agricultural products. The student is expected to:	(B) develop a marketing plan	(i) develop a marketing plan
(9) The student describes the marketing of agricultural products. The student is expected to:	(C) identify the competitive environment and the impact of foreign markets	(i) identify the competitive environment of foreign markets
(9) The student describes the marketing of agricultural products. The student is expected to:	(C) identify the competitive environment and the impact of foreign markets	(ii) identify the impact of foreign markets

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student describes the marketing of agricultural products. The student is expected to:	(D) compare types of markets and influence factors	(i) compare types of markets
(9) The student describes the marketing of agricultural products. The student is expected to:	(D) compare types of markets and influence factors	(ii) compare [market] influence factors
(9) The student describes the marketing of agricultural products. The student is expected to:	(E) identify methods of managing risk such as hedging, and crop insurance	(i) identify methods of managing risk
(10) 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	(i) use management software
(10) 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	(ii) use information technology
(10) The student knows the efficiency aspects of agribusiness management. The student is expected to:	(B) develop an entrepreneurial plan based on personal economic philosophy	(i) develop an entrepreneurial plan based on personal economic philosophy
(10) The student knows the efficiency aspects of agribusiness management. The student is expected to:	(C) develop a financial management plan	(i) develop a financial management plan

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student knows the efficiency aspects of agribusiness management. The student is expected to:	(i) present a business proposal	(i) present a business proposal

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.5. Mathematical Applications in Agriculture, Food, and Natural Resources (One Credit)
<p>(a) General Requirements. This course is recommended for students in Grades 10-12. Prerequisites: Algebra I and one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster. This course satisfies a high school mathematics graduation requirement. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) In Mathematical Applications in Agriculture, Food, and Natural Resources, students will apply knowledge and skills related to mathematics, including algebra, geometry, and data analysis in the context of agriculture, food, and natural resources. To prepare for careers in agriculture, food, and natural resources, students must acquire technical knowledge in the discipline as well as apply academic skills in mathematics. To prepare for success, students need opportunities to reinforce, apply, and transfer their knowledge and skills related to mathematics in a variety of contexts.</p> <p>(4) The mathematical process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.</p> <p>(5) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities
(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	(ii) identify entrepreneurship opportunities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate competencies related to resources, information, interpersonal skills, and systems of operation	(i) demonstrate competencies related to resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate competencies related to resources, information, interpersonal skills, and systems of operation	(ii) demonstrate competencies related to information
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate competencies related to resources, information, interpersonal skills, and systems of operation	(iii) demonstrate competencies related to interpersonal skills
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate competencies related to resources, information, interpersonal skills, and systems of operation	(iv) demonstrate competencies related to systems of operation
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(i) demonstrate knowledge of personal health practices in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(ii) demonstrate knowledge of personal safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iii) demonstrate knowledge of occupational health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iv) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations, including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership	(i) demonstrate characteristics of good citizenship

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) research career topics using technology such as the Internet	(i) research career topics using technology
(2) 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	(i) apply mathematics to problems arising in everyday life
(2) 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	(ii) apply mathematics to problems arising in society
(2) 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	(iii) apply mathematics to problems arising in the workplace
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(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	(i) 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
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(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	(i) select tools, including real objects as appropriate, to solve problems

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(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	(ii) select tools, including manipulatives as appropriate, to solve problems
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(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	(iii) select tools, including paper and pencil as appropriate, to solve problems
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(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	(iv) select tools, including technology as appropriate, to solve problems
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(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	(v) select techniques, including mental math as appropriate, to solve problems
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(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	(vi) select techniques including estimation as appropriate, to solve problems
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(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	(vii) select techniques, including number sense as appropriate, to solve problems

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(i) communicate mathematical ideas using multiple representations, including symbols as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(ii) communicate mathematical ideas using multiple representations, including diagrams as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(iii) communicate mathematical ideas using multiple representations, including graphs as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(iv) communicate mathematical ideas using multiple representations, including language as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(v) communicate mathematical reasoning using multiple representations, including symbols as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(vi) communicate mathematical reasoning using multiple representations, including diagrams as appropriate

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(vii) communicate mathematical reasoning using multiple representations, including graphs as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(viii) communicate mathematical reasoning using multiple representations, including language as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(ix) communicate [mathematical ideas'] implications using multiple representations, including symbols as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(x) communicate [mathematical ideas'] implications using multiple representations, including diagrams as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(xi) communicate [mathematical ideas'] implications using multiple representations, including graphs as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(xii) communicate [mathematical ideas'] implications using multiple representations, including language as appropriate

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(xiii) communicate [mathematical reasoning's] implications using multiple representations, including symbols as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(xiv) communicate [mathematical reasoning's] implications using multiple representations, including diagrams as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(xv) communicate [mathematical reasoning's] implications using multiple representations, including graphs as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	(xvi) communicate [mathematical reasoning's] implications using multiple representations, including language as appropriate
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(E) create and use representations to organize, record, and communicate mathematical ideas	(i) create representations to organize mathematical ideas
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(E) create and use representations to organize, record, and communicate mathematical ideas	(ii) create representations to record mathematical ideas

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(E) create and use representations to organize, record, and communicate mathematical ideas	(iii) create representations to communicate mathematical ideas
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(E) create and use representations to organize, record, and communicate mathematical ideas	(iv) use representations to organize mathematical ideas
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(E) create and use representations to organize, record, and communicate mathematical ideas	(v) use representations to record mathematical ideas
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(E) create and use representations to organize, record, and communicate mathematical ideas	(vi) use representations to communicate mathematical ideas
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(F) analyze mathematical relationships to connect and communicate mathematical ideas	(i) analyze mathematical relationships to connect mathematical ideas
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(F) analyze mathematical relationships to connect and communicate mathematical ideas	(ii) analyze mathematical relationships to communicate mathematical ideas
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication	(i) display mathematical ideas using precise mathematical language in written or oral communication

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication	(ii) display mathematical arguments using precise mathematical language in written or oral communication
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication	(iii) explain mathematical ideas using precise mathematical language in written or oral communication
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication	(iv) explain mathematical arguments using precise mathematical language in written or oral communication
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication	(v) justify mathematical ideas using precise mathematical language in written or oral communication
(2) The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:	(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication	(vi) justify mathematical arguments using precise mathematical language in written or oral communication
(3) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(3) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(3) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(3) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(3) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(3) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(3) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(3) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(i) add whole numbers in calculations related to agriculture, food, and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(ii) add fractions in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(iii) add decimals in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(iv) subtract whole numbers in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(v) subtract fractions in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(vi) subtract decimals in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(vii) multiply whole numbers in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(viii) multiply fractions in calculations related to agriculture, food, and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(ix) multiply decimals in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(x) divide whole numbers in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(xi) divide fractions in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(A) add, subtract, multiply, and divide whole numbers, fractions, and decimals in calculations related to agriculture, food, and natural resources	(xii) divide decimals in calculations related to agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(B) apply mathematical skills such as measurement, conversion, and data analysis needed for agriculture, food, and natural resources	(i) apply mathematical skills needed for agriculture, food, and natural resources
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(C) find solutions to problems related to agriculture, food, and natural resources by calculating percentages and averages	(i) find solutions to problems related to agriculture, food, and natural resources by calculating percentages
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(C) find solutions to problems related to agriculture, food, and natural resources by calculating percentages and averages	(ii) find solutions to problems related to agriculture, food, and natural resources by calculating averages

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(D) convert between English and metric units	(i) convert between English and metric units
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(E) use scientific calculations to determine weight, volume, and linear measurements	(i) use scientific calculations to determine weight
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(E) use scientific calculations to determine weight, volume, and linear measurements	(ii) use scientific calculations to determine volume
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(E) use scientific calculations to determine weight, volume, and linear measurements	(iii) use scientific calculations to determine linear measurements
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(F) solve word problems using ratios and dimensional analysis	(i) solve word problems using ratios
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(F) solve word problems using ratios and dimensional analysis	(ii) solve word problems using dimensional analysis
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(G) interpret data using tables, charts, and graphs	(i) interpret data using tables

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(G) interpret data using tables, charts, and graphs	(ii) interpret data using charts
(4) The student performs mathematical calculations used in agriculture, food and natural resources. The student is expected to	(G) interpret data using tables, charts, and graphs	(iii) interpret data using graphs
(5) The student demonstrates mathematics knowledge and skills required to solve problems related to the agriculture, food, and natural resources industries. The student is expected to:	(A) demonstrate use of relational expressions such as equal to, not equal, greater than, and less than in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(i) demonstrate use of relational expressions in agriculture, food, and natural resources industries
(5) 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:	(B) apply statistical and data analysis to solve problems related to agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(i) apply statistical and data analysis to solve problems related to agriculture, food, and natural resources industries
(5) 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:	(C) analyze mathematical problem statements for missing or irrelevant data essential to agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(i) analyze mathematical problem statements for missing or irrelevant data essential to agriculture, food, and natural resources industries

Knowledge and Skill Statement	Student Expectation	Breakout
(5) 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:	(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(i) construct charts from functions generated in agriculture, food, and natural resources industries
(5) 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:	(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(ii) construct tables from functions generated in agriculture, food, and natural resources industries
(5) 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:	(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(iii) construct graphs from functions generated in agriculture, food, and natural resources industries
(5) 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:	(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(iv) construct charts from data generated in agriculture, food, and natural resources industries

Knowledge and Skill Statement	Student Expectation	Breakout
(5) 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:	(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(v) construct tables from data generated in agriculture, food, and natural resources industries
(5) 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:	(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(vi) construct graphs from data generated in agriculture, food, and natural resources industries
(5) 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:	(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(vii) analyze charts from functions generated in agriculture, food, and natural resources industries
(5) 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:	(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems	(viii) analyze tables from functions generated in agriculture, food, and natural resources industries

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(5) 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:</p>	<p>(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems</p>	<p>(ix) analyze graphs from functions generated in agriculture, food, and natural resources industries</p>
<p>(5) 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:</p>	<p>(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems</p>	<p>(x) analyze charts from data generated in agriculture, food, and natural resources industries</p>
<p>(5) 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:</p>	<p>(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems</p>	<p>(xi) analyze tables from data generated in agriculture, food, and natural resources industries</p>
<p>(5) 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:</p>	<p>(D) construct and analyze charts, tables, and graphs from functions and data generated in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems</p>	<p>(xii) analyze graphs from data generated in agriculture, food, and natural resources industries</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(5) 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:</p>	<p>(E) analyze data using measures of central tendency when interpreting operational documents in agriculture, food, and natural resources industries such as agribusiness; animal; environmental service; food products and processing; natural resources; plant; and power, structural, and technical systems</p>	<p>(i) analyze data using measures of central tendency when interpreting operational documents in agriculture, food, and natural resources industries</p>
<p>(5) 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:</p>	<p>(F) use mathematical operations and knowledge of relationships to solve problems such as the calculation of gallons of water from inches of rain, acres of ground water, liquid and gaseous volumes, and conversion of units; calculation of caloric value, parts per million of restricted ingredients, conversion of measurements, and U.S. Department of Agriculture (USDA) grades; estimation of wildlife populations and pulpwood yields; and calculation of mapping data inherent to systems of agriculture or agribusiness</p>	<p>(i) use mathematical operations and knowledge of relationships to solve problems inherent to systems of agriculture or agribusiness</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(A) use mathematical operations and knowledge of relationships to solve daily problems related to record keeping such as profit/loss statements, income statements, capital asset inventories, insurance, risk management, lease agreements, employee payroll and benefits, and investments and loan, real estate contract, or tax documentation in agribusiness systems</p>	<p>(i) use mathematical operations and knowledge of relationships to solve daily problems related to record keeping in agribusiness systems</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(B) demonstrate knowledge of algebraic applications and linear and exponential functions related to concepts such as simple interest, compound interest, maturity value, tax rates, depreciation, production analysis, market trends, investments, and price determination in agribusiness systems</p>	<p>(i) demonstrate knowledge of algebraic applications related to concepts in agribusiness systems</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(B) demonstrate knowledge of algebraic applications and linear and exponential functions related to concepts such as simple interest, compound interest, maturity value, tax rates, depreciation, production analysis, market trends, investments, and price determination in agribusiness systems</p>	<p>(ii) demonstrate knowledge of linear functions related to concepts in agribusiness systems</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(B) demonstrate knowledge of algebraic applications and linear and exponential functions related to concepts such as simple interest, compound interest, maturity value, tax rates, depreciation, production analysis, market trends, investments, and price determination in agribusiness systems</p>	<p>(iii) demonstrate knowledge of exponential functions related to concepts in agribusiness systems</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data</p>	<p>(i) use statistical analysis, including counts, to evaluate agribusiness systems data</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data</p>	<p>(ii) use statistical analysis, including percentages, to evaluate agribusiness systems data</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data</p>	<p>(iii) use statistical analysis, including central tendency, to evaluate agribusiness systems data</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data</p>	<p>(iv) use statistical analysis, including prediction, to evaluate agribusiness systems data</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data</p>	<p>(v) use data analysis, including counts, to evaluate agribusiness systems data</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data</p>	<p>(vi) use data analysis, including percentages, to evaluate agribusiness systems data</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data</p>	<p>(vii) use data analysis, including central tendency, to evaluate agribusiness systems data</p>
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis, including counts, percentages, central tendency, and prediction, to evaluate agribusiness systems data such as demographic, production, consumption, weather, and market data</p>	<p>(viii) use data analysis, including prediction, to evaluate agribusiness systems data</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(6) The student demonstrates mathematical knowledge and skills required to solve problems related to agribusiness systems and related career opportunities. The student is expected to:</p>	<p>(D) report statistical data related to concepts such as pricing, market trends, commodity prices, exports and imports, supply and demand, and production yields numerically or graphically</p>	<p>(i) report statistical data related to concepts</p>
<p>(7) The student demonstrates mathematical knowledge and skills required to solve problems related to animal systems and related career opportunities. The student is expected to:</p>	<p>(A) use mathematical operations and knowledge of relationships to solve problems such as the calculation of purchasing, marketing, and production costs; housing requirements; conversion of units; average daily gain; topical and injectable medication dosages; USDA grades; feeding schedules; volumes; stocking rates; and breeding and gestation cycles related to animal systems</p>	<p>(i) use mathematical operations and knowledge of relationships to solve problems related to animal systems</p>
<p>(7) The student demonstrates mathematical knowledge and skills required to solve problems related to animal systems and related career opportunities. The student is expected to:</p>	<p>(B) demonstrate knowledge of algebraic applications related to animal system calculations such as ration formulation using the Pearson Square, percent homozygosity, heritability, USDA grades, gene frequency, cost per unit of nutrient, and weaning weight ratio</p>	<p>(i) demonstrate knowledge of algebraic applications related to animal system calculations</p>
<p>(7) The student demonstrates mathematical knowledge and skills required to solve problems related to animal systems and related career opportunities. The student is expected to:</p>	<p>(C) use geometric principles to solve problems such as the use of right triangles for perpendicular cross fencing and the calculation of square footage for housing requirements; acreage for normal and irregular shaped pastures; feed bin volume based upon shape such as cylinder, cone, cube, or pyramid; and housing volume for ventilation related to animal systems</p>	<p>(i) use geometric principles to solve problems related to animal systems</p>

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student demonstrates mathematical knowledge and skills required to solve problems related to animal systems and related career opportunities. The student is expected to:	(D) use statistical and data analysis to evaluate animal systems data reported numerically or graphically such as birth weight, weaning weight, days to market weight, expected progeny differences, feed efficiencies, birth type, litter size, presence or absence of genetic abnormality, milk production, sow productivity index, and veterinary costs or records	(i) use statistical analysis to evaluate animal systems data reported numerically or graphically
(7) The student demonstrates mathematical knowledge and skills required to solve problems related to animal systems and related career opportunities. The student is expected to:	(D) use statistical and data analysis to evaluate animal systems data reported numerically or graphically such as birth weight, weaning weight, days to market weight, expected progeny differences, feed efficiencies, birth type, litter size, presence or absence of genetic abnormality, milk production, sow productivity index, and veterinary costs or records	(ii) use data analysis to evaluate animal systems data reported numerically or graphically
(8) The student demonstrates mathematical knowledge and skills required to solve problems related to environmental service systems and related career opportunities. The student is expected to:	(A) demonstrate knowledge of algebraic applications to create solutions to problems such as the calculation of acre feet of water, water volume in ponds, water well volume, water pressure friction loss, flow rate, total head pressure, pump efficiency, soil solids volume, and soil degree of saturation related to environmental service systems	(i) demonstrate knowledge of algebraic applications to create solutions to problems related to environmental service systems
(8) The student demonstrates mathematical knowledge and skills required to solve problems related to environmental service systems and related career opportunities. The student is expected to:	(B) use geometric principles to solve problems such as calculating acreage for normal and irregular shaped pastures and slope of land, planning runoff drainage structures, and applying differential leveling techniques related to environmental service systems	(i) use geometric principles to solve problems related to environmental service systems

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(8) The student demonstrates mathematical knowledge and skills required to solve problems related to environmental service systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis to evaluate environmental service systems data reported numerically or graphically such as rainfall, soil classifications, groundwater levels, recycling activities, and pollution rates</p>	<p>(i) use statistical analysis to evaluate environmental service systems data reported numerically or graphically</p>
<p>(8) The student demonstrates mathematical knowledge and skills required to solve problems related to environmental service systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis to evaluate environmental service systems data reported numerically or graphically such as rainfall, soil classifications, groundwater levels, recycling activities, and pollution rates</p>	<p>(ii) use data analysis to evaluate environmental service systems data reported numerically or graphically</p>
<p>(9) The student demonstrates mathematical knowledge and skills required to solve problems related to food products and processing systems and related career opportunities. The student is expected to:</p>	<p>(A) demonstrate knowledge of algebraic applications to solve problems such as the calculation of exponential growth of bacteria, contribution margin in processing, percentage of weight loss in packaged food, percentage of water absorption in packaged food, and microbe analysis following pasteurization related to food products and processing systems</p>	<p>(i) demonstrate knowledge of algebraic applications to solve problems related to food products and processing systems</p>
<p>(9) The student demonstrates mathematical knowledge and skills required to solve problems related to food products and processing systems and related career opportunities. The student is expected to:</p>	<p>(B) use geometric principles to solve problems such as the calculation of packaging requirements, construction of food storage structures and containers, liquid transfer materials, and vessels design and volume related to food products and processing systems</p>	<p>(i) use geometric principles to solve problems related to food products and processing systems</p>
<p>(9) The student demonstrates mathematical knowledge and skills required to solve problems related to food products and processing systems and related career opportunities. The student is expected to:</p>	<p>(C) use statistical and data analysis to evaluate food products and processing systems data reported numerically or graphically such as governmental regulations, hazard analysis, critical control points data, taste tests, quality assurance data, and industry packing practices</p>	<p>(i) use statistical analysis to evaluate food products and processing systems data reported numerically or graphically</p>

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student demonstrates mathematical knowledge and skills required to solve problems related to food products and processing systems and related career opportunities. The student is expected to:	(C) use statistical and data analysis to evaluate food products and processing systems data reported numerically or graphically such as governmental regulations, hazard analysis, critical control points data, taste tests, quality assurance data, and industry packing practices	(i) use data analysis to evaluate food products and processing systems data reported numerically or graphically
(10) The student demonstrates mathematical knowledge and skills required to solve problems related to natural resource systems and related career opportunities. The student is expected to:	(A) demonstrate knowledge of algebraic applications to solve problems such as the calculation of mean harvest area, calibration of pesticides, and the Doyle Log Rule related to natural resource systems	(i) demonstrate knowledge of algebraic applications to solve problems related to natural resource systems
(10) The student demonstrates mathematical knowledge and skills required to solve problems related to natural resource systems and related career opportunities. The student is expected to:	(B) use geometric principles to solve problems such as planning and construction of structures related to wildlife and fisheries management, determination of lumber volume in given tree stock, and calculation of tank volume for chemical application related to natural resource systems	(i) use geometric principles to solve problems related to natural resource systems
(10) The student demonstrates mathematical knowledge and skills required to solve problems related to natural resource systems and related career opportunities. The student is expected to:	(C) use statistical and data analysis to evaluate natural resource systems data reported numerically or graphically such as Geographic Information Systems and Global Positioning Systems data, weather-related data, and data related to wildlife and habitat	(i) use statistical analysis to evaluate natural resource systems data reported numerically or graphically
(10) The student demonstrates mathematical knowledge and skills required to solve problems related to natural resource systems and related career opportunities. The student is expected to:	(C) use statistical and data analysis to evaluate natural resource systems data reported numerically or graphically such as Geographic Information Systems and Global Positioning Systems data, weather-related data, and data related to wildlife and habitat	(ii) use data analysis to evaluate natural resource systems data reported numerically or graphically

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student demonstrates mathematical knowledge and skills required to solve problems related to plant systems and related career opportunities. The student is expected to:	(A) use mathematical operations and knowledge of relationships to solve problems such as the calculation of crop yields, crop loss, grain drying requirements, grain weight shrinkage, germination rates, greenhouse heating, and cooling and fertilizer application rates related to plant systems	(i) use mathematical operations and knowledge of relationships to solve problems related to plant systems
(11) The student demonstrates mathematical knowledge and skills required to solve problems related to plant systems and related career opportunities. The student is expected to:	(B) demonstrate knowledge of algebraic applications to solve problems such as the calculation of grain handling efficiency, harvesting capacity, crop rotation, seeding rates, fertilizer nutrient requirements, and greenhouse ventilation related to plant systems	(i) demonstrate knowledge of algebraic applications to solve problems related to plant systems
(11) The student demonstrates mathematical knowledge and skills required to solve problems related to plant systems and related career opportunities. The student is expected to:	(C) use geometric principles for the analysis of problems such as planning grain storage structures and calculating volume of grain storage vessels, grain handling volume, greenhouse capacity, and regular and irregular shaped planting bed size related to plant systems	(i) use geometric principles for the analysis of problems related to plant systems
(11) The student demonstrates mathematical knowledge and skills required to solve problems related to plant systems and related career opportunities. The student is expected to:	(D) use statistical and data analysis to evaluate plant systems data such as crop yields, Global Information Systems data, plant growth data, and climate data	(i) use statistical analysis to evaluate plant systems data
(11) The student demonstrates mathematical knowledge and skills required to solve problems related to plant systems and related career opportunities. The student is expected to:	(D) use statistical and data analysis to evaluate plant systems data such as crop yields, Global Information Systems data, plant growth data, and climate data	(ii) use data analysis to evaluate plant systems data

Knowledge and Skill Statement	Student Expectation	Breakout
(12) The student demonstrates mathematical knowledge and skills required to solve problems related to power, structural, and technical systems and related career opportunities. The student is expected to:	(A) use mathematical operations and knowledge of relationships to solve problems such as the calculation of gear ratio, fuel efficiency, construction costs, project layout, energy costs, unit conversions, and bid preparation and labor-related calculations related to power, structural, and technical systems	(i) use mathematical operations and knowledge of relationships to solve problems related to power, structural, and technical systems
(12) The student demonstrates mathematical knowledge and skills required to solve problems related to power, structural, and technical systems and related career opportunities. The student is expected to:	(B) demonstrate knowledge of algebraic applications such as the calculation of strength of magnetism, chain or belt tension, horsepower, Ohm's Law, hydraulic multiplication of force, stresses using Mohr's Circle, and tensile strength related to power, structural, and technical systems	(i) demonstrate knowledge of algebraic applications related to power, structural, and technical systems
(12) The student demonstrates mathematical knowledge and skills required to solve problems related to power, structural, and technical systems and related career opportunities. The student is expected to:	(C) use geometric principles for the evaluation of problems such as rafter length, land measurement, differential leveling, concrete volume, heating, ventilating, and air conditioning requirements and creation of structural drawings related to power, structural, and technical systems	(i) use geometric principles for the evaluation of problems related to power, structural, and technical systems
(12) The student demonstrates mathematical knowledge and skills required to solve problems related to power, structural, and technical systems and related career opportunities. The student is expected to:	(D) use statistical and data analysis to evaluate power, structural, and technical systems data such as construction cost data; equipment maintenance; heating, ventilation, and air conditioning efficiencies; engine performance; and labor costs	(i) use statistical analysis to evaluate power, structural, and technical systems data
(12) The student demonstrates mathematical knowledge and skills required to solve problems related to power, structural, and technical systems and related career opportunities. The student is expected to:	(D) use statistical and data analysis to evaluate power, structural, and technical systems data such as construction cost data; equipment maintenance; heating, ventilation, and air conditioning efficiencies; engine performance; and labor costs	(ii) use data analysis to evaluate power, structural, and technical systems data

Knowledge and Skill Statement	Student Expectation	Breakout
(12) The student demonstrates mathematical knowledge and skills required to solve problems related to power, structural, and technical systems and related career opportunities. The student is expected to:	(E) use geometric principles to develop and implement a plan for construction of a project such as a trailer, an agricultural structure, a storage facility, or a fence	(i) use geometric principles to develop a plan for construction of a project
(12) The student demonstrates mathematical knowledge and skills required to solve problems related to power, structural, and technical systems and related career opportunities. The student is expected to:	(E) use geometric principles to develop and implement a plan for construction of a project such as a trailer, an agricultural structure, a storage facility, or a fence	(ii) use geometric principles to implement a plan for construction of a project

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.6. Equine Science (One-Half Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one-half credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) In Equine Science, students will acquire knowledge and skills related to equine animal systems and the equine industry. Equine Science may address topics related to horses, donkeys, and mules. To prepare for careers in the field of animal science, students must enhance academic knowledge and skills, acquire knowledge and skills related to 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.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of equine science
(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	(ii) identify and entrepreneurship opportunities in the field of equine science
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate competencies related to resources, information, interpersonal skills, and systems of operation in equine science	(i) demonstrate competencies related to resources in equine science
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate competencies related to resources, information, interpersonal skills, and systems of operation in equine science	(ii) demonstrate competencies related to information in equine science
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate competencies related to resources, information, interpersonal skills, and systems of operation in equine science	(iii) demonstrate competencies related to interpersonal skills in equine science
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate competencies related to resources, information, interpersonal skills, and systems of operation in equine science	(iv) demonstrate competencies related to systems of operation in equine science
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(i) demonstrate knowledge of personal health practices in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(ii) demonstrate knowledge of personal safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iii) demonstrate knowledge of occupational health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iv) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations, including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) Demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership	(i) demonstrate good citizenship characteristics

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) Research career topics using technology such as the Internet	(i) research career topics using technology
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) 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	(i) recognize the importance of the equine industry
(3) The student analyzes equine science as it relates to the selection of horses. The student is expected to:	(B) evaluate and select horses based on purpose	(i) evaluate horses based on purpose
(3) The student analyzes equine science as it relates to the selection of horses. The student is expected to:	(B) evaluate and select horses based on purpose	(ii) select horses based on purpose
(4) 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	(i) determine nutritional requirements of horses
(4) The student knows how to provide proper nutrition using accepted protocols and processes to maintain animal performance. The student is expected to:	(B) describe the anatomy and physiology of horses including the skeletal, muscular, respiratory, reproductive, and circulatory systems	(i) describe the anatomy and physiology of horses including the skeletal systems
(4) The student knows how to provide proper nutrition using accepted protocols and processes to maintain animal performance. The student is expected to:	(B) describe the anatomy and physiology of horses including the skeletal, muscular, respiratory, reproductive, and circulatory systems	(ii) describe the anatomy and physiology of horses including the muscular systems

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student knows how to provide proper nutrition using accepted protocols and processes to maintain animal performance. The student is expected to:	(B) describe the anatomy and physiology of horses including the skeletal, muscular, respiratory, reproductive, and circulatory systems	(iii) describe the anatomy and physiology of horses including the respiratory systems
(4) The student knows how to provide proper nutrition using accepted protocols and processes to maintain animal performance. The student is expected to:	(B) describe the anatomy and physiology of horses including the skeletal, muscular, respiratory, reproductive, and circulatory systems	(iv) describe the anatomy and physiology of horses including the reproductive systems
(4) The student knows how to provide proper nutrition using accepted protocols and processes to maintain animal performance. The student is expected to:	(B) describe the anatomy and physiology of horses including the skeletal, muscular, respiratory, reproductive, and circulatory systems	(v) describe the anatomy and physiology of horses including the circulatory systems
(4) The student knows how to provide proper nutrition using accepted protocols and processes to maintain animal performance. The student is expected to:	(C) explain methods of maintaining horse health and soundness	(i) explain methods of maintaining horse health
(4) The student knows how to provide proper nutrition using accepted protocols and processes to maintain animal performance. The student is expected to:	(C) explain methods of maintaining horse health and soundness	(ii) explain methods of maintaining horse soundness
(5) 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	(i) select equipment for horses
(5) 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	(ii) select facilities for horses
(5) The student analyzes equine science as it relates to the management of horses. The student is expected to:	(B) demonstrate methods of handling horses safely	(i) demonstrate methods of handling horses safely

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student analyzes equine science as it relates to the management of horses. The student is expected to:	(C) identify the procedures for breeding horses per industry standards	(i) identify the procedures for breeding horses per industry standards
(6) 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	(i) identify the role of bacteria in disease
(6) 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	(ii) identify the role of fungi in disease
(6) 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	(iii) identify the role of viruses in disease
(6) 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	(iv) identify the role of genetics in disease
(6) 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	(v) identify the role of nutrition in disease
(6) 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	(vi) describe the role of bacteria in disease
(6) 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	(vii) describe the role of fungi in disease
(6) 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	(viii) describe the role of viruses in disease

Knowledge and Skill Statement	Student Expectation	Breakout
(6) 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	(ix) describe the role of genetics in disease
(6) 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	(x) describe the role of nutrition in disease
(6) The student identifies animal pests and diseases. The student is expected to:	(B) identify methods of disease control, treatment, and prevention	(i) identify methods of disease control
(6) The student identifies animal pests and diseases. The student is expected to:	(B) identify methods of disease control, treatment, and prevention	(ii) identify methods of disease treatment
(6) The student identifies animal pests and diseases. The student is expected to:	(B) identify methods of disease control, treatment, and prevention	(iii) identify methods of disease prevention
(6) The student identifies animal pests and diseases. The student is expected to:	(C) classify internal and external parasites including treatment and prevention	(i) classify internal parasites including treatment
(6) The student identifies animal pests and diseases. The student is expected to:	(C) classify internal and external parasites including treatment and prevention	(ii) classify internal parasites including prevention
(6) The student identifies animal pests and diseases. The student is expected to:	(C) classify internal and external parasites including treatment and prevention	(iii) classify external parasites including treatment
(6) The student identifies animal pests and diseases. The student is expected to:	(C) classify internal and external parasites including treatment and prevention	(iv) classify external parasites including prevention

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies animal pests and diseases. The student is expected to:	(D) identify behavioral diseases such as cribbing, heaving, and wind sucking	(i) identify behavioral diseases
(7) The student compares and contrasts issues affecting the equine industry. The student is expected to:	(A) describe biotechnology issues related to the equine industry	(i) describe biotechnology issues related to the equine industry
(7) The student compares and contrasts issues affecting the equine industry. The student is expected to:	(B) identify animal welfare policy pertaining to equine industries such as racing, rodeos, equestrian therapy, the global food market, and pharmaceutical research	(i) identify animal welfare policy pertaining to equine industries

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.7. Livestock Production (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) In Livestock Production, students will acquire knowledge and skills related to livestock and the livestock production industry. Livestock Production may address topics related to beef cattle, dairy cattle, swine, sheep, goats, and poultry. To prepare for careers in the field of animal science, students must attain academic 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.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 animal systems	(i) identify career development opportunities in the field of animal systems
(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 animal systems	(ii) identify entrepreneurship opportunities in the field of animal systems
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(i) apply competencies related to resources in animal systems
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(ii) apply competencies related to information in animal systems
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(iii) apply competencies related to interpersonal skills in animal systems
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(iv) apply competencies related to systems of operation in animal systems in animal systems
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(i) demonstrate knowledge of personal safety practices in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(ii) demonstrate knowledge of occupational safety practices in the workplace
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(iii) demonstrate knowledge of personal health practices in the work place
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(iv) demonstrate knowledge of personal health practices in the work place
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations including appropriate work habit
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations including ethical conduct
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations including legal responsibilities
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(E) demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership	(i) demonstrate good citizenship characteristics
(1) The student learns the employability characteristics of a successful employee. The student is expected to:	(F) reseaching career topics using technology such as the Internet	(i) reseaching career topics using technology

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) 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	(i) assess the importance of the United States impact on world commodity markets
(3) The student demonstrates technical skills relating to the interrelated human, scientific, and technological dimensions of animal systems. The student is expected to:	(B) apply the principles of livestock breeding and nutrition in predicting the impact of current advances in genetics	(i) apply the principles of livestock breeding in predicting the impact of current advances in genetics
(3) The student demonstrates technical skills relating to the interrelated human, scientific, and technological dimensions of animal systems. The student is expected to:	(B) apply the principles of livestock breeding and nutrition in predicting the impact of current advances in genetics	(ii) apply the principles of livestock nutrition in predicting the impact of current advances in genetics
(3) The student demonstrates technical skills relating to the interrelated human, scientific, and technological dimensions of animal systems. The student is expected to:	(C) examine the interrelationship of plants and animals such as forage identification, rotational grazing, and grass protein levels	(i) examine the interrelationship of plants and animals
(4) The student performs technical skills related to livestock production. The student is expected to:	(A) gather performance data	(i) gather performance data
(4) The student performs technical skills related to livestock production. The student is expected to:	(B) describe common veterinary procedures and skills	(i) describe common veterinary procedures

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student performs technical skills related to livestock production. The student is expected to:	(B) describe common veterinary procedures and skills	(ii) describe common veterinary skills
(4) The student performs technical skills related to livestock production. The student is expected to:	(C) practice proper animal restraint techniques	(i) practice proper animal restraint techniques
(4) The student performs technical skills related to livestock production. The student is expected to:	(D) demonstrate identification techniques	(i) demonstrate identification techniques
(4) The student performs technical skills related to livestock production. The student is expected to:	(E) demonstrate effective management strategies such as financial planning and managing government regulations	(i) demonstrate effective management strategies
(5) The student explains anatomy and physiology related to nutrition, reproduction, health, and management of livestock species. The student is expected to:	(A) explain the skeletal, muscular, respiratory, reproductive, and circulatory systems of animals	(i) explain the skeletal system of animals
(5) The student explains anatomy and physiology related to nutrition, reproduction, health, and management of livestock species. The student is expected to:	(A) explain the skeletal, muscular, respiratory, reproductive, and circulatory systems of animals	(ii) explain the muscular system of animals
(5) The student explains anatomy and physiology related to nutrition, reproduction, health, and management of livestock species. The student is expected to:	(A) explain the skeletal, muscular, respiratory, reproductive, and circulatory systems of animals	(iii) explain the respiratory system of animals

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student explains anatomy and physiology related to nutrition, reproduction, health, and management of livestock species. The student is expected to:	(A) explain the skeletal, muscular, respiratory, reproductive, and circulatory systems of animals	(iv) explain the reproductive system of animals
(5) The student explains anatomy and physiology related to nutrition, reproduction, health, and management of livestock species. The student is expected to:	(A) explain the skeletal, muscular, respiratory, reproductive, and circulatory systems of animals	(v) explain the circulatory system of animals
(5) The student explains anatomy and physiology related to nutrition, reproduction, health, and management of livestock species. The student is expected to:	(B) evaluate vital signs and normal behavior	(i) evaluate vital signs
(5) The student explains anatomy and physiology related to nutrition, reproduction, health, and management of livestock species. The student is expected to:	(B) evaluate vital signs and normal behavior	(ii) evaluate normal behavior
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(A) describe the digestive systems of ruminant and non-ruminant animals	(i) describe the digestive systems of ruminant animals
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(A) describe the digestive systems of ruminant and non-ruminant animals	(ii) describe the digestive systems of non-ruminant animals

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(B) identify sources of nutrients and classes of feed	(i) identify sources of nutrients
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(B) identify sources of nutrients and classes of feed	(ii) identify classes of feed
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(C) identify vitamins, minerals, and feed additives	(i) identify vitamins
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(C) identify vitamins, minerals, and feed additives	(ii) identify minerals
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(C) identify vitamins, minerals, and feed additives	(iii) identify feed additives
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(D) formulate rations	(i) formulate rations
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(E) discuss feeding practices and feed quality issues	(i) discuss feeding practices

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student determines nutritional requirements of ruminant and non-ruminant animals, including poultry. The student is expected to:	(E) discuss feeding practices and feed quality issues	(ii) discuss feed quality issues
(7) The student explains animal genetics and reproduction. The student is expected to:	(A) describe the reproductive systems of various livestock	(i) describe the reproductive systems of various livestock
(7) The student explains animal genetics and reproduction. The student is expected to:	(B) explain the use of genetics in animal agriculture such as Expected Progeny Differences (EPD's), phenotype and genotype	(i) explain the use of genetics in animal agriculture
(7) The student explains animal genetics and reproduction. The student is expected to:	(C) identify systems of animal breeding	(i) identify systems of animal breeding
(7) The student explains animal genetics and reproduction. The student is expected to:	(D) research current and emerging technologies in animal reproduction such as cloning, embryo transfer, invitrofertilization, and artificial insemination	(i) research current technologies in animal reproduction
(7) The student explains animal genetics and reproduction. The student is expected to:	(D) research current and emerging technologies in animal reproduction such as cloning, embryo transfer, invitrofertilization, and artificial insemination	(ii) research emerging technologies in animal reproduction
(7) The student explains animal genetics and reproduction. The student is expected to:	(E) design and conduct experiments to support known principles of genetics	(i) design experiments to support known principles of genetics
(7) The student explains animal genetics and reproduction. The student is expected to:	(E) design and conduct experiments to support known principles of genetics	(ii) conduct experiments to support known principles of genetics

Knowledge and Skill Statement	Student Expectation	Breakout
(8) 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	(i) identify the role of bacteria in disease
(8) 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	(ii) identify the role of fungi in disease
(8) 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	(iii) identify the role of viruses in disease
(8) 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	(iv) identify the role of genetics in disease
(8) 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	(v) identify the role of nutrition in disease
(8) 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	(vi) describe the role of bacteria in disease
(8) 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	(vii) describe the role of fungi in disease
(8) 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	(viii) describe the role of viruses in disease
(8) 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	(ix) describe the role of genetics in disease

Knowledge and Skill Statement	Student Expectation	Breakout
(8) 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	(x) describe the role of nutrition in disease
(8) The student identifies animal pests and diseases. The student is expected to:	(B) identify methods of disease control, treatment, and prevention	(i) identify methods of disease control
(8) The student identifies animal pests and diseases. The student is expected to:	(B) identify methods of disease control, treatment, and prevention	(ii) identify methods of disease treatment
(8) The student identifies animal pests and diseases. The student is expected to:	(B) identify methods of disease control, treatment, and prevention	(iii) identify methods of disease prevention
(8) The student identifies animal pests and diseases. The student is expected to:	(C) classify internal and external parasites including treatment and prevention	(i) classify internal parasites including treatment
(8) The student identifies animal pests and diseases. The student is expected to:	(C) classify internal and external parasites including treatment and prevention	(ii) classify internal parasites including prevention
(8) The student identifies animal pests and diseases. The student is expected to:	(C) classify internal and external parasites including treatment and prevention	(iii) classify external parasites including treatment
(8) The student identifies animal pests and diseases. The student is expected to:	(C) classify internal and external parasites including treatment and prevention	(iv) classify external parasites including prevention
(9) The student knows the factors impacting commodity prices and costs. The student is expected to:	(A) evaluate the relationship between livestock commodity markets	(i) evaluate the relationship between livestock commodity markets

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student knows the factors impacting commodity prices and costs. The student is expected to:	(B) formulate rations based on least-cost factors	(i) formulate rations based on least-cost factors
(9) The student plans for dynamic changes in business operation. The student is expected to:	(A) design, conduct, and complete research to identify and solve livestock management problems	(i) design research to identify livestock management problems
(10) The student plans for dynamic changes in business operation. The student is expected to:	(A) design, conduct, and complete research to identify and solve livestock management problems	(ii) conduct research to identify livestock management problems
(10) The student plans for dynamic changes in business operation. The student is expected to:	(A) design, conduct, and complete research to identify and solve livestock management problems	(iii) complete research to identify livestock management problems
(10) The student plans for dynamic changes in business operation. The student is expected to:	(A) design, conduct, and complete research to identify and solve livestock management problems	(iv) design research to solve livestock management problems
(10) The student plans for dynamic changes in business operation. The student is expected to:	(A) design, conduct, and complete research to identify and solve livestock management problems	(v) conduct research to solve livestock management problems
(10) The student plans for dynamic changes in business operation. The student is expected to:	(A) design, conduct, and complete research to identify and solve livestock management problems	(vi) complete research to solve livestock management problems
(10) The student plans for dynamic changes in business operation. The student is expected to:	(B) use charts, tables, or graphs to prepare written summaries of data such as nutrition, digestion, and reproduction data obtained in a laboratory activity and an individual scientific research project	(i) use charts, tables, or graphs to prepare written summaries of data

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.8. Small Animal Management (One-Half Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one-half credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) In Small Animal Management, students will acquire knowledge and skills related to small animals and the small animal management industry. Small Animal Management may address topics related to small mammals such as dogs and cats, amphibians, reptiles, and birds. To prepare for careers in the field of animal science, students must enhance academic knowledge and skills, acquire knowledge and skills related to 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.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 specialty agricultural enterprises	(i) identify career development opportunities in the field of specialty agricultural enterprises
(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 specialty agricultural enterprises	(ii) identify entrepreneurship opportunities in the field of specialty agricultural enterprises
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in specialty agricultural enterprises	(i) apply competencies related to resources in specialty agricultural enterprises
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in specialty agricultural enterprises	(ii) apply competencies related to information in specialty agricultural enterprises
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in specialty agricultural enterprises	(iii) apply competencies related to interpersonal skills in specialty agricultural enterprises
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in specialty agricultural enterprises	(iv) apply competencies related to systems of operation in specialty agricultural enterprises
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and mechanical safety and health practices in the workplace	(i) demonstrate knowledge of personal safety practices in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and mechanical safety and health practices in the workplace	(ii) demonstrate knowledge of mechanical safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and mechanical safety and health practices in the workplace	(iii) demonstrate knowledge of health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership	(i) demonstrate good citizenship characteristics
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) research career topics using technology such as the internet	(i) research career topics using technology

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student describes the importance of responsible small animal ownership. The student is expected to:	(A) explain the domestication and use of small animals	(i) explain the domestication of small animals
(3) The student describes the importance of responsible small animal ownership. The student is expected to:	(A) explain the domestication and use of small animals	(ii) explain the use of small animals
(3) The student describes the importance of responsible small animal ownership. The student is expected to:	(B) identify the influence small animals have on society	(i) identify the influence small animals have on society
(3) The student describes the importance of responsible small animal ownership. The student is expected to:	(C) describe the importance of the small animal industry	(i) describe the importance of the small animal industry
(3) The student describes the importance of responsible small animal ownership. The student is expected to:	(D) describe the obligations and benefits of small animal ownership	(i) describe the obligations of small animal ownership
(3) The student describes the importance of responsible small animal ownership. The student is expected to:	(D) describe the obligations and benefits of small animal ownership	(ii) describe the benefits of small animal ownership
(3) The student describes the importance of responsible small animal ownership. The student is expected to:	(E) discuss the use of and services provided by small animals	(i) discuss the use of small animals
(3) The student describes the importance of responsible small animal ownership. The student is expected to:	(E) discuss the use of and services provided by small animals	(ii) discuss the services provided by small animals

Knowledge and Skill Statement	Student Expectation	Breakout
(4) 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	(i) explain the importance of safe practices when working with small animals
(4) The student learns the hazards associated with working in the small animal industry. The student is expected to:	(B) Identify zoonotic diseases that can be transmitted from small animals to humans	(i) identify zoonotic diseases that can be transmitted from small animals to humans
(4) The student learns the hazards associated with working in the small animal industry. The student is expected to:	(C) describe methods of preventing the spread of disease	(i) describe methods of preventing the spread of disease
(4) The student learns the hazards associated with working in the small animal industry. The student is expected to:	(D) follow guidelines for safety when handling dangerous chemicals and when working with small animals	(i) follow guidelines for safety when handling dangerous chemicals
(4) The student learns the hazards associated with working in the small animal industry. The student is expected to:	(D) follow guidelines for safety when handling dangerous chemicals and when working with small animals	(ii) follow the guidelines for safety when working with small animals
(4) The student learns the hazards associated with working in the small animal industry. The student is expected to:	(E) demonstrate the proper use of laboratory equipment	(i) demonstrate the proper use of laboratory equipment
(5) 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	(i) compare and contrast animal rights and animal welfare
(5) The student evaluates current topics in animal rights and animal welfare. The student is expected to:	(B) research important persons, organizations, and groups involved in the animal rights movement	(i) research important persons involved in the animal rights movement

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student evaluates current topics in animal rights and animal welfare. The student is expected to:	(B) research important persons, organizations, and groups involved in the animal rights movement	(ii) research important organizations involved in the animal rights movement
(5) The student evaluates current topics in animal rights and animal welfare. The student is expected to:	(B) research important persons, organizations, and groups involved in the animal rights movement	(iii) research important groups involved in the animal rights movement
(5) The student evaluates current topics in animal rights and animal welfare. The student is expected to:	(C) create a timeline of dates and acts of legislation related to animal welfare	(i) create a timeline of dates related to animal welfare
(5) The student evaluates current topics in animal rights and animal welfare. The student is expected to:	(C) create a timeline of dates and acts of legislation related to animal welfare	(ii) create a timeline of acts of legislation related to animal welfare
(5) The student evaluates current topics in animal rights and animal welfare. The student is expected to:	(D) analyze current issues in animal rights and animal welfare	(i) analyze current issues in animal rights
(5) The student evaluates current topics in animal rights and animal welfare. The student is expected to:	(D) analyze current issues in animal rights and animal welfare	(ii) analyze current issues in animal welfare
(6) 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	(i) discuss the physical characteristics for each species studied
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(B) list the breeds or types of each species studied as appropriate	(i) list the breeds or types of each species studied as appropriate

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(C) discuss the habitat, housing, and equipment needs for each species studied	(i) discuss the habitat needs for each species studied
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(C) discuss the habitat, housing, and equipment needs for each species studied	(ii) discuss the housing needs for each species studied
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(C) discuss the habitat, housing, and equipment needs for each species studied	(iii) discuss the equipment needs for each species studied
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(D) compare and contrast nutritional requirements for each species studied	(i) compare and contrast nutritional requirements for each species studied
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(E) explain health maintenance in each species studied, including the prevention and control of diseases and parasites	(i) explain the health maintenance in each species studied, including the prevention of diseases
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(E) explain health maintenance in each species studied, including the prevention and control of diseases and parasites	(ii) explain the health maintenance in each species studied including, the control of diseases
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(E) explain health maintenance in each species studied, including the prevention and control of diseases and parasites	(iii) explain the health maintenance in each species studied, including the prevention of parasites

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(E) explain health maintenance in each species studied, including the prevention and control of diseases and parasites	(iv) explain the health maintenance in each species studied including the control of parasites
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(F) describe and practice common methods of handling each species studied	(i) describe common methods of handling each species studied
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(F) describe and practice common methods of handling each species studied	(ii) practice common methods of handling each species studied
(6) The student knows the care and management requirements for a variety of small animals. The student is expected to:	(G) perform procedures such as fecal and blood testing and basic grooming procedures using available laboratory equipment	(i) perform procedures using available laboratory equipment
(7) 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	(i) identify career opportunities in small animal care and management
(7) 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	(ii) describe career opportunities in small animal care and management
(7) 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	(iii) compare career opportunities in small animal care and management
(7) The student examines career opportunities in small animal care. The student is expected to:	(B) describe the nature of the work, salaries, and educational requirements for careers in small animal care	(i) describe the nature of the work for careers in small animal care

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student examines career opportunities in small animal care. The student is expected to:	(B) describe the nature of the work, salaries, and educational requirements for careers in small animal care	(ii) describe the salaries for careers in small animal care
(7) The student examines career opportunities in small animal care. The student is expected to:	(B) describe the nature of the work, salaries, and educational requirements for careers in small animal care	(iii) describe the educational requirements for careers in small animal care

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.9. Veterinary Medical Applications (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Equine Science, Small Animal Management, or Livestock Production. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Veterinary Medical Applications covers topics relating to veterinary practices, including practices for large and small animal species. To prepare for careers in the field of animal science, students must attain academic 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.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 animal systems	(i) identify career development opportunities in the field of animal systems
(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 animal systems	(ii) identify entrepreneurship opportunities in the field of animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(i) apply competencies related to resources in animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(ii) apply competencies related to information in animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(iii) apply competences related to interpersonal skills in animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(iv) apply competencies related to systems of operation in animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(i) demonstrate knowledge of personal safety in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(ii) demonstrate knowledge of occupational safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(iii) demonstrate knowledge of health practices in the work place
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate good citizenship characteristics such as stewardship, advocacy, and community leadership	(i) demonstrate good citizenship characteristics
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) research career topics using technology such as the internet	(i) research career topics using technology

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) 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	(i) explain the human-animal bond
(3) 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	(ii) explain how to interact with clients
(3) 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	(iii) explain how to interact with [clients'] animals
(3) 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:	(B) identify trends, issues, and historical events that have influenced animal use and care	(i) identify trends that have influenced animal use

Knowledge and Skill Statement	Student Expectation	Breakout
(3) 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:	(B) identify trends, issues, and historical events that have influenced animal use and care	(ii) identify issues that have influenced animal use
(3) 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:	(B) identify trends, issues, and historical events that have influenced animal use and care	(iii) identify historical events that have influenced animal use
(3) 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:	(B) identify trends, issues, and historical events that have influenced animal use and care	(iv) identify trends that have influenced animal care
(3) 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:	(B) identify trends, issues, and historical events that have influenced animal use and care	(v) identify issues that have influenced animal care
(3) 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:	(B) identify trends, issues, and historical events that have influenced animal use and care	(vi) identify historical events that have influenced animal care

Knowledge and Skill Statement	Student Expectation	Breakout
(3) 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:	(C) describe the legal aspects of animal welfare and animal rights	(i) describe the legal aspects of animal welfare
(3) 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:	(C) describe the legal aspects of animal welfare and animal rights	(ii) describe the legal aspects of animal rights
(3) 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:	(D) evaluate the principals of veterinary medical ethics	(i) evaluate the principals of veterinary medical ethics
(3) 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:	(E) review policies and procedures in veterinary medicine that are considered a reflection of various local, state, and federal laws	(i) review policies and procedures in veterinary medicine that are considered a reflection of various local laws
(3) 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:	(E) review policies and procedures in veterinary medicine that are considered a reflection of various local, state, and federal laws	(ii) review policies and procedures in veterinary medicine that are considered a reflection of various state laws

Knowledge and Skill Statement	Student Expectation	Breakout
(3) 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:	(E) review policies and procedures in veterinary medicine that are considered a reflection of various local, state, and federal laws	(iii) review policies and procedures in veterinary medicine that are considered a reflection of various federal laws
(4) 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	(i) identify skills needed to communicate effectively with clients in the community
(4) 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	(ii) identify skills needed to communicate effectively with pet owners in the community
(4) 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:	(B) identify vital information and demonstrate effective communication skills necessary to solve problems	(i) identify vital information necessary to solve problems
(4) 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:	(B) identify vital information and demonstrate effective communication skills necessary to solve problems	(ii) demonstrate effective communication skills necessary to solve problems
(4) 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:	(C) explain the role and importance of marketing and its affects on the success of a veterinary hospital	(i) explain the role of marketing on the success of a veterinary hospital

Knowledge and Skill Statement	Student Expectation	Breakout
(4) 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:	(C) explain the role and importance of marketing and its affects on the success of a veterinary hospital	(ii) explain the importance of marketing on the success of a veterinary hospital
(4) 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:	(C) explain the role and importance of marketing and its affects on the success of a veterinary hospital	(iii) explain the affects [of marketing] on the success of a veterinary hospital
(4) 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:	(D) develop skills involving the use of electronic technology commonly found in a veterinary hospital such as centrifuge, autoclave, and radiography positions	(i) develop skills involving the use of electronic technology commonly found in a veterinary hospital
(5) 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	(i) analyze veterinary terms to discover their meanings
(5) 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	(ii) recognize common Greek prefixes
(5) 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	(iii) recognize common Greek suffixes

Knowledge and Skill Statement	Student Expectation	Breakout
(5) 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	(iv) recognize common Greek roots
(5) 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	(v) recognize common Latin prefixes
(5) 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	(vi) recognize common Latin suffixes
(5) 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	(vii) recognize common Latin roots
(5) 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:	(B) use directional anatomical terms appropriately	(i) use directional anatomical terms appropriately
(5) 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:	(C) identify anatomical structures of animals	(i) identify anatomical structures of animals

Knowledge and Skill Statement	Student Expectation	Breakout
(5) 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:	(D) describe the major body systems by using appropriate medical terminology	(i) describe the major body systems by using appropriate medical terminology
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(i) recognize medical terms relating to diagnosis of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(ii) pronounce medical terms relating to diagnosis of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(iii) spell medical terms relating to diagnosis of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(iv) define medical terms relating to diagnosis of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(v) recognize medical terms relating to pathology of animals

Knowledge and Skill Statement	Student Expectation	Breakout
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(vi) pronounce medical terms relating to pathology of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(vii) spell medical terms relating to pathology of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(viii) define medical terms relating to pathology of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(ix) recognize medical terms relating to treatment of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(x) pronounce medical terms relating to treatment of animals
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(xi) spell medical terms relating to treatment of animals

Knowledge and Skill Statement	Student Expectation	Breakout
(5) 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:	(E) recognize, pronounce, spell, and define medical terms relating to diagnosis, pathology, and treatment of animals	(xii) define medical terms relating to treatment of animals
(6) 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 such as companion, exotic, and large animal species according to common breed characteristics	(i) identify a variety of animal species according to common breed characteristics
(6) The student explores the area of animal management as it relates to animal identification, animal characteristics, and behavioral temperament. The student is expected to:	(B) recognize common animal behavioral problems within companion, exotic and large animals as per industry standard	(i) recognize common animal behavioral problems within companion animals as per industry standard
(6) The student explores the area of animal management as it relates to animal identification, animal characteristics, and behavioral temperament. The student is expected to:	(B) recognize common animal behavioral problems within companion, exotic and large animals as per industry standard	(ii) recognize common animal behavioral problems within exotic animals as per industry standard
(6) The student explores the area of animal management as it relates to animal identification, animal characteristics, and behavioral temperament. The student is expected to:	(B) recognize common animal behavioral problems within companion, exotic and large animals as per industry standard	(iii) recognize common animal behavioral problems within large animals as per industry standard
(6) The student explores the area of animal management as it relates to animal identification, animal characteristics, and behavioral temperament. The student is expected to:	(C) identify correct handling protocols and discuss the relevance to veterinary medical staff	(i) identify correct handling protocols

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student explores the area of animal management as it relates to animal identification, animal characteristics, and behavioral temperament. The student is expected to:	(C) identify correct handling protocols and discuss the relevance to veterinary medical staff	(ii) discuss the relevance [of correct handling protocols] to veterinary medical staff
(6) The student explores the area of animal management as it relates to animal identification, animal characteristics, and behavioral temperament. The student is expected to:	(D) demonstrate appropriate methods of handling a variety of animal behaviors	(i) demonstrate appropriate methods of handling a variety of animal behaviors
(7) 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	(i) identify the parts of the skeletal system
(7) 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	(ii) identify the parts of the muscular system
(7) 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	(iii) identify the parts of the respiratory system
(7) 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	(iv) identify the parts of the circulatory system

Knowledge and Skill Statement	Student Expectation	Breakout
(7) 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	(v) identify the parts of the digestive system
(7) 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	(vi) identify the parts of the endocrine system
(7) 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	(vii) identify the parts of the nervous system
(7) 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:	(B) describe the functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems	(i) describe the functions of the skeletal system
(7) 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:	(B) describe the functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems	(ii) describe the functions of the muscular system
(7) 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:	(B) describe the functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems	(iii) describe the functions of the respiratory system

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(7) 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:</p>	<p>(B) describe the functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems</p>	<p>(iv) describe the functions of the circulatory system</p>
<p>(7) 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:</p>	<p>(B) describe the functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems</p>	<p>(v) describe the functions of the digestive system</p>
<p>(7) 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:</p>	<p>(B) describe the functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems</p>	<p>(vi) describe the functions of the endocrine system</p>
<p>(7) 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:</p>	<p>(B) describe the functions of the skeletal, muscular, respiratory, circulatory, digestive, endocrine, and nervous systems</p>	<p>(vii) describe the functions of the nervous system</p>
<p>(7) 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:</p>	<p>(C) identify appropriate anatomical sites for injections, measuring vital signs, and collecting blood samples for various animal species</p>	<p>(i) identify appropriate anatomical sites for injections for various animal species</p>
<p>(7) 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:</p>	<p>(C) identify appropriate anatomical sites for injections, measuring vital signs, and collecting blood samples for various animal species</p>	<p>(ii) identify appropriate anatomical sites for measuring vital signs for various animal species</p>

Knowledge and Skill Statement	Student Expectation	Breakout
(7) 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:	(C) identify appropriate anatomical sites for injections, measuring vital signs, and collecting blood samples for various animal species	(iii) identify appropriate anatomical sites for collecting blood samples for various animal species
(7) 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:	(D) describe normal animal behavior and vital signs compared to sick animals using medical terminology	(i) describe normal animal behavior compared to sick animals using medical terminology
(7) 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:	(D) describe normal animal behavior and vital signs compared to sick animals using medical terminology	(ii) describe normal vital signs compared to sick animals using medical terminology
(8) 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	(i) add whole numbers as related to veterinary medicine
(8) 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	(ii) subtract whole numbers as related to veterinary medicine
(8) 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	(iii) multiply whole numbers as related to veterinary medicine
(8) 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	(iv) divide whole numbers as related to veterinary medicine

Knowledge and Skill Statement	Student Expectation	Breakout
(8) 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	(v) add fractions as related to veterinary medicine
(8) 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	(vi) subtract fractions as related to veterinary medicine
(8) 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	(vii) multiply fractions as related to veterinary medicine
(8) 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	(viii) divide fractions as related to veterinary medicine
(8) 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	(ix) add decimals as related to veterinary medicine
(8) 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	(x) subtract decimals as related to veterinary medicine
(8) 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	(xi) multiply decimals as related to veterinary medicine

Knowledge and Skill Statement	Student Expectation	Breakout
(8) 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	(xii) divide decimals as related to veterinary medicine
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(B) apply mathematical skills needed for accurate client assessment such as measurement, conversion, and data analysis	(i) apply mathematical skills needed for accurate client assessment
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(C) find solutions to veterinary problems by calculating percentages and averages	(i) find solutions to veterinary problems by calculating percentages
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(C) find solutions to veterinary problems by calculating percentages and averages	(ii) find solutions to veterinary problems by calculating averages
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(D) convert between English and metric units	(i) convert between English and metric units
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(E) determine weight, volume, and linear measurements using scientific calculations	(i) determine weight using scientific calculations
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(E) determine weight, volume, and linear measurements using scientific calculations	(ii) determine volume using scientific calculations

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(E) determine weight, volume, and linear measurements using scientific calculations	(iii) determine linear measurements using scientific calculations
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(F) solve word problems using ratios and dimensional analysis	(i) solve word problems using ratios
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(F) solve word problems using ratios and dimensional analysis	(ii) solve word problems using dimensional analysis
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(G) interpret data using tables, charts, and graphs	(i) interpret data using tables
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(G) interpret data using tables, charts, and graphs	(ii) interpret data using charts
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(G) interpret data using tables, charts, and graphs	(iii) interpret data using graphs
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(H) use mathematical equations to calculate and prepare chemical concentrations	(i) use mathematical equations to calculate

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student performs mathematical calculations used in veterinary medicine. The student is expected to:	(H) use mathematical equations to calculate and prepare chemical concentrations	(ii) use mathematical equations to prepare chemical concentrations
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(A) identify factors that influence the health of animals	(i) identify factors that influence the health of animals
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(B) identify pathogens and describe the effects that diseases have on various body systems	(i) identify pathogens
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(B) identify pathogens and describe the effects that diseases have on various body systems	(ii) describe the effects that diseases have on various body systems
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(C) explain courses of treatment for common viral and bacterial diseases	(i) explain courses of treatment for common viral diseases
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(C) explain courses of treatment for common viral and bacterial diseases	(ii) explain courses of treatment for common bacterial diseases
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(D) describe the process of immunity and disease transmission	(i) describe the process of immunity

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(D) describe the process of immunity and disease transmission	(ii) describe the process of disease transmission
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(E) identify internal, external, and protozoal parasites using common and scientific names	(i) identify internal parasites using common names
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(E) identify internal, external, and protozoal parasites using common and scientific names	(ii) identify external parasites using common names
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(E) identify internal, external, and protozoal parasites using common and scientific names	(iii) identify protozoal parasites using common names
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(E) identify internal, external, and protozoal parasites using common and scientific names	(iv) identify internal parasites using scientific names
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(E) identify internal, external, and protozoal parasites using common and scientific names	(v) identify external parasites using scientific names
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(E) identify internal, external, and protozoal parasites using common and scientific names	(vi) identify protozoal parasites using scientific names

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(F) describe life cycles of common parasites	(i) describe life cycles of common parasites
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(G) explain how parasites are transmitted and their effect on the host	(i) explain how parasites are transmitted
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(G) explain how parasites are transmitted and their effect on the host	(ii) explain [parasites'] effect on the host
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(H) conduct parasitic diagnostic procedures	(i) conduct parasitic diagnostic procedures
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(I) describe types of treatments for diseases and parasites	(i) describe types of treatments for diseases
(9) The student evaluates animal diseases and identifies internal, external, and protozoal parasites. The student is expected to:	(I) describe types of treatments for diseases and parasites	(ii) describe types of treatments for parasites
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(A) describe the characteristics and signs of a healthy animal	(i) describe the characteristics of a healthy animal
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(A) describe the characteristics and signs of a healthy animal	(ii) describe the signs of a healthy animal

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(B) recognize examples of abnormalities and relate them to the associated problems and illnesses	(i) recognize examples of abnormalities
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(B) recognize examples of abnormalities and relate them to the associated problems and illnesses	(ii) relate [abnormalities] to the associated problems
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(B) recognize examples of abnormalities and relate them to the associated problems and illnesses	(iii) relate [abnormalities] to the associated illnesses
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(C) take temperature, pulse, and respiration for a variety of animals	(i) take temperature for a variety of animals
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(C) take temperature, pulse, and respiration for a variety of animals	(ii) take pulse for a variety of animals
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(C) take temperature, pulse, and respiration for a variety of animals	(iii) take respiration for a variety of animals
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(D) describe effects of age, stress, and environmental factors on vital signs of animals	(i) describe effects of age on vital signs of animals
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(D) describe effects of age, stress, and environmental factors on vital signs of animals	(ii) describe effects of stress on vital signs of animals
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(D) describe effects of age, stress, and environmental factors on vital signs of animals	(iii) describe effects of environmental factors on vital signs of animals

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(E) explain procedures for physical examinations	(i) explain procedures for physical examinations
(10) The student evaluates an animal's health during a clinical examination. The student is expected to:	(F) explain the regional approach to assess an animal's health	(i) explain the regional approach to assess an animal's health
(11) 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	(i) identify imaging equipment
(11) The student identifies imaging equipment and demonstrates how to safely operate and maintain equipment. The student is expected to:	(B) explain safety procedures, maintenance, and operation of imaging equipment	(i) explain safety procedures of imaging equipment
(11) The student identifies imaging equipment and demonstrates how to safely operate and maintain equipment. The student is expected to:	(B) explain safety procedures, maintenance, and operation of imaging equipment	(ii) explain maintenance of imaging equipment
(11) The student identifies imaging equipment and demonstrates how to safely operate and maintain equipment. The student is expected to:	(B) explain safety procedures, maintenance, and operation of imaging equipment	(iii) explain operation of imaging equipment
(11) The student identifies imaging equipment and demonstrates how to safely operate and maintain equipment. The student is expected to:	(C) demonstrate patient restraint and positioning methods used for imaging purposes	(i) demonstrate patient restraint methods used for imaging purposes
(11) The student identifies imaging equipment and demonstrates how to safely operate and maintain equipment. The student is expected to:	(C) demonstrate patient restraint and positioning methods used for imaging purposes	(ii) demonstrate patient positioning methods used for imaging purposes

Knowledge and Skill Statement	Student Expectation	Breakout
(12) 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	(i) identify the anatomy of the digestive system of ruminant animals
(12) 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	(ii) identify the anatomy of the digestive system of non-ruminant animals
(12) 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:	(B) describe the process of digestion in ruminant and non-ruminant animals	(i) describe the process of digestion in ruminants animals
(12) 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:	(B) describe the process of digestion in ruminant and non-ruminant animals	(ii) describe the process of digestion in non-ruminant animals
(12) 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:	(C) identify types and sources of nutrients and classes of feeds	(i) identify types of nutrients
(12) 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:	(C) identify types and sources of nutrients and classes of feeds	(ii) identify sources of nutrients

Knowledge and Skill Statement	Student Expectation	Breakout
(12) 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:	(C) identify types and sources of nutrients and classes of feeds	(iii) identify classes of feeds
(12) 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:	(D) identify feed additives and describe how additives affect the food supply	(i) identify feed additives
(12) 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:	(D) identify feed additives and describe how additives affect the food supply	(ii) describe how additives affect the food supply
(12) 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:	(E) evaluate animal dietary needs and feeding factors	(i) evaluate animal dietary needs
(12) 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:	(E) evaluate animal dietary needs and feeding factors	(ii) evaluate animal feeding factors
(12) 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:	(F) calculate energy requirements and formulate rations	(i) calculate energy requirements

Knowledge and Skill Statement	Student Expectation	Breakout
(12) 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:	(F) calculate energy requirements and formulate rations	(ii) formulate rations
(12) 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:	(G) discuss feeding practices and feed-quality issues	(i) discuss feeding practices
(12) 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:	(G) discuss feeding practices and feed-quality issues	(ii) discuss feed-quality issues
(12) 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:	(H) analyze the quality of commercially prepared feeds	(i) analyze the quality of commercially prepared feeds
(13) 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	(i) describe laboratory tests
(13) 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	(ii) explain the importance of proper laboratory procedures
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(i) demonstrate the procedures used in collecting fecal specimens

Knowledge and Skill Statement	Student Expectation	Breakout
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(ii) demonstrate the procedures used in handling fecal specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(iii) demonstrate the procedures used in preparing fecal specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(iv) demonstrate the procedures used in examining fecal specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(v) demonstrate the procedures used in collecting blood specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(vi) demonstrate the procedures used in handling blood specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(vii) demonstrate the procedures used in preparing blood specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(viii) demonstrate the procedures used in examining blood specimens

Knowledge and Skill Statement	Student Expectation	Breakout
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(ix) demonstrate the procedures used in collecting urine specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(x) demonstrate the procedures used in handling urine specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(xi) demonstrate the procedures used in preparing urine specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(B) demonstrate the procedures used in collecting, handling, preparing, and examining fecal, blood, and urine specimens	(xii) demonstrate the procedures used in examining urine specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(C) discuss normal and abnormal results obtained in complete blood counts	(i) discuss normal results obtained in complete blood counts
(13) The student examines various aspects of clinical hematology. The student is expected to:	(C) discuss normal and abnormal results obtained in complete blood counts	(ii) discuss abnormal results obtained in complete blood counts
(13) The student examines various aspects of clinical hematology. The student is expected to:	(D) explain sensitivity testing and how to read testing results	(i) explain sensitivity testing
(13) The student examines various aspects of clinical hematology. The student is expected to:	(D) explain sensitivity testing and how to read testing results	(ii) explain how to read testing results

Knowledge and Skill Statement	Student Expectation	Breakout
(13) The student examines various aspects of clinical hematology. The student is expected to:	(E) prepare microscope slides, preserve specimens, and perform several of the most common laboratory tests such as fecal flotations, microfilaria smear, pac cell volume	(i) prepare microscope slides
(13) The student examines various aspects of clinical hematology. The student is expected to:	(E) prepare microscope slides, preserve specimens, and perform several of the most common laboratory tests such as fecal flotations, microfilaria smear, pac cell volume	(ii) preserve specimens
(13) The student examines various aspects of clinical hematology. The student is expected to:	(E) prepare microscope slides, preserve specimens, and perform several of the most common laboratory tests such as fecal flotations, microfilaria smear, pac cell volume	(iii) perform several of the most common laboratory tests
(14) 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	(i) explain the care of equipment found in veterinary practice
(14) 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	(ii) explain the maintenance of equipment found in veterinary practice
(14) 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	(iii) explain the use of equipment found in veterinary practice
(14) 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	(iv) explain the care of instruments found in veterinary practice

Knowledge and Skill Statement	Student Expectation	Breakout
(14) 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	(v) explain the maintenance of instruments found in veterinary practice
(14) 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	(vi) explain the use of instruments found in veterinary practice
(14) 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:	(B) explain appropriate hospital procedures	(i) explain appropriate hospital procedures
(14) 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:	(C) discuss emergency protocols and describe first aid procedures, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock, for small and large animals	(i) discuss emergency protocols for small animals
(14) 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:	(C) discuss emergency protocols and describe first aid procedures, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock, for small and large animals	(ii) discuss emergency protocols for large animals
(14) 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:	(C) discuss emergency protocols and describe first aid procedures, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock, for small and large animals	(iii) describe first aid procedures, including cardiopulmonary resuscitation for small animals

Knowledge and Skill Statement	Student Expectation	Breakout
(14) 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:	(C) discuss emergency protocols and describe first aid procedures, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock, for small and large animals	(iv) describe first aid procedures, including control of bleeding for small animals
(14) 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:	(C) discuss emergency protocols and describe first aid procedures, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock, for small and large animals	(v) describe first aid procedures, including treatment for shock for small animals
(14) 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:	(C) discuss emergency protocols and describe first aid procedures, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock, for small and large animals	(vi) describe first aid procedures, including cardiopulmonary resuscitation for large animals
(14) 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:	(C) discuss emergency protocols and describe first aid procedures, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock, for small and large animals	(vii) describe first aid procedures, including control of bleeding for large animals
(14) 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:	(C) discuss emergency protocols and describe first aid procedures, including cardiopulmonary resuscitation, control of bleeding, and treatment for shock, for small and large animals	(viii) describe first aid procedures, including treatment for shock for large animals
(14) 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:	(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	(i) demonstrate animal care skills

Knowledge and Skill Statement	Student Expectation	Breakout
(14) 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:	(E) demonstrate therapeutic care such as patient observation, maintaining and administering fluids, applying bandages, caring for open wounds, and managing hydrotherapy and physical therapy	(i) demonstrate therapeutic care
(14) 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:	(F) describe skills involved in the reproductive and genetic evaluation of animals	(i) describe skills involved in the reproductive evaluation of animals
(14) 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:	(F) describe skills involved in the reproductive and genetic evaluation of animals	(ii) describe skills involved in the genetic evaluation of animals
(15) 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:	(A) explain the protocol for pre-surgical and post-surgical care of a patient	(i) explain the protocol for pre-surgical care of a patient
(15) 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:	(A) explain the protocol for pre-surgical and post-surgical care of a patient	(ii) explain the protocol for post-surgical care of a patient
(15) 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:	(B) describe methods used in the sterilization and preparation of small and large animal surgery packs	(i) describe methods used in the sterilization of small animal surgery packs

Knowledge and Skill Statement	Student Expectation	Breakout
(15) 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:	(B) describe methods used in the sterilization and preparation of small and large animal surgery packs	(ii) describe methods used in the preparation of small animal surgery packs
(15) 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:	(B) describe methods used in the sterilization and preparation of small and large animal surgery packs	(iii) describe methods used in the sterilization of large animal surgery packs
(15) 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:	(B) describe methods used in the sterilization and preparation of small and large animal surgery packs	(iv) describe methods used in the preparation of large animal surgery packs
(15) 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:	(C) review skills involved in patient and surgical room preparation	(i) review skills involved in patient room preparation
(15) 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:	(C) review skills involved in patient and surgical room preparation	(ii) review skills involved in surgical room preparation
(15) 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:	(D) describe surgical skills such as castration, dehorning, and docking	(i) describe surgical skills

Knowledge and Skill Statement	Student Expectation	Breakout
(15) 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:	(E) describe care of newborn, orphan, and recumbent patients	(i) describe care of newborn patients
(15) 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:	(E) describe care of newborn, orphan, and recumbent patients	(ii) describe care of orphan patients
(15) 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:	(E) describe care of newborn, orphan, and recumbent patients	(iii) describe care of recumbent patients
(15) 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:	(F) identify and monitor equipment used in surgical procedures	(i) identify equipment used in surgical procedures
(15) 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:	(F) identify and monitor equipment used in surgical procedures	(ii) monitor equipment used in surgical procedures
(16) 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	(i) identify medications according to their classification

Knowledge and Skill Statement	Student Expectation	Breakout
(16) 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	(ii) identify medications according to their form
(16) 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	(iii) identify medications according to their routes
(16) 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	(iv) identify medications according to their methods of administration
(16) 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:	(B) explain handling and distribution, protocol, and laws for controlled substances, including the U.S. Drug Enforcement Agency	(i) explain handling and distribution for controlled substances, including the U.S. Drug Enforcement Agency
(16) 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:	(B) explain handling and distribution, protocol, and laws for controlled substances, including the U.S. Drug Enforcement Agency	(ii) explain protocol for controlled substances, including the U.S. Drug Enforcement Agency
(16) 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:	(B) explain handling and distribution, protocol, and laws for controlled substances, including the U.S. Drug Enforcement Agency	(iii) explain laws for controlled substances, including the U.S. Drug Enforcement Agency

Knowledge and Skill Statement	Student Expectation	Breakout
(16) 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:	(C) calculate dosage using factors such as concentration of drug, weight of animal, and required dosage	(i) calculate dosage using factors
(16) 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:	(D) complete a prescription label with identifiers that are required by the United States Food and Drug Administration	(i) complete a prescription label with identifiers that are required by the United States Food and Drug Administration
(16) 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:	(E) select equipment and instruments used to give medications	(i) select equipment used to give medications
(16) 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:	(E) select equipment and instruments used to give medications	(ii) select instruments used to give medications

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.10. Advanced Animal Science (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology, Chemistry, or Integrated Physics and Chemistry (IPC); Algebra I and Geometry; and either Small Animal Management, Equine Science, or Livestock Production. Recommended prerequisite: Veterinary Medical Applications. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Advanced Animal Science 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. To prepare for careers in the field of animal science, students must 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.</p> <p>(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.</p> <p>(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.</p> <p>(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).</p> <p>(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.</p> <p>(8) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 animal systems	(i) identify career development opportunities in the field of animal systems
(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 animal systems	(ii) identify entrepreneurship opportunities in the field of animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(i) apply competencies related to resources in animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(ii) apply competencies related to information in animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(iii) apply competencies related to interpersonal skills in animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems	(iv) apply competencies related to systems of operation in animal systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(i) demonstrate knowledge of personal safety practices in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(ii) demonstrate knowledge of personal health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(iii) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace	(iv) demonstrate knowledge of occupational health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations, including appropriate ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations, including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership	(i) demonstrate characteristics of good citizenship

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) research career topics using technology such as the Internet	(i) research career topics using technology
(2) The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	(A) demonstrate safe practices during laboratory and field investigations	(i) demonstrate safe practices during laboratory investigations
(2) The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	(A) demonstrate safe practices during laboratory and field investigations	(ii) demonstrate safe practices during field investigations
(2) The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials	(i) demonstrate an understanding of the use of resources
(2) The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials	(ii) demonstrate an understanding of the conservation of resources
(2) The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials	(iii) demonstrate an understanding the proper disposal or recycling of materials

Knowledge and Skill Statement	Student Expectation	Breakout
(3) 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)(4) of this section	(i) know the definition of science as specified in subsection (b)(4) [above]
(3) 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)(4) of this section	(ii) understand that [science] has limitations, as specified in subsection (b)(4) [above]
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(i) know that hypotheses are tentative statements that must be capable of being supported or not supported by observational evidence
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(ii) know that hypotheses are testable statements that must be capable of being supported or not supported by observational evidence
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(iii) know that hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(C) know that 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 are created and new technologies emerge	(i) know that scientific theories are based on natural and physical phenomena
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(C) know that 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 are created and new technologies emerge	(ii) know that scientific theories are capable of being tested by multiple independent researchers
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(C) know that 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 are created and new technologies emerge	(iii) know that unlike hypotheses, scientific theories are well-established explanations
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(C) know that 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 are created and new technologies emerge	(iv) know that unlike hypotheses, scientific theories are highly-reliable explanations

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(C) know that 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 are created and new technologies emerge	(v) know that scientific theories may be subject to change as new areas of science are created
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(C) know that 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 are created and new technologies emerge	(vi) know that scientific theories may be subject to change as new technologies emerge
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(D) distinguish between scientific hypotheses and scientific theories	(i) distinguish between scientific hypotheses and scientific theories
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(i) plan descriptive investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(ii) plan descriptive investigations, including selecting equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(iii) plan descriptive investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(iv) plan comparative investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(v) plan comparative investigations, including formulating testable hypotheses
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(vi) plan comparative investigations, including selecting equipment
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(vii) plan comparative investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(viii) plan experimental investigations, including asking questions

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(ix) plan experimental investigations, including formulating testable hypotheses
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(x) plan experimental investigations, including selecting equipment
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xi) plan experimental investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xii) implement descriptive investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xiii) implement descriptive investigations, including formulating testable hypotheses
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xiv) implement descriptive investigations, including selecting equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xv) implement descriptive investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xvi) implement comparative investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xvii) implement comparative investigations, including selecting equipment
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xviii) implement comparative investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xix) implement experimental investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xx) implement experimental investigations, including formulating testable hypotheses

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xxi) implement experimental investigations, including selecting equipment
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xxii) implement experimental investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(i) collect qualitative data

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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</p>	<p>(ii) collect quantitative data</p>
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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</p>	<p>(iii) organize qualitative data</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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</p>	<p>(iv) organize quantitative data</p>
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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</p>	<p>(v) make measurements with accuracy using tools</p>

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(vi) make measurements with precision using tools
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(G) analyze, evaluate, make inferences, and predict trends from data	(i) analyze data
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(G) analyze, evaluate, make inferences, and predict trends from data	(ii) evaluate data
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(G) analyze, evaluate, make inferences, and predict trends from data	(iii) make inferences from data
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(G) analyze, evaluate, make inferences, and predict trends from data	(iv) predict trends from data

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(i) communicate valid conclusions supported by the data through methods
(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	(i) in all fields of science, analyze scientific explanations by using empirical evidence
(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	(ii) in all fields of science, analyze scientific explanations by using logical reasoning
(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	(iii) in all fields of science, analyze scientific explanations by using experimental testing
(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	(iv) in all fields of science, analyze scientific explanations by using observational testing

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(v) in all fields of science, analyze scientific explanations, including examining all sides of scientific evidence of those scientific explanations
(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	(vi) in all fields of science, evaluate scientific explanations by using empirical evidence
(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	(vii) in all fields of science, evaluate scientific explanations by using logical reasoning
(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	(viii) in all fields of science, evaluate scientific explanations by using experimental testing

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(ix) in all fields of science, evaluate scientific explanations by using observational testing
(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	(x) in all fields of science, evaluate scientific explanations, including examining all sides of scientific evidence of those scientific explanations
(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	(xi) in all fields of science, critique scientific explanations by using empirical evidence
(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	(xii) in all fields of science, critique scientific explanations by using logical reasoning

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(xiii) in all fields of science, critique scientific explanations by using experimental testing
(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	(xiv) in all fields of science, critique scientific explanations by using observational testing
(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	(xv) in all fields of science, critique scientific explanations, including examining all sides of scientific evidence of those scientific explanations
(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:	(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials	(i) communicate scientific information extracted from various sources
(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:	(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials	(ii) apply scientific information extracted from various sources

Knowledge and Skill Statement	Student Expectation	Breakout
(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:	(C) draw inferences based on data related to promotional materials for products and services	(i) draw inferences based on data related to promotional materials for products
(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:	(C) draw inferences based on data related to promotional materials for products and services	(ii) draw inferences based on data related to promotional materials for services
(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:	(D) evaluate the impact of scientific research on society and the environment	(i) evaluate the impact of scientific research on society
(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:	(D) evaluate the impact of scientific research on society and the environment	(ii) evaluate the impact of scientific research on the environment
(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:	(E) evaluate models according to their limitations in representing biological objects or events	(i) evaluate models according to their limitations in representing biological objects or events
(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:	(F) research and describe the history of biology and contributions of scientists	(i) research the history of biology

Knowledge and Skill Statement	Student Expectation	Breakout
(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:	(F) research and describe the history of biology and contributions of scientists	(ii) research the contributions of scientists
(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:	(F) research and describe the history of biology and contributions of scientists	(iii) describe the history of biology
(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:	(F) research and describe the history of biology and contributions of scientists	(iv) describe the contributions of scientists
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(5) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(5) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(5) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(5) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(6) The student demonstrates principles related to the human, scientific, and technological dimensions of animal agriculture and the resources necessary for producing domesticated animals. The student is expected to:	(A) evaluate market classes and grades of livestock	(i) evaluate market classes of livestock
(6) The student demonstrates principles related to the human, scientific, and technological dimensions of animal agriculture and the resources necessary for producing domesticated animals. The student is expected to:	(A) evaluate market classes and grades of livestock	(ii) evaluate market grades of livestock

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student demonstrates principles related to the human, scientific, and technological dimensions of animal agriculture and the resources necessary for producing domesticated animals. The student is expected to:	(B) identify animal products such as organic and farm-raised and consumption patterns relative to human diet and health issues	(i) identify animal products relative to human diet
(6) The student demonstrates principles related to the human, scientific, and technological dimensions of animal agriculture and the resources necessary for producing domesticated animals. The student is expected to:	(B) identify animal products such as organic and farm-raised and consumption patterns relative to human diet and health issues	(ii) identify animal products relative to human health issues
(6) The student demonstrates principles related to the human, scientific, and technological dimensions of animal agriculture and the resources necessary for producing domesticated animals. The student is expected to:	(C) describe the growth and development of livestock as a global commodity	(i) describe the growth of livestock as a global commodity
(6) The student demonstrates principles related to the human, scientific, and technological dimensions of animal agriculture and the resources necessary for producing domesticated animals. The student is expected to:	(C) describe the growth and development of livestock as a global commodity	(ii) describe the development of livestock as a global commodity
(7) 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	(i) describe reproductive cycles
(7) 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	(ii) relate [reproductive cycles] to breeding systems

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student applies the principles of reproduction and breeding to livestock improvement. The student is expected to:	(B) explain the embryo transfer process and how it can impact the livestock industries	(i) explain the embryo transfer process
(7) The student applies the principles of reproduction and breeding to livestock improvement. The student is expected to:	(B) explain the embryo transfer process and how it can impact the livestock industries	(ii) explain how [the embryo transfer process] can impact the livestock industries
(7) The student applies the principles of reproduction and breeding to livestock improvement. The student is expected to:	(C) recognize the significance of meiosis to sexual reproduction	(i) recognize the significance of meiosis to sexual reproduction
(7) The student applies the principles of reproduction and breeding to livestock improvement. The student is expected to:	(D) evaluate animal behavior and its relationship to livestock management	(i) evaluate animal behavior
(7) The student applies the principles of reproduction and breeding to livestock improvement. The student is expected to:	(D) evaluate animal behavior and its relationship to livestock management	(ii) evaluate [animal behavior's] relationship to livestock management
(8) 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	(i) explain Mendel's laws of inheritance by predicting genotypes of offspring using the Punnett square
(8) 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	(ii) explain Mendel's laws of inheritance by predicting phenotypes of offspring using the Punnett square

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(B) predict genotypes and phenotypes of animal offspring using Mendelian or non-Mendelian patterns of inheritance in various forms of livestock and use Punnett Square and assign alleles to justify all predictions	(i) predict genotypes of animal offspring using Mendelian or non-Mendelian patterns of inheritance in various forms of livestock
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(B) predict genotypes and phenotypes of animal offspring using Mendelian or non-Mendelian patterns of inheritance in various forms of livestock and use Punnett Square and assign alleles to justify all predictions	(ii) predict phenotypes of animal offspring using Mendelian or non-Mendelian patterns of inheritance in various forms of livestock
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(B) predict genotypes and phenotypes of animal offspring using Mendelian or non-Mendelian patterns of inheritance in various forms of livestock and use Punnett Square and assign alleles to justify all predictions	(iii) use Punnett Square to justify all [genotype and phenotype] predictions
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(B) predict genotypes and phenotypes of animal offspring using Mendelian or non-Mendelian patterns of inheritance in various forms of livestock and use Punnett Square and assign alleles to justify all predictions	(iv) assign alleles to justify all [genotype and phenotype] predictions
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(C) identify the parts of the nucleotide and the difference between the nucleotides found in deoxyribonucleic acid (DNA) versus ribonucleic acid (RNA)	(i) identify the parts of the nucleotide
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(C) identify the parts of the nucleotide and the difference between the nucleotides found in deoxyribonucleic acid (DNA) versus ribonucleic acid (RNA)	(ii) identify the difference between the nucleotides found in deoxyribonucleic acid (DNA) versus ribonucleic acid (RNA)

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(D) explain the functions of DNA and RNA	(i) explain the functions of DNA
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(D) explain the functions of DNA and RNA	(ii) explain the functions of RNA
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(E) describe how heredity is used in the selection of livestock such as knowing the difference between outbreeding and inbreeding/linebreeding	(i) describe how heredity is used in the selection of livestock
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(F) explain how traits are passed from parent to offspring through genetic transfer and the implications of breeding practices	(i) explain how traits are passed from parent to offspring through genetic transfer
(8) The student applies the principles of molecular genetics and heredity. The student is expected to:	(F) explain how traits are passed from parent to offspring through genetic transfer and the implications of breeding practices	(ii) explain the implications of breeding practices
(9) 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 livestock species	(i) identify the external anatomy of livestock species
(9) 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 livestock species	(ii) compare the external anatomy of livestock species

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(i) compare the anatomy and physiology of the skeletal systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(ii) compare the anatomy and physiology of the muscular systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(iii) compare the anatomy and physiology of the reproductive systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(iv) compare the anatomy and physiology of the digestive systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(v) compare the anatomy and physiology of the circulatory systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(vi) compare the anatomy and physiology of the genitourinary systems of animals

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(vii) compare the anatomy and physiology of the respiratory systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(viii) compare the anatomy and physiology of the nervous systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(ix) compare the anatomy and physiology of the immune systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genitourinary, respiratory, nervous, immune and endocrine systems of animals	(x) compare the anatomy and physiology of the endocrine systems of animals
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(C) describe interactions among various body systems such as circulatory, respiratory, and muscular systems	(i) describe interactions among various body systems
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(i) identify the functions of epithelial tissue

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(ii) identify the functions of nervous tissue
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(iii) identify the functions of connective tissue
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(iv) identify the functions of muscular tissue
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(v) describe the functions of epithelial tissue
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(vi) describe the functions of nervous tissue
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(vii) describe the functions of connective tissue
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(viii) describe the functions of muscular tissue

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(ix) relate the functions of epithelial tissue to animal body systems
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(x) relate the functions of nervous tissue to animal body systems
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(xi) relate the functions of connective tissue to animal body systems
(9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:	(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems	(xii) relate the functions of muscular tissue to animal body systems
(10) 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 animals, including cattle, and non-ruminant animals, including poultry	(i) describe the structures of the digestive system of ruminant animals, including cattle
(10) 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 animals, including cattle, and non-ruminant animals, including poultry	(ii) describe the structures of the digestive system of non-ruminant animals, including poultry
(10) 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 animals, including cattle, and non-ruminant animals, including poultry	(iii) describe the functions of the digestive system of ruminant animals, including cattle

Knowledge and Skill Statement	Student Expectation	Breakout
(10) 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 animals, including cattle, and non-ruminant animals, including poultry	(iv) describe the functions of the digestive system of non-ruminant animals, including poultry
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(B) identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals	(i) identify sources of nutrients
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(B) identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals	(ii) identify classes of feeds
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(B) identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals	(iii) describe sources of nutrients
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(B) identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals	(iv) describe classes of feeds
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(B) identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals	(v) relate [sources of nutrients] to the ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(B) identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals	(vi) relate [classes of feed] to the ruminant animals

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(B) identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals	(vii) relate [sources of nutrients] to the non-ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(B) identify and describe sources of nutrients and classes of feeds and relate to the ruminant and non-ruminant animals	(viii) relate [classes of feed] to the non-ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(i) identify vitamins
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(ii) identify minerals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(iii) identify feed additives
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(iv) describe vitamins
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(v) describe minerals

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(vi) describe feed additives
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(vii) identify how [vitamins] relate to the nutritional requirements of ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(viii) identify how [minerals] relate to the nutritional requirements of ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(ix) identify how [feed additives] relate to the nutritional requirements of ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(x) identify how [vitamins] relate to the nutritional requirements of non-ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(xi) identify how [minerals] relate to the nutritional requirements of non-ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(xii) identify how [feed additives] relate to the nutritional requirements of non-ruminant animals

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(xiii) describe how [vitamins] relate to the nutritional requirements of non-ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(xiv) describe how [minerals] relate to the nutritional requirements of non-ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals	(xv) describe how [feed additives] relate to the nutritional requirements of non-ruminant animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(D) formulate rations based on different nutritional requirements	(i) formulate rations based on different nutritional requirements
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(E) analyze feeding practices in relation to nutritional requirements of animals	(i) analyze feeding practices in relation to nutritional requirements of animals
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(F) analyze feed quality issues and determine their effect on animal health	(i) analyze feed quality issues
(10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:	(F) analyze feed quality issues and determine their effect on animal health	(ii) determine [feed quality issues] affect on animal health

Knowledge and Skill Statement	Student Expectation	Breakout
(11) 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 for a particular species	(i) identify factors that influence the health of animals
(11) The student evaluates animal diseases and parasites. The student is expected to:	(B) identify pathogens and describe the effects that diseases have on various body systems	(i) identify pathogens
(11) The student evaluates animal diseases and parasites. The student is expected to:	(B) identify pathogens and describe the effects that diseases have on various body systems	(ii) describe the effects that diseases have on various body systems
(11) The student evaluates animal diseases and parasites. The student is expected to:	(C) explain the methods of prevention, control, and treatment for diseases	(i) explain the methods of prevention for diseases
(11) The student evaluates animal diseases and parasites. The student is expected to:	(C) explain the methods of prevention, control, and treatment for diseases	(ii) explain the methods of control for diseases
(11) The student evaluates animal diseases and parasites. The student is expected to:	(C) explain the methods of prevention, control, and treatment for diseases	(iii) explain the methods of treatment of diseases
(11) The student evaluates animal diseases and parasites. The student is expected to:	(D) describe the process of immunity and disease transmission	(i) describe the process of immunity transmission
(11) The student evaluates animal diseases and parasites. The student is expected to:	(D) describe the process of immunity and disease transmission	(ii) describe the process of disease transmission
(11) The student evaluates animal diseases and parasites. The student is expected to:	(E) explain how external and internal parasites are transmitted and the effect they have on the host	(i) explain how external parasites are transmitted

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student evaluates animal diseases and parasites. The student is expected to:	(E) explain how external and internal parasites are transmitted and the effect they have on the host	(ii) explain how internal parasites are transmitted
(11) The student evaluates animal diseases and parasites. The student is expected to:	(E) explain how external and internal parasites are transmitted and the effect they have on the host	(iii) explain the effect [external parasites] have on the host
(11) The student evaluates animal diseases and parasites. The student is expected to:	(E) explain how external and internal parasites are transmitted and the effect they have on the host	(iv) explain the effect [internal parasites] have on the host
(11) The student evaluates animal diseases and parasites. The student is expected to:	(F) explain the methods of prevention, control, and treatment of internal and external parasites	(i) explain the methods of prevention of internal parasites
(11) The student evaluates animal diseases and parasites. The student is expected to:	(F) explain the methods of prevention, control, and treatment of internal and external parasites	(ii) explain the methods of control of internal parasites
(11) The student evaluates animal diseases and parasites. The student is expected to:	(F) explain the methods of prevention, control, and treatment of internal and external parasites	(iii) explain the methods of treatment of internal parasites
(11) The student evaluates animal diseases and parasites. The student is expected to:	(F) explain the methods of prevention, control, and treatment of internal and external parasites	(iv) explain the methods of prevention of external parasites
(11) The student evaluates animal diseases and parasites. The student is expected to:	(F) explain the methods of prevention, control, and treatment of internal and external parasites	(v) explain the methods of control of external parasites
(11) The student evaluates animal diseases and parasites. The student is expected to:	(F) explain the methods of prevention, control, and treatment of internal and external parasites	(vi) explain the methods of treatment of external parasites

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student evaluates animal diseases and parasites. The student is expected to:	(G) describe the life cycles of various parasites and relate them to animal health issues	(i) describe the life cycles of various parasites
(11) The student evaluates animal diseases and parasites. The student is expected to:	(G) describe the life cycles of various parasites and relate them to animal health issues	(ii) relate [the life cycles of various parasites] to animal health issues
(11) The student evaluates animal diseases and parasites. The student is expected to:	(H) conduct parasite diagnostic tests	(i) conduct parasite diagnostic tests
(12) 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	(i) compare cells from different parts of animals, including epithelia, to show specialization of structure
(12) 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	(ii) compare cells from different parts of animals, including muscles, to show specialization of structure
(12) 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	(iii) compare cells from different parts of animals, including bones, to show specialization of structure
(12) 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	(iv) compare cells from different parts of animals, including epithelia, to show specialization of function
(12) 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	(v) compare cells from different parts of animals, including muscles, to show specialization of function

Knowledge and Skill Statement	Student Expectation	Breakout
(12) 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	(vi) compare cells from different parts of animals, including bones, to show specialization of function
(12) The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to:	(B) describe and explain cell differentiation in the development of organisms	(i) describe cell differentiation in the development of organisms
(12) The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to:	(B) describe and explain cell differentiation in the development of organisms	(ii) explain cell differentiation in the development of organisms
(12) The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to:	(C) sequence the levels of organization in animals and relate the parts to each other and to the whole	(i) sequence the levels of organization in animals
(12) The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to:	(C) sequence the levels of organization in animals and relate the parts to each other and to the whole	(ii) relate the parts to each other

Knowledge and Skill Statement	Student Expectation	Breakout
(12) The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to:	(C) sequence the levels of organization in animals and relate the parts to each other and to the whole	(iii) relate the parts to the whole
(13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:	(A) discuss the effects of biotechnology such as cloning, artificial insemination, and freezing of semen and embryos on the production of livestock	(i) discuss the effects of biotechnology on the production of livestock
(13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:	(B) analyze the issues surrounding animal welfare and the humane treatment of livestock	(i) analyze the issues surrounding animal welfare
(13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:	(B) analyze the issues surrounding animal welfare and the humane treatment of livestock	(ii) analyze the issues surrounding the humane treatment of livestock
(13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:	(C) apply principles of nutrition to maximize feed efficiency for livestock	(i) apply principles of nutrition to maximize feed efficiency for livestock
(13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:	(D) design, conduct, and complete research to solve a self-identified problem in scientific animal agriculture	(i) design research to solve a self-identified problem in scientific animal agriculture
(13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:	(D) design, conduct, and complete research to solve a self-identified problem in scientific animal agriculture	(ii) conduct research to solve a self-identified problem in scientific animal agriculture

Knowledge and Skill Statement	Student Expectation	Breakout
(13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:	(D) design, conduct, and complete research to solve a self-identified problem in scientific animal agriculture	(iii) complete research to solve a self-identified problem in scientific animal agriculture
(13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:	(E) analyze the issues surrounding the impact of livestock production on the environment	(i) analyze the issues surrounding the impact of livestock production on the environment
(14) The student discusses livestock harvesting operations. The student is expected to:	(A) map the stages of animal growth and development and how they relate to market readiness	(i) map the stages of animal growth
(14) The student discusses livestock harvesting operations. The student is expected to:	(A) map the stages of animal growth and development and how they relate to market readiness	(ii) map the stages of animal development
(14) The student discusses livestock harvesting operations. The student is expected to:	(A) map the stages of animal growth and development and how they relate to market readiness	(iii) map how [the stages of animal growth] relate to market readiness
(14) The student discusses livestock harvesting operations. The student is expected to:	(A) map the stages of animal growth and development and how they relate to market readiness	(iv) map how [the stages of animal development] relate to market readiness
(14) The student discusses livestock harvesting operations. The student is expected to:	(B) describe the harvesting process	(i) describe the harvesting process
(14) The student discusses livestock harvesting operations. The student is expected to:	(C) describe federal and state meat inspection standards such as safety, hygiene, and quality control	(i) describe federal meat inspection standards
(14) The student discusses livestock harvesting operations. The student is expected to:	(C) describe federal and state meat inspection standards such as safety, hygiene, and quality control	(ii) describe state meat inspection standards

Knowledge and Skill Statement	Student Expectation	Breakout
(14) The student discusses livestock harvesting operations. The student is expected to:	(D) identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups	(i) identify retail cuts of meat
(14) The student discusses livestock harvesting operations. The student is expected to:	(D) identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups	(ii) identify wholesale cuts of meat
(14) The student discusses livestock harvesting operations. The student is expected to:	(D) identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups	(iii) identify meat by-products
(14) The student discusses livestock harvesting operations. The student is expected to:	(D) identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups	(iv) correlate [retail cuts of meat] to major muscle groups
(14) The student discusses livestock harvesting operations. The student is expected to:	(D) identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups	(v) correlate [wholesale cuts of meat] to major muscle groups
(14) The student discusses livestock harvesting operations. The student is expected to:	(D) identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups	(vi) correlate [meat by-products] to major muscle groups
(15) The student explores methods of marketing livestock. The student is expected to:	(A) compare various methods of marketing livestock	(i) compare various methods of marketing livestock
(15) The student explores methods of marketing livestock. The student is expected to:	(B) describe methods of marketing meat and meat products	(i) describe methods of marketing meat
(15) The student explores methods of marketing livestock. The student is expected to:	(B) describe methods of marketing meat and meat products	(ii) describe methods of marketing meat products

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.11. Energy and Natural Resource Technology (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Energy and Natural Resource Technology examines the interrelatedness of environmental issues and production agriculture. Students will evaluate the environmental benefits provided by sustainable resources and green technologies. Instruction is designed to allow for the application of science and technology to measure environmental impacts resulting from production agriculture through field and laboratory experiences. To prepare for careers in environmental service systems, students must attain academic skills and knowledge, acquire advanced technical knowledge and skills related to environmental service systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 energy and natural resources	(i) identify career development opportunities in the field of energy and natural resources
(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 energy and natural resources	(ii) identify education opportunities in the field of energy and natural resources
(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 energy and natural resources	(iii) identify entrepreneurship opportunities in the field of energy and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in energy and natural resources	(i) apply competencies related to resources in energy and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in energy and natural resources	(ii) apply competencies related to information in energy and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in energy and natural resources	(iii) apply competencies related to interpersonal skills in energy and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in energy and natural resources	(iv) apply competencies related to systems of operation in energy and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(i) demonstrate knowledge of personal safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(ii) demonstrate knowledge of occupational safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(iii) demonstrate knowledge of environmental regulations in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(iv) demonstrate knowledge of first-aid policy in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations such as appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(i) analyze employers' expectations
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(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	(i) demonstrate safe practices during field investigations in a documented supervised experience

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(ii) demonstrate safe practices during laboratory investigations in a documented supervised experience
(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:	(B) use accepted procedures for the use and conservation of resources and for the safe handling of materials	(i) use accepted procedures for the use of resources
(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:	(B) use accepted procedures for the use and conservation of resources and for the safe handling of materials	(ii) use accepted procedures for the conservation of resources
(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:	(B) use accepted procedures for the use and conservation of resources and for the safe handling of materials	(iii) use accepted procedures for the safe handling of materials
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(A) identify various types of natural resources	(i) identify various types of natural resources
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(B) discuss renewable and non-renewable energy resources and the impact on the environment	(i) discuss renewable energy resources

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(B) discuss renewable and non-renewable energy resources and the impact on the environment	(ii) discuss non-renewable energy resources
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(B) discuss renewable and non-renewable energy resources and the impact on the environment	(iii) discuss the impact [of renewable energy resources] on the environment
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(B) discuss renewable and non-renewable energy resources and the impact on the environment	(iv) discuss the impact [of non-renewable energy resources] on the environment
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(C) analyze the impacts of natural resources and their effects on the agricultural economy	(i) analyze the impacts of natural resources
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(C) analyze the impacts of natural resources and their effects on the agricultural economy	(ii) analyze the effects [of natural resources] on the agricultural economy
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(D) map the geographic and demographic uses of natural resources	(i) map the geographic uses of natural resources
(4) The student discusses the importance and scope of natural resources. The student is expected to:	(D) map the geographic and demographic uses of natural resources	(ii) map the demographic uses of natural resources
(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	(i) identify the distribution of water in the hydrologic cycle
(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	(ii) identify the properties of water in the hydrologic cycle

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student identifies water use and management in agricultural settings. The student is expected to:	(B) identify agricultural uses of water such as recycling	(i) identify agricultural uses of water
(5) The student identifies water use and management in agricultural settings. The student is expected to:	(C) discuss how agricultural uses may impact water resources	(i) discuss how agricultural uses may impact water resources
(5) The student identifies water use and management in agricultural settings. The student is expected to:	(D) define point source and non-point source pollution	(i) define point source pollution
(5) The student identifies water use and management in agricultural settings. The student is expected to:	(D) define point source and non-point source pollution	(ii) define non-point source pollution
(5) The student identifies water use and management in agricultural settings. The student is expected to:	(E) identify sources of point source and non-point source pollution associated with agriculture	(i) identify sources of point source pollution associated with agriculture
(5) The student identifies water use and management in agricultural settings. The student is expected to:	(E) identify sources of point source and non-point source pollution associated with agriculture	(ii) identify sources of non-point source pollution associated with agriculture
(5) The student identifies water use and management in agricultural settings. The student is expected to:	(F) evaluate how the different agricultural water uses may impact water availability	(i) evaluate how the different agricultural water uses may impact water availability
(5) The student identifies water use and management in agricultural settings. The student is expected to:	(G) research water use legislation	(i) research water use legislation
(6) The student describes air quality associated with agricultural production. The student is expected to:	(A) describe the components of the atmosphere and the atmospheric cycle	(i) describe the components of the atmosphere

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student describes air quality associated with agricultural production. The student is expected to:	(A) describe the components of the atmosphere and the atmospheric cycle	(ii) describe the atmospheric cycle
(6) The student describes air quality associated with agricultural production. The student is expected to:	(B) define air pollution	(i) define air pollution
(6) The student describes air quality associated with agricultural production. The student is expected to:	(C) analyze air quality legislation	(i) analyze air quality legislation
(6) The student describes air quality associated with agricultural production. The student is expected to:	(D) identify sources and effects of air pollution from agricultural production	(i) identify sources of air pollution from agricultural production
(6) The student describes air quality associated with agricultural production. The student is expected to:	(D) identify sources and effects of air pollution from agricultural production	(ii) identify effects of air pollution from agricultural production
(6) The student describes air quality associated with agricultural production. The student is expected to:	(E) discuss different emission management strategies	(i) discuss different emission management strategies
(6) The student describes air quality associated with agricultural production. The student is expected to:	(F) identify common air pollution controls used in agricultural production	(i) identify common air pollution controls used in agricultural production
(7) The student examines soil erosion as related to agricultural production. The student is expected to:	(A) identify agriculture production practices that can contribute to soil erosion	(i) identify agriculture production practices that can contribute to soil erosion
(7) The student examines soil erosion as related to agricultural production. The student is expected to:	(B) analyze effects of soil erosion	(i) analyze effects of soil erosion

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student examines soil erosion as related to agricultural production. The student is expected to:	(C) discuss the legal aspects of soil erosion	(i) discuss the legal aspects of soil erosion
(7) The student examines soil erosion as related to agricultural production. The student is expected to:	(D) identify soil erosion control methods and programs	(i) identify soil erosion control methods
(7) The student examines soil erosion as related to agricultural production. The student is expected to:	(D) identify soil erosion control methods and programs	(ii) identify soil erosion control programs
(8) The student explains the effects of natural resource use. The student is expected to:	(A) identify the progression of use of natural resources leading to environmental degradation	(i) identify the progression of use of natural resources leading to environmental degradation
(8) The student explains the effects of natural resource use. The student is expected to:	(B) explain the impact of human population dynamics on the environment	(i) explain the impact of human population dynamics on the environment
(8) The student explains the effects of natural resource use. The student is expected to:	(C) discuss the abuse of natural resources	(i) discuss the abuse of natural resources
(8) The student explains the effects of natural resource use. The student is expected to:	(D) communicate the environmental consequences of natural resource use such as the impact on living organisms	(i) communicate the environmental consequences of natural resource use

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.12. Advanced Energy and Natural Resource Technology (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 11 and 12. Recommended prerequisites: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster and Energy and Natural Resource Technology. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Advanced Energy and Natural Resource Technology is designed to explore the interdependency of the public and natural resource systems related to energy production. In addition, renewable, sustainable, and environmentally friendly practices will be explored. To prepare for careers in the field of energy and natural resource systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to energy and natural resources and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 energy and natural resources	(i) identify career development opportunities in the field of energy and natural resources
(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 energy and natural resources	(ii) identify education opportunities in the field of energy and natural resources
(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 energy and natural resources	(iii) identify entrepreneurship opportunities in the field of energy and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in energy and natural resources	(i) apply competencies related to resources in energy and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in energy and natural resources	(ii) apply competencies related to information in energy and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in energy and natural resources	(iii) apply competencies related to interpersonal skills in energy and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in energy and natural resources	(iv) apply competencies related to systems of operation in energy and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(i) demonstrate knowledge of personal safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(ii) demonstrate knowledge of occupational safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(iii) demonstrate knowledge of environmental regulations in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(iv) demonstrate knowledge of first aid policy in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations such as appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(i) analyze employers' expectations
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student uses instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a supervised agriculture experience. The student is expected to:	(A) demonstrate safe practices during field and laboratory investigations in a supervised agriculture experience	(i) demonstrate safe practices during field investigations in a supervised agriculture experience

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a supervised agriculture experience. The student is expected to:	(A) demonstrate safe practices during field and laboratory investigations in a supervised agriculture experience	(ii) demonstrate safe practices during laboratory investigations in a supervised agriculture experience
(3) The student uses instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a supervised agriculture experience. The student is expected to:	(B) apply accepted procedures for the use and conservation of resources and for the safe handling of materials	(i) apply accepted procedures for the use of resources
(3) The student uses instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a supervised agriculture experience. The student is expected to:	(B) apply accepted procedures for the use and conservation of resources and for the safe handling of materials	(ii) apply accepted procedures for the conservation of resources
(3) The student uses instructional time to conduct field and laboratory investigations using safe, environmentally appropriate, and ethical practices in a supervised agriculture experience. The student is expected to:	(B) apply accepted procedures for the use and conservation of resources and for the safe handling of materials	(iii) apply accepted procedures 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:	(A) identify various types of natural resources	(i) identify various types of natural resources
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(B) identify renewable, non-renewable, and sustainable energy resources and determine their availability	(i) identify renewable energy resources

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(B) identify renewable, non-renewable, and sustainable energy resources and determine their availability	(ii) identify non-renewable energy resources
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(B) identify renewable, non-renewable, and sustainable energy resources and determine their availability	(iii) identify sustainable energy resources
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(B) identify renewable, non-renewable, and sustainable energy resources and determine their availability	(iv) determine the availability [of renewable energy resources]
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(B) identify renewable, non-renewable, and sustainable energy resources and determine their availability	(v) determine the availability [of non-renewable energy resources]
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(B) identify renewable, non-renewable, and sustainable energy resources and determine their availability	(vi) determine the availability [of sustainable energy resources]
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(C) evaluate the impacts of energy production on natural resources and the agricultural economy	(i) evaluate the impacts of energy production on natural resources
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(C) evaluate the impacts of energy production on natural resources and the agricultural economy	(ii) evaluate the impacts of energy production on the agricultural economy

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(D) analyze the geographic and demographic uses of natural resources	(i) analyze the geographic uses of natural resources
(4) The student determines and evaluates the importance and scope of energy and natural resources. The student is expected to:	(D) analyze the geographic and demographic uses of natural resources	(ii) analyze the demographic uses of natural resources
(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	(i) compile examples of different lease agreements used for leasing minerals
(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	(ii) compile examples of different lease agreements used for leasing natural resources
(5) The student analyzes ethical issues related to natural resource management and energy production. The student is expected to:	(B) interpret legal documents related to natural resource management and energy production	(i) interpret legal documents related to natural resource management
(5) The student analyzes ethical issues related to natural resource management and energy production. The student is expected to:	(B) interpret legal documents related to natural resource management and energy production	(ii) interpret legal documents related to energy production
(5) The student analyzes ethical issues related to natural resource management and energy production. The student is expected to:	(C) compare and contrast public and industry interest in natural resource management	(i) compare and contrast public and industry interest in natural resource management

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(A) identify policy affecting the use of natural resources	(i) identify policy affecting the use of natural resources
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(B) identify policy affecting energy production	(i) identify policy affecting energy production
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(C) research controls that protect Earth's natural resources	(i) research controls that protect Earth's natural resources
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(D) identify state and federal agencies that have natural resource management and energy production responsibilities	(i) identify state agencies that have natural resource management responsibilities
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(D) identify state and federal agencies that have natural resource management and energy production responsibilities	(ii) identify state agencies that have energy production responsibilities
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(D) identify state and federal agencies that have natural resource management and energy production responsibilities	(iii) identify federal agencies that have natural resource management responsibilities

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(D) identify state and federal agencies that have natural resource management and energy production responsibilities	(iv) identify federal agencies that have energy production responsibilities
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(E) define the roles of government, society, and property owners in the development of natural resource management and energy production policy	(i) define the role of government in the development of natural resource management policy
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(E) define the roles of government, society, and property owners in the development of natural resource management and energy production policy	(ii) define the role of society in the development of natural resource management policy
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(E) define the roles of government, society, and property owners in the development of natural resource management and energy production policy	(iii) define the role of property owners in the development of natural resource management policy
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(E) define the roles of government, society, and property owners in the development of natural resource management and energy production policy	(iv) define the role of government in the development of energy production policy
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(E) define the roles of government, society, and property owners in the development of natural resource management and energy production policy	(v) define the role of society in the development of energy production policy

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student understands the role of natural resource management and energy production policies at the local, state, and national levels. The student is expected to:	(E) define the roles of government, society, and property owners in the development of natural resource management and energy production policy	(vi) define the role of property owners in the development of energy production policy
(7) The student recognizes the purpose of land use planning for natural resource management and energy production. The student is expected to:	(A) discuss advantages and disadvantages of land use planning for natural resource management and energy production	(i) discuss advantages of land use planning for natural resource management
(7) The student recognizes the purpose of land use planning for natural resource management and energy production. The student is expected to:	(A) discuss advantages and disadvantages of land use planning for natural resource management and energy production	(ii) discuss disadvantages of land use planning for natural resource management
(7) The student recognizes the purpose of land use planning for natural resource management and energy production. The student is expected to:	(A) discuss advantages and disadvantages of land use planning for natural resource management and energy production	(iii) discuss advantages of land use planning for energy production
(7) The student recognizes the purpose of land use planning for natural resource management and energy production. The student is expected to:	(A) discuss advantages and disadvantages of land use planning for natural resource management and energy production	(iv) discuss disadvantages of land use planning for energy production
(7) The student recognizes the purpose of land use planning for natural resource management and energy production. The student is expected to:	(B) compare and contrast land use policy trends within the state	(i) compare and contrast land use policy trends within the state
(8) The student identifies water use and wastewater management. The student is expected to:	(A) identify municipal, industrial, and agricultural uses of water	(i) identify municipal uses of water

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student identifies water use and wastewater management. The student is expected to:	(A) identify municipal, industrial, and agricultural uses of water	(ii) identify industrial uses of water
(8) The student identifies water use and wastewater management. The student is expected to:	(A) identify municipal, industrial, and agricultural uses of water	(iii) identify agricultural uses of water
(8) The student identifies water use and wastewater management. The student is expected to:	(B) explore and develop water recycling opportunities	(i) explore water recycling opportunities
(8) The student identifies water use and wastewater management. The student is expected to:	(B) explore and develop water recycling opportunities	(ii) develop water recycling opportunities
(8) The student identifies water use and wastewater management. The student is expected to:	(C) evaluate sources of point and non-point source pollution associated with municipal, industrial, and agricultural uses	(i) evaluate sources of point source pollution associated with municipal uses
(8) The student identifies water use and wastewater management. The student is expected to:	(C) evaluate sources of point and non-point source pollution associated with municipal, industrial, and agricultural uses	(ii) evaluate sources of point source pollution associated with industrial uses
(8) The student identifies water use and wastewater management. The student is expected to:	(C) evaluate sources of point and non-point source pollution associated with municipal, industrial, and agricultural uses	(iii) evaluate sources of point source pollution associated with agricultural uses
(8) The student identifies water use and wastewater management. The student is expected to:	(C) evaluate sources of point and non-point source pollution associated with municipal, industrial, and agricultural uses	(iv) evaluate sources of non-point source pollution associated with municipal uses

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student identifies water use and wastewater management. The student is expected to:	(C) evaluate sources of point and non-point source pollution associated with municipal, industrial, and agricultural uses	(v) evaluate sources of non-point source pollution associated with industrial uses
(8) The student identifies water use and wastewater management. The student is expected to:	(C) evaluate sources of point and non-point source pollution associated with municipal, industrial, and agricultural uses	(vi) evaluate sources of non-point source pollution associated with agricultural uses
(8) The student identifies water use and wastewater management. The student is expected to:	(D) describe effective management practices commonly used to abate point and non-point sources of pollution	(i) describe effective management practices commonly used to abate point sources of pollution
(8) The student identifies water use and wastewater management. The student is expected to:	(D) describe effective management practices commonly used to abate point and non-point sources of pollution	(ii) describe effective management practices commonly used to abate non-point sources of pollution
(8) The student identifies water use and wastewater management. The student is expected to:	(E) analyze how water use impacts water availability	(i) analyze how water use impacts water availability
(8) The student identifies water use and wastewater management. The student is expected to:	(F) research water use legislation	(i) research water use legislation
(8) The student identifies water use and wastewater management. The student is expected to:	(G) discuss water quality policy and how it affects the decisions made in agricultural production	(i) discuss water quality policy
(8) The student identifies water use and wastewater management. The student is expected to:	(G) discuss water quality policy and how it affects the decisions made in agricultural production	(ii) discuss how [water quality policy] affects the decisions made in agricultural production
(8) The student identifies water use and wastewater management. The student is expected to:	(H) discuss the interaction of energy production and water resources	(i) discuss the interaction of energy production and water resources

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student describes air quality associated with natural resource management and energy production. The student is expected to:	(A) research air quality legislation	(i) research air quality legislation
(9) The student describes air quality associated with natural resource management and energy production. The student is expected to:	(B) identify sources and effects of air pollution	(i) identify sources of air pollution
(9) The student describes air quality associated with natural resource management and energy production. The student is expected to:	(B) identify sources and effects of air pollution	(ii) identify effects of air pollution
(9) The student describes air quality associated with natural resource management and energy production. The student is expected to:	(C) discuss different emission management strategies	(i) discuss different emission management strategies
(9) The student describes air quality associated with natural resource management and energy production. The student is expected to:	(D) identify air pollution controls used in energy production	(i) 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:	(A) examine the effects of natural resource management and energy production on soil erosion	(i) examine the effects of natural resource management on soil erosion
(10) The student examines soil erosion as related to natural resource management and energy production. The student is expected to:	(A) examine the effects of natural resource management and energy production on soil erosion	(ii) examine the effects of energy production on soil erosion

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student examines soil erosion as related to natural resource management and energy production. The student is expected to:	(B) analyze the components and functions of soils	(i) analyze the components of soils
(10) The student examines soil erosion as related to natural resource management and energy production. The student is expected to:	(B) analyze the components and functions of soils	(ii) analyze the functions of soils
(10) The student examines soil erosion as related to natural resource management and energy production. The student is expected to:	(C) appraise soil and water conservation programs	(i) appraise soil conservation programs
(10) The student examines soil erosion as related to natural resource management and energy production. The student is expected to:	(C) appraise soil and water conservation programs	(ii) appraise water conservation programs
(10) The student examines soil erosion as related to natural resource management and energy production. The student is expected to:	(D) compare soil erosion control methods	(i) compare soil erosion control methods
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(A) classify types of waste and hazardous materials	(i) classify types of waste
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(A) classify types of waste and hazardous materials	(ii) classify types of hazardous materials

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(B) research legislation related to waste and hazardous materials	(i) research legislation related to waste
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(B) research legislation related to waste and hazardous materials	(ii) research legislation related to hazardous materials
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(C) select appropriate entities responsible for waste and hazardous material management	(i) select appropriate entities responsible for waste management
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(C) select appropriate entities responsible for waste and hazardous material management	(ii) select appropriate entities responsible for hazardous material management
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(D) describe safe handling, storing, and disposal of waste materials such as composting and recycling	(i) describe safe handling of waste materials
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(D) describe safe handling, storing, and disposal of waste materials such as composting and recycling	(ii) describe safe storing of waste materials
(11) The student analyzes the identification, handling, storing, and disposing of waste and hazardous materials. The student is expected to:	(D) describe safe handling, storing, and disposal of waste materials such as composting and recycling	(iii) describe safe disposal of waste materials

Knowledge and Skill Statement	Student Expectation	Breakout
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(A) identify agricultural and silvicultural crops and bio-products suitable for renewable production	(i) identify agricultural crops suitable for renewable production
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(A) identify agricultural and silvicultural crops and bio-products suitable for renewable production	(ii) identify silvicultural crops suitable for renewable production
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(A) identify agricultural and silvicultural crops and bio-products suitable for renewable production	(iii) identify agricultural bio-products suitable for renewable production
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(A) identify agricultural and silvicultural crops and bio-products suitable for renewable production	(iv) identify silvicultural bio-products suitable for renewable production
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(B) discuss production processes for agricultural- and silvicultural-based bio-products	(i) discuss production processes for agricultural-based bio-products
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(B) discuss production processes for agricultural- and silvicultural-based bio-products	(ii) discuss production processes for silvicultural-based bio-products

Knowledge and Skill Statement	Student Expectation	Breakout
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(C) describe the fundamentals for non-renewable resource recovery	(i) describe the fundamentals for non-renewable resource recovery
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(D) analyze the effects of non-renewable resource recovery methods and the environmental considerations associated with each method such as environmentally friendly alternatives	(i) analyze the effects of non-renewable resource recovery methods
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(D) analyze the effects of non-renewable resource recovery methods and the environmental considerations associated with each method such as environmentally friendly alternatives	(ii) analyze the environmental considerations associated with each [non-renewable resource recovery] method
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(E) analyze the advantages and disadvantages of wind-generated energy	(i) analyze the advantages of wind-generated energy
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(E) analyze the advantages and disadvantages of wind-generated energy	(ii) analyze the disadvantages of wind-generated energy
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(F) identify public policy considerations associated with transmission line construction to transport wind-generated energy	(i) identify public policy considerations associated with transmission line construction to transport wind-generated energy

Knowledge and Skill Statement	Student Expectation	Breakout
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(G) locate areas in the state that have geothermal energy production potential	(i) locate areas in the state that have geothermal energy production potential
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(H) explain the benefits of geothermal energy	(i) explain the benefits of geothermal energy
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(I) identify solar energy systems and describe the function of each	(i) identify solar energy systems
(12) The student learns the processes for producing energy and green products from agricultural, biomass, fossil fuel, wind, solar, and geothermal sources. The student is expected to:	(I) identify solar energy systems and describe the function of each	(ii) describe the function of each [solar energy system]

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.13. Oil and Gas Production I (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) In Oil and Gas Production I, students 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. To prepare for careers in oil and gas production, students must attain academic skills and knowledge, acquire technical knowledge and skills related to oil and gas production 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.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 oil and gas production field	(i) identify career development opportunities in the oil and gas production field
(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 oil and gas production field	(ii) identify education opportunities in the oil and gas production field
(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 oil and gas production field	(iii) identify entrepreneurship opportunities in the oil and gas production field
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation	(i) apply competencies related to resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation	(ii) apply competencies related to information
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation	(iii) apply competencies related to interpersonal skills

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation	(iv) apply competencies related to problem solving
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation	(v) apply competencies related to critical thinking
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation	(vi) apply competencies related to systems of operation
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(i) demonstrate knowledge of personal safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(ii) demonstrate knowledge of occupational safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(iii) demonstrate knowledge of environmental regulations in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, environmental regulations, and first-aid policy in the workplace	(iv) demonstrate knowledge of first-aid policy in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations such as appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(i) analyze employers' expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate leadership skills to accomplish organizational goals and objectives	(i) demonstrate leadership skills to accomplish organizational goals
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate leadership skills to accomplish organizational goals and objectives	(ii) demonstrate leadership skills to accomplish organizational objectives
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student understands 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	(i) describe the history of drilling for petroleum in the United States
(3) The student understands 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	(ii) describe the history of drilling for petroleum abroad
(3) The student understands the history and process for drilling a well. The student is expected to:	(B) describe and appraise routine drilling operations, offshore drilling, and new drilling technologies	(i) describe routine drilling operations

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student understands the history and process for drilling a well. The student is expected to:	(B) describe and appraise routine drilling operations, offshore drilling, and new drilling technologies	(ii) describe offshore drilling
(3) The student understands the history and process for drilling a well. The student is expected to:	(B) describe and appraise routine drilling operations, offshore drilling, and new drilling technologies	(iii) describe new drilling technologies
(3) The student understands the history and process for drilling a well. The student is expected to:	(B) describe and appraise routine drilling operations, offshore drilling, and new drilling technologies	(iv) appraise routine drilling operations
(3) The student understands the history and process for drilling a well. The student is expected to:	(B) describe and appraise routine drilling operations, offshore drilling, and new drilling technologies	(v) appraise offshore drilling
(3) The student understands the history and process for drilling a well. The student is expected to:	(B) describe and appraise routine drilling operations, offshore drilling, and new drilling technologies	(vi) appraise new drilling technologies
(3) The student understands the history and process for drilling a well. The student is expected to:	(C) describe the tools and techniques for directional drilling	(i) describe the tools for directional drilling
(3) The student understands the history and process for drilling a well. The student is expected to:	(C) describe the tools and techniques for directional drilling	(ii) describe the techniques for directional drilling
(3) The student understands the history and process for drilling a well. The student is expected to:	(D) examine the differences between fishing, retrieving, and repairing pipe	(i) examine the differences between fishing, retrieving, and repairing pipe
(3) The student understands the history and process for drilling a well. The student is expected to:	(E) describe the methods for completing a well in order for production to begin	(i) describe the methods for completing a well in order for production to begin

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student understands the history and process for drilling a well. The student is expected to:	(F) assess fluid pressure	(i) assess fluid pressure
(3) The student understands the history and process for drilling a well. The student is expected to:	(G) determine how the flow is initiated in a new well	(i) determine how the flow is initiated in a new well
(3) The student understands the history and process for drilling a well. The student is expected to:	(H) differentiate between major components of a well and discuss the purpose, design, and operation of each component	(i) differentiate between major components of a well
(3) The student understands the history and process for drilling a well. The student is expected to:	(H) differentiate between major components of a well and discuss the purpose, design, and operation of each component	(ii) discuss the purpose of each component [of a well]
(3) The student understands the history and process for drilling a well. The student is expected to:	(H) differentiate between major components of a well and discuss the purpose, design, and operation of each component	(iii) discuss the design of each component [of a well]
(3) The student understands the history and process for drilling a well. The student is expected to:	(H) differentiate between major components of a well and discuss the purpose, design, and operation of each component	(iv) discuss the operation of each component [of a well]
(3) The student understands the history and process for drilling a well. The student is expected to:	(I) describe activities associated with completing a well	(i) describe activities associated with completing a well
(3) The student understands the history and process for drilling a well. The student is expected to:	(J) describe the well completion processes and equipment	(i) describe the well completion processes

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student understands the history and process for drilling a well. The student is expected to:	(J) describe the well completion processes and equipment	(ii) describe the well completion equipment
(3) The student understands the history and process for drilling a well. The student is expected to:	(K) summarize the instruments and techniques used when logging and testing during the drilling and completion of a well	(i) summarize the instruments used when logging during the drilling of a well
(3) The student understands the history and process for drilling a well. The student is expected to:	(K) summarize the instruments and techniques used when logging and testing during the drilling and completion of a well	(ii) summarize the instruments used when logging during the completion of a well
(3) The student understands the history and process for drilling a well. The student is expected to:	(K) summarize the instruments and techniques used when logging and testing during the drilling and completion of a well	(iii) summarize the instruments used when testing during the drilling of a well
(3) The student understands the history and process for drilling a well. The student is expected to:	(K) summarize the instruments and techniques used when logging and testing during the drilling and completion of a well	(iv) summarize the instruments used when testing during the completion of a well.
(3) The student understands the history and process for drilling a well. The student is expected to:	(K) summarize the instruments and techniques used when logging and testing during the drilling and completion of a well	(v) summarize the techniques used when logging during the drilling of a well
(3) The student understands the history and process for drilling a well. The student is expected to:	(K) summarize the instruments and techniques used when logging and testing during the drilling and completion of a well	(vi) summarize the techniques used when logging during the completion of a well

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student understands the history and process for drilling a well. The student is expected to:	(K) summarize the instruments and techniques used when logging and testing during the drilling and completion of a well	(vii) summarize the techniques used when testing during the drilling of a well
(3) The student understands the history and process for drilling a well. The student is expected to:	(K) summarize the instruments and techniques used when logging and testing during the drilling and completion of a well	(viii) summarize the techniques used when testing during the completion of a well.
(3) The student understands the history and process for drilling a well. The student is expected to:	(L) list the factors that are analyzed when studying a poorly producing well	(i) list the factors that are analyzed when studying a poorly producing well
(3) The student understands the history and process for drilling a well. The student is expected to:	(M) identify the responsibilities, characteristics, abilities, and work behaviors of personnel that are involved in well service	(i) identify the responsibilities of personnel that are involved in well service
(3) The student understands the history and process for drilling a well. The student is expected to:	(M) identify the responsibilities, characteristics, abilities, and work behaviors of personnel that are involved in well service	(ii) identify the characteristics of personnel that are involved in well service
(3) The student understands the history and process for drilling a well. The student is expected to:	(M) identify the responsibilities, characteristics, abilities, and work behaviors of personnel that are involved in well service	(iii) identify the abilities of personnel that are involved in well service
(3) The student understands the history and process for drilling a well. The student is expected to:	(M) identify the responsibilities, characteristics, abilities, and work behaviors of personnel that are involved in well service	(iv) identify the work behaviors of personnel that are involved in well service

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student discusses and identifies 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	(i) identify the major systems used in the production of oil and gas
(4) The student discusses and identifies 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	(ii) identify the major equipment used in the production of oil and gas
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(B) identify and describe the wellhead equipment that controls fluid flow	(i) identify the wellhead equipment that controls fluid flow
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(B) identify and describe the wellhead equipment that controls fluid flow	(ii) describe the wellhead equipment that controls fluid flow
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(C) trace the process flow through the oil and gas production systems and equipment	(i) trace the process flow through the oil and gas production systems
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(C) trace the process flow through the oil and gas production systems and equipment	(ii) trace the process flow through the oil and gas production equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(D) discuss the purpose of the wellhead and identify the major components	(i) discuss the purpose of the wellhead
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(D) discuss the purpose of the wellhead and identify the major components	(ii) identify the major components
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(E) describe the purpose, design, and operation of each wellhead component	(i) describe the purpose of each wellhead component
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(E) describe the purpose, design, and operation of each wellhead component	(ii) describe the design of each wellhead component
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(E) describe the purpose, design, and operation of each wellhead component	(iii) describe the operation of each wellhead component
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(F) compare and contrast the major differences in wellhead construction	(i) compare and contrast the major differences in wellhead construction

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(G) compare and contrast onshore and offshore facilities	(i) compare and contrast onshore facilities
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(G) compare and contrast onshore and offshore facilities	(ii) compare and contrast offshore facilities
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(H) compare and contrast oil and gas regions within the United States	(i) compare and contrast oil and gas regions within the United States
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(I) describe the safety, health, and environmental concerns associated with working around a wellhead	(i) describe the safety concerns associated with working around a wellhead
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(I) describe the safety, health, and environmental concerns associated with working around a wellhead	(ii) describe the health concerns associated with working around a wellhead
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(I) describe the safety, health, and environmental concerns associated with working around a wellhead	(iii) describe the environmental concerns associated with working around a wellhead

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(J) explain how the wellhead system affects other production systems tied to the wellhead	(i) explain how the wellhead system affects other production systems tied to the wellhead
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(K) describe the activities associated with monitoring and regulating well flow	(i) describe the activities associated with monitoring well flow
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(K) describe the activities associated with monitoring and regulating well flow	(ii) describe the activities associated with regulating well flow
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(L) describe the wellhead maintenance activities performed by the production technician	(i) describe the wellhead maintenance activities performed by the production technician
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(M) operate and troubleshoot a wellhead using a computer simulator, pilot plant, or tabletop unit	(i) operate a wellhead using a computer simulator, pilot plant, or tabletop unit
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(M) operate and troubleshoot a wellhead using a computer simulator, pilot plant, or tabletop unit	(ii) troubleshoot a wellhead using a computer simulator, pilot plant, or tabletop unit

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(N) identify 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	(i) identify the operating conditions that would warrant a manual or automatic shut-in of a well
(4) The student discusses and identifies components, systems, equipment, production, and safety regulations associated with oil and gas wells. The student is expected to:	(N) identify 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	(ii) identify the 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	(i) describe the safety concerns associated with drilling
(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	(ii) describe the safety concerns associated with production
(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	(iii) describe the safety concerns associated with maintenance
(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	(iv) describe the health concerns associated with drilling

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(v) describe the health concerns associated with production
(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	(vi) describe the health concerns associated with maintenance
(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	(vii) describe the environmental concerns associated with drilling
(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	(viii) describe the environmental concerns associated with production
(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	(ix) describe the environmental concerns associated with maintenance

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(5) The students will discuss safety issues related to the oil and gas industry. The student is expected to:</p>	<p>(B) research safety standards in the petroleum 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</p>	<p>(i) research safety standards in the petroleum industry</p>

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.14. Oil and Gas Production II (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 10-12. Prerequisite: Oil and Gas Production I. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) In Oil and Gas Production II, students will gain knowledge of the specific requirements for entry into post-secondary education and employment in the petroleum industry; research and discuss petroleum economics; research and discuss the modes of transportation in the petroleum industry; research and discuss environmental, health, and safety concerns; research and discuss different energy sources; and prepare for industry certification. To prepare for careers in oil and gas production, students must attain academic skills and knowledge, acquire technical knowledge and skills related to oil and gas production 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.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of agriculture, food, and natural resources
(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	(ii) identify education opportunities in the field of agriculture, food, and natural resources
(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	(iii) identify entrepreneurship opportunities in the field of agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and/or social studies	(i) identify careers in agriculture, food, and natural resources with required aptitudes in science, technology, engineering, mathematics, language arts, and/or social studies
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) apply technology skills to create an electronic portfolio of skills and abilities	(i) apply technology skills to create an electronic portfolio of skills

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) apply technology skills to create an electronic portfolio of skills and abilities	(ii) apply technology skills to create an electronic portfolio of abilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(i) apply competencies related to resources in agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(ii) apply competencies related to information in agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(iii) apply competencies related to interpersonal skills in agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(iv) apply competencies related to problem solving in agriculture, food, and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(v) apply competencies related to critical thinking in agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources	(vi) apply competencies related to systems of operation in agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(i) demonstrate knowledge of personal and occupational safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(ii) demonstrate knowledge of health in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(iii) demonstrate knowledge of environmental regulations in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(iv) demonstrate knowledge of first-aid policy in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(i) analyze employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(ii) analyze employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(iii) analyze employers' expectations, including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(iv) analyze employers' expectations, including good citizenship skills
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(A) describe evolution of transportation in the petroleum industry	(i) describe evolution of transportation in the petroleum industry
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(B) research and access the various ground methods of transportation	(i) research the various ground methods of transportation
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(B) research and access the various ground methods of transportation	(ii) access the various ground methods of transportation
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(C) survey health and safety policies, procedures, regulations, and practices as they relate to transportation in the petroleum industry	(i) survey health and safety policies as they relate to transportation in the petroleum industry
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(C) survey health and safety policies, procedures, regulations, and practices as they relate to transportation in the petroleum industry	(ii) survey health and safety procedures as they relate to transportation in the petroleum industry
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(C) survey health and safety policies, procedures, regulations, and practices as they relate to transportation in the petroleum industry	(iii) survey health and safety regulations as they relate to transportation in the petroleum industry

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(C) survey health and safety policies, procedures, regulations, and practices as they relate to transportation in the petroleum industry	(iv) survey health and safety practices as they relate to transportation in the petroleum industry
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(D) research and discuss petroleum economics	(i) research petroleum economics
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(D) research and discuss petroleum economics	(ii) discuss petroleum economics
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(E) compare and contrast marketing, sales, and distribution of petroleum products	(i) compare and contrast marketing of petroleum products
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(E) compare and contrast marketing, sales, and distribution of petroleum products	(ii) compare and contrast sales of petroleum products
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(E) compare and contrast marketing, sales, and distribution of petroleum products	(iii) compare and contrast distribution of petroleum products

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(F) identify supply chain businesses that create new supplies of oil and gas	(i) identify supply chain businesses that create new supplies of oil and gas
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(G) identify supply creation companies and how they operate	(i) identify supply creation companies
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(G) identify supply creation companies and how they operate	(ii) identify how [supply creation companies] operate
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(H) discuss the factors in investment decision-making	(i) discuss the factors in investment decision-making
(3) The student researches and discusses the modes of transportation and environmental, health, and safety concerns. The student is expected to:	(I) calculate rates of return to evaluate prospects	(i) calculate rates of return to evaluate prospects
(4) The student researches 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	(i) discuss the disposal methods of exploration wastes

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student researches 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	(ii) discuss the disposal methods of production wastes
(4) The student researches the different methods of disposing of oil and gas waste and methods of cleanup. The student is expected to:	(B) identify cleanup methods for blowouts and spills	(i) identify cleanup methods for blowouts
(4) The student researches the different methods of disposing of oil and gas waste and methods of cleanup. The student is expected to:	(B) identify cleanup methods for blowouts and spills	(ii) identify cleanup methods for spills
(4) The student researches the different methods of disposing of oil and gas waste and methods of cleanup. The student is expected to:	(C) identify refining processes that minimize environmental impact	(i) identify refining processes that minimize environmental impact
(5) The student researches and identifies 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	(i) research the petroleum industry to identify renewable energy sources
(5) The student researches and identifies the different energy sources and priorities for the oil and gas industry. The student is expected to:	(B) present the challenges and priorities of the petroleum industry	(i) present the challenges of the petroleum industry

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student researches and identifies the different energy sources and priorities for the oil and gas industry. The student is expected to:	(B) present the challenges and priorities of the petroleum industry	(ii) present the priorities of the petroleum industry
(5) The student researches and identifies the different energy sources and priorities for the oil and gas industry. The student is expected to:	(C) research the critical technologies needed in the future	(i) research the critical technologies needed in the future
(5) The student researches and identifies the different energy sources and priorities for the oil and gas industry. The student is expected to:	(D) research the nontechnical solutions to energy needs	(i) research the nontechnical solutions to energy needs

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.15. Food Technology and Safety (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Food Technology and Safety examines the food technology industry as it relates to food production, handling, and safety. To prepare for careers in value-added and food processing systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to value-added and food processing and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(A) identify and locate career opportunities that appeal to personal career goals	(i) identify career opportunities that appeal to personal career goals
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(A) identify and locate career opportunities that appeal to personal career goals	(ii) locate career opportunities that appeal to personal career goals
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in food processing	(i) apply competencies related to resources in food processing
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in food processing	(ii) apply competencies related to information in food processing
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in food processing	(iii) apply competencies related to interpersonal skills in food processing
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in food processing	(iv) apply competencies related to systems of operation in food processing

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(i) demonstrate knowledge of personal health and safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(ii) demonstrate knowledge of occupational health and safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iv) identify employers' expectations, including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership	(i) demonstrate characteristics of good citizenship

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) research career topics using technology such as the internet	(i) research career topics using technology such as the internet
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student explains the impact of food science systems. The student is expected to:	(A) explain the significance of food science systems	(i) explain the significance of food science systems
(3) The student explains the impact of food science systems. The student is expected to:	(B) define trends in food production, world population, and supply and demand for food products	(i) define trends in food production in food production
(3) The student explains the impact of food science systems. The student is expected to:	(B) define trends in food production, world population, and supply and demand for food products	(ii) define trends in world population
(3) The student explains the impact of food science systems. The student is expected to:	(B) define trends in food production, world population, and supply and demand for food products	(iii) define trends in supply and demand for food products

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student explains the impact of food science systems. The student is expected to:	(C) research trends in animal and food science research	(i) research trends in animal science research
(3) The student explains the impact of food science systems. The student is expected to:	(C) research trends in animal and food science research	(ii) research trends food science research
(3) The student explains the impact of food science systems. The student is expected to:	(D) evaluate the relationship between biotechnology and the food science industry	(i) evaluate the relationship between biotechnology and the food science industry
(4) The student analyzes the nutritive value of food constituents. The student is expected to:	(A) define the terms used in food technology	(i) define the terms used in food technology
(4) The student analyzes the nutritive value of food constituents. The student is expected to:	(B) compare and contrast the nutritive value of food groups	(i) compare and contrast the nutritive value of food groups
(4) The student analyzes the nutritive value of food constituents. The student is expected to:	(C) apply data and measurements to solve a problem related to food processing	(i) apply data to solve a problem related to food processing
(4) The student analyzes the nutritive value of food constituents. The student is expected to:	(C) apply data and measurements to solve a problem related to food processing	(ii) apply measurements to solve a problem related to food processing

Knowledge and Skill Statement	Student Expectation	Breakout
(5) 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	(i) identify food industry inspection standards, including hazard analysis
(5) 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	(ii) identify food industry inspection standards, including critical control points
(5) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	(B) describe procedures for insect and rodent control	(i) describe procedures for insect control
(5) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	(B) describe procedures for insect and rodent control	(ii) describe procedures for rodent control
(5) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	(C) identify appropriate chemicals used in the food industry	(i) identify appropriate chemicals used in the food industry
(5) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	(D) assess conditions with regard to safety and health	(i) assess conditions with regard to safety
(5) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	(D) assess conditions with regard to safety and health	(ii) assess conditions with regard to health

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	(E) identify specific regulation for organic animal products, grains, and produce	(i) identify specific regulation for organic animal products
(5) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	(E) identify specific regulation for organic animal products, grains, and produce	(ii) identify specific regulation for organic grains
(5) The student identifies procedures and regulations for sanitation and safety in the food industry. The student is expected to:	(E) identify specific regulation for organic animal products, grains, and produce	(iii) identify specific regulation for organic produce
(6) 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	(i) research regulations dealing with preserving red meat
(6) 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	(ii) research regulations dealing with preserving poultry
(6) 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	(iii) research regulations dealing with preserving fish

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(i) describe packaging requirements for red meat
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(ii) describe packaging requirements for poultry
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(iii) describe packaging requirements for fish
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(iv) describe labeling requirements for red meat
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(v) describe labeling requirements for poultry
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(vi) describe labeling requirements for fish

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(vii) describe storage requirements for red meat
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(viii) describe storage requirements for poultry
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(B) describe packaging, labeling, and storage requirements for red meat, poultry, and fish	(ix) describe storage requirements for fish
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(C) explain the impact of temperature in food preservation	(i) explain the impact of temperature in food preservation
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(D) compare and contrast packaging requirements	(i) compare and contrast packaging requirements
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(E) evaluate cultural practices and exotic species in food harvesting and processing	(i) evaluate cultural practices in food harvesting

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(E) evaluate cultural practices and exotic species in food harvesting and processing	(ii) evaluate cultural practices in food processing
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(E) evaluate cultural practices and exotic species in food harvesting and processing	(iii) evaluate exotic species in food harvesting
(6) The student identifies safety and governmental regulations involved in the processing and labeling of foods. The student is expected to:	(E) evaluate cultural practices and exotic species in food harvesting and processing	(iv) evaluate exotic species in food processing
(7) The student demonstrates an understanding of the trends and issues important to careers in the food science industry by comparing and contrasting issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare issues. The student is expected to:	(A) select solutions for different environmental issues	(i) select solutions for different environmental issues
(7) The student demonstrates an understanding of the trends and issues important to careers in the food science industry by comparing and contrasting issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare issues. The student is expected to:	(B) identify issues affecting food science	(i) identify issues affecting food science

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(7) The student demonstrates an understanding of the trends and issues important to careers in the food science industry by comparing and contrasting issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare issues. The student is expected to:</p>	<p>(C) research history and policies related to food science issues</p>	<p>(i) research history related to food science issues</p>
<p>(7) The student demonstrates an understanding of the trends and issues important to careers in the food science industry by comparing and contrasting issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare issues. The student is expected to:</p>	<p>(C) research history and policies related to food science issues</p>	<p>(ii) research policies related to food science issues</p>
<p>(7) The student demonstrates an understanding of the trends and issues important to careers in the food science industry by comparing and contrasting issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare issues. The student is expected to:</p>	<p>(D) analyze and defend solutions for different environmental issues</p>	<p>(i) analyze solutions for different environmental issues</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(7) The student demonstrates an understanding of the trends and issues important to careers in the food science industry by comparing and contrasting issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare issues. The student is expected to:</p>	<p>(D) analyze and defend solutions for different environmental issues</p>	<p>(ii) defend solutions for different environmental issues</p>
<p>(7) The student demonstrates an understanding of the trends and issues important to careers in the food science industry by comparing and contrasting issues affecting the food science industry, including biotechnology, employment, safety, environmental, and animal welfare issues. The student is expected to:</p>	<p>(E) apply economic principles such as supply, demand, and profit to food science systems</p>	<p>(i) apply economic principles to food science systems</p>
<p>(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:</p>	<p>(A) describe preparing livestock carcasses for market</p>	<p>(i) describe preparing livestock carcasses for market</p>
<p>(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:</p>	<p>(B) describe the U.S. Department of Agriculture's inspection and grading procedures</p>	<p>(i) describe the U.S. Department of Agriculture's inspection procedures</p>
<p>(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:</p>	<p>(B) describe the U.S. Department of Agriculture's inspection and grading procedures</p>	<p>(ii) describe the U.S. Department of Agriculture's grading procedures</p>

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(C) identify wholesale and retail cuts	(i) identify wholesale cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(C) identify wholesale and retail cuts	(ii) identify retail cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(i) evaluate beef carcasses
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(ii) evaluate pork carcasses
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(iii) evaluate lamb carcasses
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(iv) evaluate goat carcasses

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(v) evaluate beef wholesale cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(vi) evaluate pork wholesale cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(vii) evaluate lamb wholesale cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(viii) evaluate goat wholesale cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(ix) grade beef carcasses
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(x) grade pork carcasses

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(xi) grade lamb carcasses
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(xii) grade goat carcasses
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(xiii) grade beef wholesale cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(xiv) grade pork wholesale cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(xv) grade lamb wholesale cuts
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(D) evaluate and grade beef, pork, lamb, and goat carcasses and wholesale cuts	(xvi) evaluate goat wholesale cuts

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(E) identify methods of fabricating and marketing processed meats	(i) identify methods of fabricating processed meats
(8) The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:	(E) identify methods of fabricating and marketing processed meats	(ii) identify methods of marketing processed meats
(9) 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	(i) describe processing techniques
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(B) demonstrate poultry and retail cuts evaluation	(i) demonstrate poultry evaluation
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(B) demonstrate poultry and retail cuts evaluation	(ii) demonstrate retail cuts evaluation
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(C) identify grades and classes of eggs, poultry, fish, and seafood	(i) identify grades of eggs

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(C) identify grades and classes of eggs, poultry, fish, and seafood	(ii) identify grades of poultry
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(C) identify grades and classes of eggs, poultry, fish, and seafood	(iii) identify grades of fish
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(C) identify grades and classes of eggs, poultry, fish, and seafood	(iv) identify grades of seafood
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(C) identify grades and classes of eggs, poultry, fish, and seafood	(v) identify classes of eggs
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(C) identify grades and classes of eggs, poultry, fish, and seafood	(vi) identify classes of poultry
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(C) identify grades and classes of eggs, poultry, fish, and seafood	(vii) identify classes of fish

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(C) identify grades and classes of eggs, poultry, fish, and seafood	(viii) identify classes of seafood
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(D) fabricate specialty and value-added products	(i) fabricate specialty products
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(D) fabricate specialty and value-added products	(ii) fabricate value-added products
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(E) demonstrate an understanding of quality and portion control procedures	(i) demonstrate an understanding of quality control procedures
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(E) demonstrate an understanding of quality and portion control procedures	(ii) demonstrate an understanding of portion control procedures
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(F) describe marketing procedures for eggs, poultry, fish, and seafood	(i) describe marketing procedures for eggs

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(F) describe marketing procedures for eggs, poultry, fish, and seafood	(ii) describe marketing procedures for poultry
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(F) describe marketing procedures for eggs, poultry, fish, and seafood	(iii) describe marketing procedures for fish
(9) The student describes the processing, packaging, quality analysis, and marketing of eggs, poultry, and fish and their by-products. The student is expected to:	(F) describe marketing procedures for eggs, poultry, fish, and seafood	(iv) describe marketing procedures for seafood
(10) 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	(i) identify fruits
(10) 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	(ii) identify nuts
(10) 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	(iii) identify vegetables

Knowledge and Skill Statement	Student Expectation	Breakout
(10) 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	(iv) classify fruits
(10) 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	(v) classify nuts
(10) 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	(vi) classify vegetables
(10) 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	(vii) grade fruits
(10) 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	(viii) grade nuts
(10) 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	(ix) grade vegetables

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(B) demonstrate trimming, washing, waxing, peeling, blanching, and other marketing techniques	(i) demonstrate trimming
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(B) demonstrate trimming, washing, waxing, peeling, blanching, and other marketing techniques	(ii) demonstrate washing
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(B) demonstrate trimming, washing, waxing, peeling, blanching, and other marketing techniques	(iii) demonstrate waxing
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(B) demonstrate trimming, washing, waxing, peeling, blanching, and other marketing techniques	(iv) demonstrate peeling
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(B) demonstrate trimming, washing, waxing, peeling, blanching, and other marketing techniques	(v) demonstrate blanching
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(B) demonstrate trimming, washing, waxing, peeling, blanching, and other marketing techniques	(vi) demonstrate other marketing techniques

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(i) research critical issues in transporting fruits
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(ii) research critical issues in transporting nuts
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(iii) research critical issues in transporting vegetables
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(iv) research critical issues in receiving fruits
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(v) research critical issues in receiving nuts
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(vi) research critical issues in receiving vegetables

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(vii) research critical issues in storing fruits
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(viii) research critical issues in storing nuts
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(C) research critical issues in transporting, receiving, and storing fruits, nuts, and vegetables	(ix) research critical issues in storing vegetables
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(i) discuss preserving fruits
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(ii) discuss preserving nuts
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(iii) discuss preserving vegetables

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(iv) discuss packaging fruits
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(v) discuss packaging nuts
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(vi) discuss packaging vegetables
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(vii) discuss storing fruits
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(viii) discuss storing nuts
(10) The student describes the processing, packaging, quality analysis, and marketing of fruits, nuts, and vegetables and their by-products. The student is expected to:	(D) discuss preserving, packaging, and storing fruits, nuts, and vegetables	(ix) discuss storing vegetables

Knowledge and Skill Statement	Student Expectation	Breakout
(11) 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	(i) describe methods of preparing milk for processing
(11) The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:	(B) evaluate methods of processing milk and dairy products	(i) evaluate methods of processing milk
(11) The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:	(B) evaluate methods of processing milk and dairy products	(ii) evaluate methods of processing dairy products
(11) The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:	(C) identify dairy products, including cultured milk products and frozen dairy desserts	(i) identify dairy products, including cultured milk products
(11) The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:	(C) identify dairy products, including cultured milk products and frozen dairy desserts	(ii) identify dairy products, including frozen dairy desserts
(11) The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:	(D) process, classify, and grade cheese	(i) process cheese

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:	(D) process, classify, and grade cheese	(ii) classify cheese
(11) The student describes the processing, packaging, quality analysis, and marketing of milk and dairy products for distribution. The student is expected to:	(D) process, classify, and grade cheese	(iii) grade cheese

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.16. Food Processing (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Food Technology and Safety. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p> <p>(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.</p> <p>(2) Career development is a lifelong pursuit of answers to the questions: Who am I? Why am I here? What am I meant to do with my life? It is vital that students have a clear sense of direction for their career choice. Career planning is a critical step and is essential to success.</p> <p>(3) The goal of this course is to create a foundation for success in high school, future studies, and careers such as Science, Technology, Engineering, and Mathematics; Business and Industry; Public Service; Arts and Humanities; and Multidisciplinary Studies. The students research labor market information, learn job-seeking skills, and create documents required for employment.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 food processing industry, including the value-added products industry	(i) identify career development opportunities in the food processing industry, including the value-added products industry
(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 food processing industry, including the value-added products industry	(ii) identify entrepreneurship opportunities in the food processing industry, including the value-added products industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in the food processing industry, including the value-added products industry	(i) apply competencies related to resources in the food processing industry, including the value-added products industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in the food processing industry, including the value-added products industry	(ii) apply competencies related to information in the food processing industry, including the value-added products industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in the food processing industry, including the value-added products industry	(iii) apply competencies related to interpersonal skills in the food processing industry, including the value-added products industry

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in the food processing industry, including the value-added products industry	(iv) apply competencies related to systems of operation in the food processing industry, including the value-added products industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety practices in the workplace	(i) demonstrate knowledge of personal safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety practices in the workplace	(ii) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(i) identify employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(ii) identify employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities	(iii) identify employers' expectations, including legal responsibilities

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership	(i) demonstrate characteristics of good citizenship
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) research career topics using technology such as the Internet	(i) research career topics using technology
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) 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	(i) explain the importance of the food processing industry in the free enterprise system
(3) The student knows the relationship of the food processing industry to the free enterprise system. The student is expected to:	(B) explain trends in the consumption of food products	(i) explain the trends in the consumption of food products
(4) The student understands consumer satisfaction issues. The student is expected to	(A) practice equipment maintenance and sanitation procedures	(i) practice equipment maintenance

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student understands consumer satisfaction issues. The student is expected to	(A) practice equipment maintenance and sanitation procedures	(ii) practice sanitation procedures
(4) The student understands consumer satisfaction issues. The student is expected to	(B) explain the factors that affect food palatability	(i) explain the factors that affect food palatability
(4) The student understands consumer satisfaction issues. The student is expected to	(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts	(i) fabricate red meat into wholesale cuts
(4) The student understands consumer satisfaction issues. The student is expected to	(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts	(ii) fabricate poultry into wholesale cuts
(4) The student understands consumer satisfaction issues. The student is expected to	(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts	(iii) fabricate game into wholesale cuts
(4) The student understands consumer satisfaction issues. The student is expected to	(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts	(iv) fabricate fish into wholesale cuts
(4) The student understands consumer satisfaction issues. The student is expected to	(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts	(v) fabricate red meat into retail cuts

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student understands consumer satisfaction issues. The student is expected to	(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts	(vi) fabricate poultry into retail cuts
(4) The student understands consumer satisfaction issues. The student is expected to	(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts	(vii) fabricate game into retail cuts
(4) The student understands consumer satisfaction issues. The student is expected to	(C) fabricate red meat, poultry, game, and fish into wholesale and retail cuts	(viii) fabricate fish into retail cuts
(4) The student understands consumer satisfaction issues. The student is expected to	(D) demonstrate work ethics, customer relations skills, and management competencies consistent with industry standards	(i) demonstrate work ethics consistent with industry standards
(4) The student understands consumer satisfaction issues. The student is expected to	(D) demonstrate work ethics, customer relations skills, and management competencies consistent with industry standards	(ii) demonstrate customer relations skills consistent with industry standards
(5) 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	(i) practice procedures relating to the safe manufacture of foods through hygienic food handling
(5) 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	(ii) practice procedures relating to the safe manufacture of foods through hygienic food processing

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student understands quality control issues in food processing. The student is expected to:	(B) develop and maintain sanitation schedules	(i) develop sanitation schedules
(5) The student understands quality control issues in food processing. The student is expected to:	(B) develop and maintain sanitation schedules	(ii) maintain sanitation schedules
(5) The student understands quality control issues in food processing. The student is expected to:	(C) describe hazard analysis and critical control point implementation issues	(i) describe hazard analysis issues
(5) The student understands quality control issues in food processing. The student is expected to:	(C) describe hazard analysis and critical control point implementation issues	(ii) describe critical control point implementation issues
(5) The student understands quality control issues in food processing. The student is expected to:	(D) research food safety laws	(i) research food safety laws
(5) The student understands quality control issues in food processing. The student is expected to:	(E) describe solutions for different environmental issues	(i) describe solutions for different environmental issues
(6) 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	(i) practice methods of merchandising red meat

Knowledge and Skill Statement	Student Expectation	Breakout
(6) 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	(ii) practice methods of merchandising poultry
(6) 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	(iii) practice methods of merchandising game
(6) 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	(iv) practice methods of merchandising fish
(6) 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	(v) practice methods of merchandising [red meat's] by-products
(6) 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	(vi) practice methods of merchandising [poultry's] by-products
(6) 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	(vii) practice methods of merchandising [game] by-products
(6) 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	(viii) practice methods of merchandising [fish] by-products

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies marketing considerations for food processing. The student is expected to:	(B) identify, select, and grade meat	(i) identify meat
(6) The student identifies marketing considerations for food processing. The student is expected to:	(B) identify, select, and grade meat	(ii) select meat
(6) The student identifies marketing considerations for food processing. The student is expected to:	(B) identify, select, and grade meat	(iii) grade meat
(6) The student identifies marketing considerations for food processing. The student is expected to:	(C) develop food preservation programs using appropriate food preservation methods	(i) develop food preservation programs using appropriate food preservation methods
(6) The student identifies marketing considerations for food processing. The student is expected to:	(D) explain the impact of temperature in food preservation	(i) explain the impact of temperature in food preservation
(6) The student identifies marketing considerations for food processing. The student is expected to:	(E) compare and contrast preservation packaging such as film, plastic, and cans	(i) compare and contrast preservation packaging
(6) The student identifies marketing considerations for food processing. The student is expected to:	(F) describe harvest and inspection techniques to process food products and analyze food product options	(i) describe harvest techniques to process food products

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies marketing considerations for food processing. The student is expected to:	(F) describe harvest and inspection techniques to process food products and analyze food product options	(ii) describe inspection techniques to process food products
(6) The student identifies marketing considerations for food processing. The student is expected to:	(F) describe harvest and inspection techniques to process food products and analyze food product options	(iii) analyze food product options
(6) The student identifies marketing considerations for food processing. The student is expected to:	(G) identify specific criteria for organic food processing and marketing	(i) identify specific criteria for organic food processing
(6) The student identifies marketing considerations for food processing. The student is expected to:	(G) identify specific criteria for organic food processing and marketing	(ii) identify specific criteria for organic food marketing

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.17. Wildlife, Fisheries, and Ecology Management (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 9–12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Wildlife, Fisheries, and Ecology Management examines the management of game and non-game wildlife species, fish, and aquacrops and their ecological needs as related to current agricultural practices. To prepare for careers in natural resource systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 natural resources	(i) identify career development opportunities in the field of natural resources
(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 natural resources	(ii) identify education opportunities in the field of natural resources
(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 natural resources	(iii) identify entrepreneurship opportunities in the field of natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in natural resources	(i) apply competencies related to resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in natural resources	(ii) apply competencies related to information
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in natural resources	(iii) apply competencies related to interpersonal skills
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in natural resources	(iv) apply competencies related to systems of operation in natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health, environmental regulations, and first-aid policy in the workplace	(i) demonstrate knowledge of personal safety and health in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health, environmental regulations, and first-aid policy in the workplace	(ii) demonstrate knowledge of occupational safety and health in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health, environmental regulations, and first-aid policy in the workplace	(iii) demonstrate knowledge of environmental regulations in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety and health, environmental regulations, and first-aid policy in the workplace	(iv) demonstrate knowledge of first-aid policy in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations such as appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(i) analyze employers' expectations
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) 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	(i) analyze the importance of wildlife, fisheries, and ecology management

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student analyzes the importance of wildlife, with an emphasis on use and management. The student is expected to:	(B) discuss the history of wildlife, fisheries, and ecology management	(i) discuss the history of wildlife, fisheries, and ecology management
(3) The student analyzes the importance of wildlife, with an emphasis on use and management. The student is expected to:	(C) discuss policies, laws, and the administration of wildlife, fisheries, and ecology management	(i) discuss policies of wildlife, fisheries, and ecology management
(3) The student analyzes the importance of wildlife, with an emphasis on use and management. The student is expected to:	(C) discuss policies, laws, and the administration of wildlife, fisheries, and ecology management	(ii) discuss laws of wildlife, fisheries, and ecology management
(3) The student analyzes the importance of wildlife, with an emphasis on use and management. The student is expected to:	(C) discuss policies, laws, and the administration of wildlife, fisheries, and ecology management	(iii) discuss the administration of wildlife, fisheries, and ecology management
(3) The student analyzes the importance of wildlife, with an emphasis on use and management. The student is expected to:	(D) analyze the economic impact of public recreation	(i) analyze the economic impact of public recreation
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(A) analyze the basic ecological concepts of game management	(i) analyze the basic ecological concepts of game management

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:</p>	<p>(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species</p>	<p>(i) identify game birds</p>
<p>(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:</p>	<p>(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species</p>	<p>(ii) identify non-game birds</p>
<p>(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:</p>	<p>(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species</p>	<p>(iii) identify upland birds</p>
<p>(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:</p>	<p>(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species</p>	<p>(iv) identify migratory game birds</p>

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species	(v) identify waterfowl
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species	(vi) identify furbearers
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species	(vii) identify freshwater fish
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species	(viii) identify saltwater fish

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species	(ix) identify predators
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(B) identify game, non-game, upland, and migratory game birds, waterfowl, furbearers, freshwater and saltwater fish, predators, and protected endangered species	(x) identify protected endangered species
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(C) describe and assess the management of wildlife populations	(i) describe the management of wildlife populations
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(C) describe and assess the management of wildlife populations	(ii) assess the management of wildlife populations
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(D) identify diseases and parasites impacting wildlife species	(i) identify diseases impacting wildlife species

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(D) identify diseases and parasites impacting wildlife species	(ii) identify parasites impacting wildlife species
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(E) discuss the appropriate method of reporting disease and parasite outbreaks	(i) discuss the appropriate method of reporting disease outbreaks
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(E) discuss the appropriate method of reporting disease and parasite outbreaks	(ii) discuss the appropriate method of reporting parasite outbreaks
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(F) identify plants impacting aquaculture and wildlife management practices	(i) identify plants impacting aquaculture management practices
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(F) identify plants impacting aquaculture and wildlife management practices	(ii) identify plants impacting wildlife management practices

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(G) discuss habitat and food plot management to benefit aquaculture and wildlife species	(i) discuss habitat management to benefit aquaculture
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(G) discuss habitat and food plot management to benefit aquaculture and wildlife species	(ii) discuss habitat management to benefit wildlife species
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(G) discuss habitat and food plot management to benefit aquaculture and wildlife species	(iii) discuss food plot management to benefit aquaculture
(4) The student knows the scientific basis of and applies concepts related to wildlife management. The student is expected to:	(G) discuss habitat and food plot management to benefit aquaculture and wildlife species	(iv) discuss food plot management to benefit wildlife species
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(A) discuss the importance and role of the Wildlife Management Areas of Texas in the management of private and public lands	(i) discuss the importance of the Wildlife Management Areas of Texas in the management of private lands

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(A) discuss the importance and role of the Wildlife Management Areas of Texas in the management of private and public lands	(ii) discuss the importance of the Wildlife Management Areas of Texas in the management of public lands
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(A) discuss the importance and role of the Wildlife Management Areas of Texas in the management of private and public lands	(iii) discuss the role of the Wildlife Management Areas of Texas in the management of private lands
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(A) discuss the importance and role of the Wildlife Management Areas of Texas in the management of private and public lands	(iv) discuss the role of the Wildlife Management Areas of Texas in the management of public lands
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(B) identify laws and regulations regarding the use of wildlife resources	(i) identify laws and regulations regarding the use of wildlife resources

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(C) apply laws and regulations regarding recreation safety such as angler, archer, boater, and hunter safety	(i) apply laws and regulations regarding recreation safety
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(D) compare and contrast public and private land use	(i) compare and contrast public and private land use
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(E) identify appropriate safety certification requirements	(i) identify appropriate safety certification requirements
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(F) recognize precautions to use when interfacing with the public concerning regulations and law enforcement	(i) recognize precautions to use when interfacing with the public concerning regulations

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(F) recognize precautions to use when interfacing with the public concerning regulations and law enforcement	(ii) recognize precautions to use when interfacing with the public concerning law enforcement
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(G) describe security issues for closed and restricted areas	(i) describe security issues for closed areas
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(G) describe security issues for closed and restricted areas	(ii) describe security issues for restricted areas
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(H) recognize potential threat situations for the public of dangers on public and private lands	(i) recognize potential threat situations for the public of dangers on public lands

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(H) recognize potential threat situations for the public of dangers on public and private lands	(ii) recognize potential threat situations for the public of dangers on private lands
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(I) recognize the role of law enforcement	(i) recognize the role of law enforcement
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(J) summarize wildlife and fish harvest techniques and procedures	(i) summarize wildlife harvest techniques
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(J) summarize wildlife and fish harvest techniques and procedures	(ii) summarize wildlife harvest procedures

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(J) summarize wildlife and fish harvest techniques and procedures	(iii) summarize fish harvest techniques
(5) The student knows the interrelationship between various aspects of wildlife and outdoor public use management. The student is expected to:	(J) summarize wildlife and fish harvest techniques and procedures	(iv) summarize fish harvest procedures
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(A) explain the hydrologic, nitrogen, carbon, and nutrient cycles	(i) explain the hydrologic cycle
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(A) explain the hydrologic, nitrogen, carbon, and nutrient cycles	(ii) explain the nitrogen cycle
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(A) explain the hydrologic, nitrogen, carbon, and nutrient cycles	(iii) explain the carbon cycle

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(A) explain the hydrologic, nitrogen, carbon, and nutrient cycles	(iv) explain the nutrient cycle
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(B) evaluate the impact of natural cycles on succession	(i) evaluate the impact of natural cycles on succession
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(C) analyze the effects of natural cycles on population dynamics	(i) analyze the effects of natural cycles on population dynamics
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(D) distinguish between primary and secondary producers	(i) distinguish between primary and secondary producers
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(E) compare and contrast predator-prey relationships	(i) compare and contrast predator-prey relationships

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(F) evaluate the effects of pollution sources	(i) evaluate the effects of pollution sources
(6) The student examines natural cycles and ecological concepts. The student is expected to:	(G) evaluate riparian zones	(i) evaluate riparian zones
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(A) compare and contrast types of maps	(i) compare and contrast types of maps
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(B) interpret map features and legends	(i) interpret map features
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(B) interpret map features and legends	(ii) interpret map legends

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(C) compare map scale to actual distance	(i) compare map scale to actual distance
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(D) evaluate elevation and terrain features from topographic maps	(i) evaluate elevation features from topographic maps
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(D) evaluate elevation and terrain features from topographic maps	(ii) evaluate terrain features from topographic maps
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(E) use land survey and coordinate systems	(i) use land survey systems
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(E) use land survey and coordinate systems	(ii) use land coordinate systems

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(F) locate position and interpret images using a geospatial interface	(i) locate position using a geospatial interface
(7) The student applies cartographic skills to natural resource activities. The student is expected to:	(F) locate position and interpret images using a geospatial interface	(ii) interpret images using a geospatial interface
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(A) identify resource inventory and population studies	(i) identify resource inventory studies
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(A) identify resource inventory and population studies	(ii) identify population studies
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(B) devise sample plots and points	(i) devise sample plots

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(B) devise sample plots and points	(ii) devise sample points
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(C) identify and locate resources	(i) identify resources
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(C) identify and locate resources	(ii) locate resources
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(D) interpret data concerning resource availability and health	(i) interpret data concerning resource availability
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(D) interpret data concerning resource availability and health	(ii) interpret data concerning resource health

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(E) organize databases of resource data	(i) organize databases of resource data
(8) The student evaluates planning data by monitoring natural resource status. The student is expected to:	(F) create a technical report	(i) create a technical report
(9) The student analyzes various natural resource enhancement techniques using scientific knowledge. The student is expected to	(A) develop a riparian zone enhancement technique plan	(i) develop a riparian zone enhancement technique plan
(9) The student analyzes various natural resource enhancement techniques using scientific knowledge. The student is expected to	(B) evaluate wildlife habitat enhancement plans	(i) evaluate wildlife habitat enhancement plans
(9) The student analyzes various natural resource enhancement techniques using scientific knowledge. The student is expected to	(C) evaluate public use and recreation area enhancement plans	(i) evaluate public use enhancement plans

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student analyzes various natural resource enhancement techniques using scientific knowledge. The student is expected to	(C) evaluate public use and recreation area enhancement plans	(ii) evaluate recreation area enhancement plans
(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	(i) discuss the importance of aquaculture as an emerging industry
(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	(ii) discuss the progress of aquaculture as an emerging industry
(10) The student demonstrates concepts related to optimum production. The student is expected to:	(B) describe nutritional requirements of aquaculture production	(i) describe nutritional requirements of aquaculture production
(10) The student demonstrates concepts related to optimum production. The student is expected to:	(C) identify requirements for optimum growth of species-specific aqua crops/aquaculture products	(i) identify requirements for optimum growth of species-specific aqua crops/aquaculture products

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student demonstrates concepts related to optimum production. The student is expected to:	(D) identify appropriate treatments for diseases and parasites impacting wildlife species and aquaculture	(i) identify appropriate treatments for diseases impacting wildlife species
(10) The student demonstrates concepts related to optimum production. The student is expected to:	(D) identify appropriate treatments for diseases and parasites impacting wildlife species and aquaculture	(ii) identify appropriate treatments for diseases impacting aquaculture
(10) The student demonstrates concepts related to optimum production. The student is expected to:	(D) identify appropriate treatments for diseases and parasites impacting wildlife species and aquaculture	(iii) identify appropriate treatments for parasites impacting wildlife species
(10) The student demonstrates concepts related to optimum production. The student is expected to:	(D) identify appropriate treatments for diseases and parasites impacting wildlife species and aquaculture	(iv) identify appropriate treatments for parasites impacting aquaculture

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.18. Forestry and Woodland Ecosystem (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Forestry and Woodland Ecosystems examines current management practices for forestry and woodlands. Special emphasis is given to management as it relates to ecological requirements and how these practices impact the environment. To prepare for careers in natural resource systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 forestry and woodland ecosystems	(i) identify career development opportunities in the field of forestry and woodland ecosystems
(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 forestry and woodland ecosystems	(ii) identify education opportunities in the field of forestry and woodland ecosystems
(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 forestry and woodland ecosystems	(iii) identify entrepreneurship opportunities in the field of forestry and woodland ecosystems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in forestry and woodland ecosystems	(i) apply competencies related to resources in forestry and woodland ecosystems

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in forestry and woodland ecosystems	(ii) apply competencies related to information in forestry and woodland ecosystems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in forestry and woodland ecosystems	(iii) apply competencies related to interpersonal skills in forestry and woodland ecosystems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in forestry and woodland ecosystems	(iv) apply competencies related to systems of operation in forestry and woodland ecosystems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(i) demonstrate knowledge of personal safety in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(ii) demonstrate knowledge of occupational safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(iii) demonstrate knowledge of health in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(iv) demonstrate knowledge of environmental regulations in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(v) demonstrate knowledge of first-aid policy in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(i) analyze employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(ii) analyze employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(iii) analyze employers' expectations, including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(iv) analyze employers' expectations, including good citizenship skills
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(A) describe the historical and economic significance of forestry	(i) describe the historical significance of forestry
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(A) describe the historical and economic significance of forestry	(ii) describe the economic significance of forestry

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(B) illustrate tree anatomy and morphology	(i) illustrate tree anatomy
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(B) illustrate tree anatomy and morphology	(ii) illustrate tree morphology
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(C) differentiate between species of trees	(i) differentiate between species of trees
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(D) classify forest and woodland soils	(i) classify forest and woodland soils
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(E) describe silviculture	(i) describe silviculture

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(F) compare and contrast forest and woodland ecosystems	(i) compare and contrast forest and woodland ecosystems
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(G) describe photosynthesis and respiration as they relate to forest and woodland species	(i) describe photosynthesis as [it relates] to forest and woodland species
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(G) describe photosynthesis and respiration as they relate to forest and woodland species	(ii) describe respiration as [it relates] to forest and woodland species
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(H) describe watershed management as it relates to forest and woodland ecosystems	(i) describe watershed management as it relates to forest and woodland ecosystems
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(I) describe sexual and asexual reproduction in forest and woodland species	(i) describe sexual reproduction in forest and woodland species

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(I) describe sexual and asexual reproduction in forest and woodland species	(ii) describe asexual reproduction in forest and woodland species
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(J) define succession	(i) define succession
(3) The student describes the principles of forestry and woodland ecosystems. The student is expected to	(K) compare natural and managed forests and woodlands	(i) compare natural and managed forests and woodlands
(4) The student demonstrates forestry biometrics skills. The student is expected to:	(A) calculate tree volume	(i) calculate tree volume
(4) The student demonstrates forestry biometrics skills. The student is expected to:	(B) estimate timber growth and yield	(i) estimate timber growth
(4) The student demonstrates forestry biometrics skills. The student is expected to:	(B) estimate timber growth and yield	(ii) estimate timber yield

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student demonstrates forestry biometrics skills. The student is expected to:	(C) evaluate forest and woodland quality by cruising timber stands	(i) evaluate forest and woodland quality by cruising timber stands
(4) The student demonstrates forestry biometrics skills. The student is expected to:	(D) scale logs to calculate their quality and volume	(i) scale logs to calculate their quality
(4) The student demonstrates forestry biometrics skills. The student is expected to:	(D) scale logs to calculate their quality and volume	(ii) scale logs to calculate their volume
(5) The student demonstrates knowledge of forestry management skills. The student is expected to:	(A) identify forestry management techniques	(i) identify forestry management techniques
(5) The student demonstrates knowledge of forestry management skills. The student is expected to:	(B) discuss multiple-use possibilities for forest and woodlands areas	(i) discuss multiple-use possibilities for forest and woodlands areas
(5) The student demonstrates knowledge of forestry management skills. The student is expected to:	(C) develop a control plan for destructive agents such as fire, insects, and disease	(i) develop a control plan for destructive agents

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies softwood and hardwood forest management and use practices. The student is expected to:	(A) identify principles of forestry economics	(i) identify principles of forestry economics
(6) The student identifies softwood and hardwood forest management and use practices. The student is expected to:	(B) research sources of forestry management assistance	(i) research sources of forestry management assistance
(6) The student identifies softwood and hardwood forest management and use practices. The student is expected to:	(C) identify harvesting practices and equipment	(i) identify harvesting practices
(6) The student identifies softwood and hardwood forest management and use practices. The student is expected to:	(C) identify harvesting practices and equipment	(ii) identify harvesting equipment
(6) The student identifies softwood and hardwood forest management and use practices. The student is expected to:	(D) describe merchandising practices	(i) describe merchandising practices

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies softwood and hardwood forest management and use practices. The student is expected to:	(E) evaluate research in forestry and wood technology	(i) evaluate research in forestry and wood technology
(7) The student describes the role of wood technology in forest product development. The student is expected to:	(A) compare timber manufacturing processes and products	(i) compare timber manufacturing processes
(7) The student describes the role of wood technology in forest product development. The student is expected to:	(A) compare timber manufacturing processes and products	(ii) compare timber manufacturing products
(7) The student describes the role of wood technology in forest product development. The student is expected to:	(B) discuss research and development issues in forestry and wood technology	(i) discuss research and development issues in forestry and wood technology
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(A) compare and contrast types of maps	(i) compare and contrast types of maps

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(B) interpret map features and legends	(i) interpret map features
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(B) interpret map features and legends	(ii) interpret map legends
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(C) compare map scale to actual distance	(i) compare map scale to actual distance
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(D) evaluate elevation and terrain features from topographic maps	(i) evaluate elevation features from topographic maps
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(D) evaluate elevation and terrain features from topographic maps	(ii) evaluate terrain features from topographic maps

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(E) use land survey and coordinate systems	(i) use land survey systems
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(E) use land survey and coordinate systems	(ii) use land coordinate systems
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(F) locate position and interpret images using a geospatial interface	(i) locate position using a geospatial interface
(8) The student applies cartographic skills to natural resource activities. The student is expected to:	(F) locate position and interpret images using a geospatial interface	(ii) interpret images using a geospatial interface

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.19. Range Ecology and Management (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Range Ecology and Management is designed to develop students' understanding of rangeland ecosystems and sustainable forage production. To prepare for careers in environmental and natural resource systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to environmental and natural resources, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 environmental and natural resources	(i) identify career development opportunities in the field of environmental and natural resources
(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 environmental and natural resources	(ii) identify education opportunities in the field of environmental and natural resources
(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 environmental and natural resources	(iii) identify entrepreneurship opportunities in the field of environmental and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in environmental and natural resources	(i) apply competencies related to resources in environmental and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in environmental and natural resources	(ii) apply competencies related to information in environmental and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in environmental and natural resources	(iii) apply competencies related to interpersonal skills in environmental and natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in environmental and natural resources	(iv) apply competencies related to systems of operation in environmental and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(i) demonstrate knowledge of personal safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(ii) demonstrate knowledge of occupational safety in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(iii) demonstrate knowledge of health in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(iv) demonstrate knowledge of environmental regulations in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace	(v) demonstrate knowledge of first-aid policy in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(i) analyze employers' expectations, including appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(ii) analyze employers' expectations, including ethical conduct
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(iii) analyze employers' expectations, including legal responsibilities
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) analyze employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills	(iv) analyze employers' expectations, including good citizenship skills
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student develops an understanding of the rangeland ecosystem. The student is expected to:	(A) describe ecology, photosynthesis, energy flow, and climax vegetation	(i) describe ecology
(3) The student develops an understanding of the rangeland ecosystem. The student is expected to:	(A) describe ecology, photosynthesis, energy flow, and climax vegetation	(ii) describe photosynthesis
(3) The student develops an understanding of the rangeland ecosystem. The student is expected to:	(A) describe ecology, photosynthesis, energy flow, and climax vegetation	(iii) describe energy flow
(3) The student develops an understanding of the rangeland ecosystem. The student is expected to:	(A) describe ecology, photosynthesis, energy flow, and climax vegetation	(iv) describe climax vegetation
(3) The student develops an understanding of the rangeland ecosystem. The student is expected to:	(B) describe the impact of rangeland on the water cycle and water quality	(i) describe the impact of rangeland on the water cycle
(3) The student develops an understanding of the rangeland ecosystem. The student is expected to:	(B) describe the impact of rangeland on the water cycle and water quality	(ii) describe the impact of rangeland on water quality
(3) The student develops an understanding of the rangeland ecosystem. The student is expected to:	(C) determine capabilities and limitations of rangelands	(i) determine capabilities of rangelands

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student develops an understanding of the rangeland ecosystem. The student is expected to:	(C) determine capabilities and limitations of rangelands	(ii) determine limitations of rangelands
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(A) explain the relationship of rangeland to the environment	(i) explain the relationship of rangeland to the environment
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(B) discuss the interrelationships among water, alternative use, carrying capacity, and population	(i) discuss the interrelationships among water, alternative use, carrying capacity, and population
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(i) identify native plants in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(ii) identify non-native plants in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(iii) identify invasive plants in the rangeland ecosystem

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(iv) identify native animals in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(v) identify non-native animals in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(vi) identify invasive animals in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(vii) classify native plants in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(viii) classify non-native plants in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(ix) classify invasive plants in the rangeland ecosystem

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(x) classify native animals in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(xi) classify non-native animals in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(C) identify and classify native, non-native, and invasive plants and animals in the rangeland ecosystem	(xii) classify invasive animals in the rangeland ecosystem
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(D) explore the use of rangeland plants as alternative energy sources	(i) explore the use of rangeland plants as alternative energy sources
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(E) develop an understanding of the role of rangeland in water recharge and conservation	(i) develop an understanding of the role of rangeland in water recharge
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(E) develop an understanding of the role of rangeland in water recharge and conservation	(ii) develop an understanding of the role of rangeland in water conservation

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student develops an understanding of rangeland as a dynamic, living, and changeable system. The student is expected to:	(F) recognize the importance of successful rangeland ecology practices	(i) recognize the importance of successful rangeland ecology practices
(5) The student analyzes the biotic and abiotic components of a rangeland. The student is expected to:	(A) discuss components of rangeland with an emphasis on soil	(i) discuss components of rangeland with an emphasis on soil
(5) The student analyzes the biotic and abiotic components of a rangeland. The student is expected to:	(B) determine components of rangeland with an emphasis on topography	(i) determine components of rangeland with an emphasis on topography
(5) The student analyzes the biotic and abiotic components of a rangeland. The student is expected to:	(C) classify range sites by soil properties	(i) classify range sites by soil properties
(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	(i) determine range condition based on plant populations
(6) The student develops an understanding of the dynamic process of a renewable rangeland resource. The student is expected to:	(B) compare and contrast rangeland condition trends	(i) compare and contrast rangeland condition trends

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student develops an understanding of the dynamic process of a renewable rangeland resource. The student is expected to:	(C) formulate methods to improve range conditions	(i) formulate methods to improve range conditions
(7) The student identifies methods of maintaining and improving rangeland for livestock management. The student is expected to:	(A) identify plants beneficial to livestock	(i) identify plants beneficial to livestock
(7) The student identifies methods of maintaining and improving rangeland for livestock management. The student is expected to:	(B) identify plant species harmful to livestock	(i) identify plant species harmful to livestock
(7) The student identifies methods of maintaining and improving rangeland for livestock management. The student is expected to:	(C) analyze how livestock use range plants	(i) analyze how livestock use range plants
(7) The student identifies methods of maintaining and improving rangeland for livestock management. The student is expected to:	(D) discuss livestock grazing management	(i) discuss livestock grazing management
(8) The student identifies methods of maintaining and improving rangeland for wildlife management. The student is expected to:	(A) identify plants beneficial to wildlife	(i) identify plants beneficial to wildlife

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student identifies methods of maintaining and improving rangeland for wildlife management. The student is expected to:	(B) identify plants species harmful to wildlife	(i) identify plants species harmful to wildlife
(8) The student identifies methods of maintaining and improving rangeland for wildlife management. The student is expected to:	(C) analyze how wildlife species use range plants	(i) analyze how wildlife species use range plants
(8) The student identifies methods of maintaining and improving rangeland for wildlife management. The student is expected to:	(D) discuss wildlife grazing management	(i) discuss wildlife grazing management
(9) The student develops an understanding of rangeland management as it relates to global concerns. The student is expected to:	(A) examine how rangeland characteristics affect aquifers	(i) examine how rangeland characteristics affect aquifers
(9) The student develops an understanding of rangeland management as it relates to global concerns. The student is expected to:	(B) analyze how rangeland characteristics affect the environment	(i) analyze how rangeland characteristics affect the environment
(9) The student develops an understanding of rangeland management as it relates to global concerns. The student is expected to:	(C) analyze how rangeland management affects the environment	(i) analyze how rangeland management affects the environment
(9) The student develops an understanding of rangeland management as it relates to global concerns. The student is expected to:	(D) evaluate the impact of energy production systems on rangelands	(i) evaluate the impact of energy production systems on rangelands

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.20. Floral Design (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 9-12. This course satisfies the fine arts graduation requirement. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p> <p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Floral Design 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. Through the analysis of artistic floral styles and historical periods, students will develop respect for the traditions and contributions of diverse cultures. Students will respond to and analyze floral designs, thus contributing to the development of lifelong skills of making informed judgments and evaluations. To prepare for careers in floral design, students must attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of floral design
(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	(ii) identify career development opportunities in the field of interior landscape development
(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	(iii) identify entrepreneurship opportunities in the field of floral design
(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	(iv) identify entrepreneurship opportunities in the field of interior landscape development
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development	(i) apply competencies related to resources in floral design
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development	(ii) apply competencies related to information in floral design

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development	(iii) apply competencies related to interpersonal skills in floral design
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development	(iv) apply competencies related to systems of operation in floral design
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development	(v) apply competencies related to resources in interior landscape development
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development	(vi) apply competencies related to information in interior landscape development
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development	(vii) apply competencies related to interpersonal skills in interior landscape development
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in floral design and interior landscape development	(viii) apply competencies related to systems of operation in interior landscape development

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(i) demonstrate knowledge of personal health and safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(ii) demonstrate knowledge of occupational health and safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employer expectations and appropriate work habits	(i) identify employer expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employer expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship, including advocacy
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(ii) demonstrate characteristics of good citizenship, including stewardship

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(iii) demonstrate characteristics of good citizenship, including community leadership
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) identify training, education, and certification requirements for occupational choices	(i) identify training for occupational choices
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) identify training, education, and certification requirements for occupational choices	(ii) identify education for occupational choices
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) identify training, education, and certification requirements for occupational choices	(iii) identify certification requirements for occupational choices
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify the aesthetic benefits of floral art
(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	(ii) identify the history of floral art, particularly as it relates to current practice
(3) The student identifies design principles and techniques in floral art and interiorscapes. The student is expected to:	(B) classify and identify flowers and plants used in floral design	(i) classify flowers used in floral design
(3) The student identifies design principles and techniques in floral art and interiorscapes. The student is expected to:	(B) classify and identify flowers and plants used in floral design	(ii) classify plants used in floral design
(3) The student identifies design principles and techniques in floral art and interiorscapes. The student is expected to:	(B) classify and identify flowers and plants used in floral design	(iii) identify flowers used in floral design
(3) The student identifies design principles and techniques in floral art and interiorscapes. The student is expected to:	(B) classify and identify flowers and plants used in floral design	(iv) identify flowers plants used in floral design
(3) The student identifies design principles and techniques in floral art and interiorscapes. The student is expected to:	(C) identify design elements and principles	(i) identify design elements

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student identifies design principles and techniques in floral art and interiorscapes. The student is expected to:	(C) identify design elements and principles	(ii) identify design principles
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(A) demonstrate an understanding of and implement the design process through the medium of floral materials	(i) demonstrate an understanding of the design process through the medium of floral materials
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(A) demonstrate an understanding of and implement the design process through the medium of floral materials	(ii) implement the design process through the medium of floral materials
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(B) evaluate and prepare geometric floral designs using cut flowers	(i) evaluate geometric floral designs using cut flowers
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(B) evaluate and prepare geometric floral designs using cut flowers	(ii) prepare geometric floral designs using cut flowers
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(C) evaluate and prepare geometric floral designs using silk flowers	(i) evaluate geometric floral designs using silk flowers
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(C) evaluate and prepare geometric floral designs using silk flowers	(ii) prepare geometric floral designs using silk flowers

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(D) prepare corsages and boutonnieres	(i) prepare corsages
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(D) prepare corsages and boutonnieres	(ii) prepare boutonnieres
(4) The student demonstrates floral design principles and techniques. The student is expected to:	(E) prepare floral designs for specific occasions	(i) prepare floral designs for specific occasions
(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	(i) illustrate ideas for floral designs from direct observation
(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	(ii) illustrate ideas for floral designs from experiences
(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	(iii) illustrate ideas for floral designs from imagination
(5) The student develops and formulates ideas from the environment. The student is expected to:	(B) compare and contrast the use of art elements such as color, texture, form, line, and space	(i) compare and contrast the use of art elements

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student develops and formulates ideas from the environment. The student is expected to:	(C) compare and contrast art principles such as continuity, pattern, rhythm, balance, proportion, and unity in personal designs	(i) compare and contrast art principles in personal designs
(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	(i) interpret artistic decisions in personal arrangements
(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	(ii) evaluate artistic decisions in personal arrangements
(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	(iii) justify artistic decisions in personal arrangements
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(i) select original designs by peers and others
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(ii) select original portfolios by peers and others

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(iii) select original floral exhibitions by peers and others
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(iv) analyze original designs by peers and others to form precise conclusions about formal qualities
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(v) analyze original portfolios by peers and others to form precise conclusions about formal qualities
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(vi) analyze original floral exhibitions by peers and others to form precise conclusions about formal qualities
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(vii) analyze original designs by peers and others to form precise conclusions about historical and cultural contexts

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(viii) analyze original portfolios by peers and others to form precise conclusions about historical and cultural contexts
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(ix) analyze original floral exhibitions by peers and others to form precise conclusions about historical and cultural contexts
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(x) analyze original designs by peers and others to form precise conclusions about intents
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(xi) analyze original portfolios by peers and others to form precise conclusions about intents
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(xii) analyze original floral exhibitions by peers and others to form precise conclusions about intents

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(xiii) analyze original designs by peers and others to form precise conclusions about meanings
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(xiv) analyze original portfolios by peers and others to form precise conclusions about meanings
(6) The student makes informed judgments about personal designs and the designs of others. The student is expected to:	(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	(xv) analyze original floral exhibitions by peers and others to form precise conclusions about meanings
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(A) classify and identify specialty floral items	(i) classify specialty floral items
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(A) classify and identify specialty floral items	(ii) identify specialty floral items

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(B) evaluate and appraise floral designs	(i) evaluate floral designs
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(B) evaluate and appraise floral designs	(ii) appraise floral designs
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(C) prepare cost-effective designs	(i) prepare cost-effective designs
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(D) create specialty designs to expand artistic expression	(i) create specialty designs to expand artistic expression
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(E) demonstrate pricing and order-processing skills	(i) demonstrate pricing skills
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(E) demonstrate pricing and order-processing skills	(ii) demonstrate order-processing skills

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student demonstrates contemporary designs, business practices, and creativity in the floral industry by developing floral design skills. The student is expected to:	(F) list service delivery options related to effectiveness	(i) list service delivery options related to effectiveness
(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 of floral materials	(i) use temperature to increase keeping quality of floral materials
(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 of floral materials	(ii) use preservatives to increase keeping quality of floral materials
(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 of floral materials	(iii) use cutting techniques to increase keeping quality of floral materials
(8) The student knows the management factors of floral enterprises. The student is expected to:	(B) identify tools, chemicals, and equipment used in floral design	(i) identify tools used in floral design
(8) The student knows the management factors of floral enterprises. The student is expected to:	(B) identify tools, chemicals, and equipment used in floral design	(ii) identify chemicals used in floral design
(8) The student knows the management factors of floral enterprises. The student is expected to:	(B) identify tools, chemicals, and equipment used in floral design	(iii) identify equipment used in floral design

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student knows the management factors of floral enterprises. The student is expected to:	(C) fertilize, prune, and water tropical plants	(i) fertilize tropical plants
(8) The student knows the management factors of floral enterprises. The student is expected to:	(C) fertilize, prune, and water tropical plants	(ii) prune tropical plants
(8) The student knows the management factors of floral enterprises. The student is expected to:	(C) fertilize, prune, and water tropical plants	(iii) water tropical plants
(8) The student knows the management factors of floral enterprises. The student is expected to:	(D) manage pests	(i) manage pests
(8) The student knows the management factors of floral enterprises. The student is expected to:	(E) demonstrate technical skills for increasing the preservation of cut flowers and foliage	(i) demonstrate technical skills for increasing the preservation of cut flowers
(8) The student knows the management factors of floral enterprises. The student is expected to:	(E) demonstrate technical skills for increasing the preservation of cut flowers and foliage	(ii) demonstrate technical skills for increasing the preservation of foliage

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.21. Landscape Design and Management (One-Half Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one-half credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Landscape Design and Management is designed to develop an understanding of landscape design and management techniques and practices. To prepare for careers in horticultural systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 landscape design and management	(i) identify career development opportunities in the field of landscape design and management
(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 landscape design and management	(ii) identify entrepreneurship opportunities in the field of landscape design and management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in landscape design and management	(i) apply competencies related to resources in landscape design and management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in landscape design and management	(ii) apply competencies related to information in landscape design and management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in landscape design and management	(iii) apply competencies related to interpersonal skills in landscape design and management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in landscape design and management	(iv) apply competencies related to problem solving in landscape design and management

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in landscape design and management	(v) apply competencies related to critical thinking in landscape design and management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in landscape design and management	(vi) apply competencies related to systems of operation in landscape design and management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(i) examine licensing requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(ii) examine certification requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(iii) examine credentialing requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the industry	(i) demonstrate knowledge of personal health and safety practices in the industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the industry	(ii) demonstrate knowledge of occupational health and safety practices in the industry

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employers' expectations and appropriate work habits	(i) identify employers' expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employers' expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship such as advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(A) assess soil characteristics and environmental conditions	(i) assess soil characteristics
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(A) assess soil characteristics and environmental conditions	(ii) assess environmental conditions
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(B) assess site for local conditions such as property lines, easement restrictions, and location of public utilities	(i) assess site for local conditions

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(C) complete a site analysis checklist	(i) complete a site analysis checklist
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(D) produce a site sketch using graphic design equipment or software	(i) produce a site sketch using graphic design equipment or software
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(E) identify plants used in designing landscapes	(i) identify plants used in designing landscapes
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(F) identify structures and hardscape materials used in designing landscapes	(i) identify structures used in designing landscapes
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(F) identify structures and hardscape materials used in designing landscapes	(ii) identify hardscape materials used in designing landscapes
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(G) create landscape designs demonstrating the application of design elements and principles	(i) create landscape designs demonstrating the application of design elements
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(G) create landscape designs demonstrating the application of design elements and principles	(ii) create landscape designs demonstrating the application of design principles

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(H) analyze different landscape design styles and identify the different aesthetic and environmental factors of each style	(i) analyze different landscape design styles
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(H) analyze different landscape design styles and identify the different aesthetic and environmental factors of each style	(ii) identify the different aesthetic factors of each style
(3) The student identifies environmental, aesthetic, and financial benefits of landscaped sites. The student is expected to:	(H) analyze different landscape design styles and identify the different aesthetic and environmental factors of each style	(iii) identify the different environmental factors of each style
(4) The student performs landscape business procedures. The student is expected to:	(A) demonstrate skills for interviewing potential clients	(i) demonstrate skills for interviewing potential clients
(4) The student performs landscape business procedures. The student is expected to:	(B) develop landscape ideas from a checklist	(i) develop landscape ideas from a checklist
(4) The student performs landscape business procedures. The student is expected to:	(C) prepare cost estimates and schedules for landscaping services, including materials, labor, and business costs	(i) prepare cost estimates for landscaping services, including materials
(4) The student performs landscape business procedures. The student is expected to:	(C) prepare cost estimates and schedules for landscaping services, including materials, labor, and business costs	(ii) prepare cost estimates for landscaping services, including labor
(4) The student performs landscape business procedures. The student is expected to:	(C) prepare cost estimates and schedules for landscaping services, including materials, labor, and business costs	(iii) prepare cost estimates for landscaping services, including business costs

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student performs landscape business procedures. The student is expected to:	(C) prepare cost estimates and schedules for landscaping services, including materials, labor, and business costs	(iv) prepare schedules for landscaping services, including materials
(4) The student performs landscape business procedures. The student is expected to:	(C) prepare cost estimates and schedules for landscaping services, including materials, labor, and business costs	(v) prepare schedules for landscaping services, including labor
(4) The student performs landscape business procedures. The student is expected to:	(C) prepare cost estimates and schedules for landscaping services, including materials, labor, and business costs	(vi) prepare schedules for landscaping services, including business costs
(4) The student performs landscape business procedures. The student is expected to:	(D) analyze service contracts	(i) analyze service contracts
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(A) identify, store, and maintain landscaping hand tools and power equipment	(i) identify landscaping hand tools
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(A) identify, store, and maintain landscaping hand tools and power equipment	(ii) store landscaping hand tools
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(A) identify, store, and maintain landscaping hand tools and power equipment	(iii) maintain landscaping hand tools

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(A) identify, store, and maintain landscaping hand tools and power equipment	(iv) identify landscaping power equipment
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(A) identify, store, and maintain landscaping hand tools and power equipment	(v) store landscaping power equipment
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(A) identify, store, and maintain landscaping hand tools and power equipment	(vi) maintain landscaping power equipment
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(B) analyze costs associated with purchasing and maintaining landscaping hand tools and power equipment	(i) analyze costs associated with purchasing landscaping hand tools
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(B) analyze costs associated with purchasing and maintaining landscaping hand tools and power equipment	(ii) analyze costs associated with purchasing landscaping power equipment
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(B) analyze costs associated with purchasing and maintaining landscaping hand tools and power equipment	(iii) analyze costs associated with maintaining landscaping hand tools
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(B) analyze costs associated with purchasing and maintaining landscaping hand tools and power equipment	(iv) analyze costs associated with maintaining landscaping power equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(C) assess different landscape irrigation systems for efficiency, application, and environmental impact	(i) assess different landscape irrigation systems for efficiency
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(C) assess different landscape irrigation systems for efficiency, application, and environmental impact	(ii) assess different landscape irrigation systems for application
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(C) assess different landscape irrigation systems for efficiency, application, and environmental impact	(iii) assess different landscape irrigation systems for environmental impact
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(D) identify common irrigation system components and materials	(i) identify common irrigation system components
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(D) identify common irrigation system components and materials	(ii) identify common irrigation system materials
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(E) examine local and state regulations affecting irrigation systems	(i) examine local regulations affecting irrigation systems
(5) The student analyzes the cost and maintenance of tools and equipment used in the landscape industry. The student is expected to:	(E) examine local and state regulations affecting irrigation systems	(ii) examine state regulations affecting irrigation systems

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student performs landscape installation services. The student is expected to:	(A) prepare landscape sites for installation	(i) prepare landscape sites for installation
(6) The student performs landscape installation services. The student is expected to:	(B) install landscape plants and structures using proper installation techniques	(i) install landscape plants using proper installation techniques
(6) The student performs landscape installation services. The student is expected to:	(B) install landscape plants and structures using proper installation techniques	(ii) install landscape structures using 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	(i) identify proper pruning techniques for different plant materials
(7) The student performs landscape maintenance services. The student is expected to:	(A) identify and demonstrate proper pruning techniques for different plant materials	(ii) demonstrate proper pruning techniques for different plant materials
(7) The student performs landscape maintenance services. The student is expected to:	(B) recognize methods for renovating existing landscapes	(i) recognize methods for renovating existing landscapes
(7) The student performs landscape maintenance services. The student is expected to:	(C) analyze nutritional needs of plants	(i) analyze nutritional needs of plants
(7) The student performs landscape maintenance services. The student is expected to:	(D) develop fertilization plans that address plant needs and environmental concerns	(i) develop fertilization plans that address plant needs
(7) The student performs landscape maintenance services. The student is expected to:	(D) develop fertilization plans that address plant needs and environmental concerns	(ii) develop fertilization plans that address environmental concerns

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student performs landscape maintenance services. The student is expected to:	(E) examine Integrated Pest Management in assessing an insect, pathogen, or weed problem	(i) examine Integrated Pest Management in assessing an insect, pathogen, or weed problem
(7) The student performs landscape maintenance services. The student is expected to:	(F) use pesticide application techniques and equipment properly	(i) use pesticide application techniques properly
(7) The student performs landscape maintenance services. The student is expected to:	(F) use pesticide application techniques and equipment properly	(ii) use pesticide application equipment properly
(7) The student performs landscape maintenance services. The student is expected to:	(G) explain pesticide labeling and safety data sheets	(i) explain pesticide labeling
(7) The student performs landscape maintenance services. The student is expected to:	(G) explain pesticide labeling and safety data sheets	(ii) explain safety data sheets
(7) The student performs landscape maintenance services. The student is expected to:	(H) demonstrate lawn management techniques	(i) demonstrate lawn management techniques

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.22. Turf Grass Management (One-Half Credit), Adopted 2015.
(a) General Requirements. General requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one-half credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Turf Grass Management is designed to develop an understanding of turf grass management techniques and practices. To prepare for careers in horticultural systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of turf grass management
(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	(ii) identify entrepreneurship opportunities in the field of turf grass management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in turf grass management	(i) apply competencies related to resources in turf grass management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in turf grass management	(ii) apply competencies related to information in turf grass management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in turf grass management	(iii) apply competencies related to interpersonal skills in turf grass management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in turf grass management	(iv) apply competencies related to problem solving in turf grass management

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in turf grass management	(v) apply competencies related to critical thinking in turf grass management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in turf grass management	(vi) apply competencies related to systems of operation in turf grass management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and legal requirements to maintain compliance with industry requirements	(i) examine licensing to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and legal requirements to maintain compliance with industry requirements	(ii) examine certification to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and legal requirements to maintain compliance with industry requirements	(iii) examine legal requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the industry	(i) demonstrate knowledge of personal health and safety practices in the industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the industry	(ii) demonstrate knowledge of occupational health and safety practices in the industry

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employers' expectations and appropriate work habits	(i) identify employers' expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employers' expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship such as advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(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	(i) assess sites for environmental factors that impact turf grass establishment
(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	(ii) assess sites for environmental factors that impact turf grass management

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student identifies the environmental, aesthetic, and financial benefits of turf grass in residential, commercial, and athletic settings. The student is expected to:	(B) develop a site assessment checklist	(i) develop a site assessment checklist
(3) The student identifies the environmental, aesthetic, and financial benefits of turf grass in residential, commercial, and athletic settings. The student is expected to:	(C) develop a site preparation plan	(i) develop a 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	(i) identify turf grass varieties that fulfill site requirements
(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	(ii) identify turf grass cultivars that fulfill site requirements
(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	(B) identify pests and pathogens of turf grasses	(i) identify pests of turf grasses
(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	(B) identify pests and pathogens of turf grasses	(ii) identify pathogens of turf grasses

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	(C) identify common weeds found in turf grasses	(i) identify common weeds found in turf grasses
(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	(D) determine the importance of site grading for water movement	(i) determine the importance of site grading for water movement
(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	(E) determine the importance of soil compaction on turf grass establishment	(i) determine the importance of soil compaction on turf grass establishment
(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	(F) reduce impact of compaction using aeration methods	(i) reduce impact of compaction using aeration methods
(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	(G) compare establishment procedures such as seeding, sodding, sprigging, and hydromulching	(i) compare establishment procedures
(4) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass establishment. The student is expected to:	(H) explain the importance of turf grass installation timing	(i) explain the importance of turf grass installation timing

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) explain mowing heights
(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	(ii) demonstrate mowing heights
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(B) explain the principle of mowing frequency	(i) explain the principle of mowing frequency
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(C) compare residential, commercial, and athletic turf maintenance needs	(i) compare residential, commercial, and athletic turf maintenance needs
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(D) determine turf grass irrigation requirements	(i) determine turf grass irrigation requirements
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(E) analyze and address thatch accumulation in turf grass	(i) analyze thatch accumulation in turf grass

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(E) analyze and address thatch accumulation in turf grass	(ii) address thatch accumulation in turf grass
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(F) analyze nutritional needs of turf grass	(i) analyze nutritional needs of turf grass
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(G) develop fertilization plans that address turf grass needs and environmental concerns	(i) develop fertilization plans that address turf grass needs
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(G) develop fertilization plans that address turf grass needs and environmental concerns	(ii) develop fertilization plans that address turf grass environmental concerns
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(H) examine Integrated Pest Management in assessing an insect, pathogen, or weed problem	(i) examine Integrated Pest Management in assessing an insect, pathogen, or weed problem
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(I) use turf grass pesticide application techniques and equipment properly	(i) use turf grass pesticide application techniques properly

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(I) use turf grass pesticide application techniques and equipment properly	(ii) use turf grass pesticide application equipment properly
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(J) explain turf grass pesticide labeling and safety data sheets	(i) explain turf grass pesticide labeling
(5) The student identifies and implements common cultural and physiological requirements for cool and warm season turf grass maintenance. The student is expected to:	(J) explain turf grass pesticide labeling and safety data sheets	(ii) explain safety data sheets
(6) The student performs turf grass management business procedures. The student is expected to:	(A) assess the needs of prospective clients	(i) assess the needs of prospective clients
(6) The student performs turf grass management business procedures. The student is expected to:	(B) analyze material, labor, and business costs related to turf grass sites	(i) analyze material costs related to turf grass sites
(6) The student performs turf grass management business procedures. The student is expected to:	(B) analyze material, labor, and business costs related to turf grass sites	(ii) analyze labor costs related to turf grass sites
(6) The student performs turf grass management business procedures. The student is expected to:	(B) analyze material, labor, and business costs related to turf grass sites	(iii) analyze business costs related to turf grass sites
(6) The student performs turf grass management business procedures. The student is expected to:	(C) develop and analyze service contracts and maintenance schedules	(i) develop service contracts

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student performs turf grass management business procedures. The student is expected to:	(C) develop and analyze service contracts and maintenance schedules	(ii) analyze service contracts
(6) The student performs turf grass management business procedures. The student is expected to:	(C) develop and analyze service contracts and maintenance schedules	(iii) develop maintenance schedules
(6) The student performs turf grass management business procedures. The student is expected to:	(C) develop and analyze service contracts and maintenance schedules	(iv) analyze maintenance schedules
(6) The student performs turf grass management business procedures. The student is expected to:	(D) prepare a cost estimate for establishing a turf grass site, including materials and labor	(i) prepare a cost estimate for establishing a turf grass site, including materials
(6) The student performs turf grass management business procedures. The student is expected to:	(D) prepare a cost estimate for establishing a turf grass site, including materials and labor	(ii) prepare a cost estimate for establishing a turf grass site, including labor
(6) The student performs turf grass management business procedures. The student is expected to:	(E) prepare a cost estimate for maintaining a turf grass site, including materials and labor	(i) prepare a cost estimate for maintaining a turf grass site, including materials
(6) The student performs turf grass management business procedures. The student is expected to:	(E) prepare a cost estimate for maintaining a turf grass site, including materials and labor	(ii) prepare a cost estimate for maintaining a turf grass site, including 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	(i) identify turf grass hand tools
(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	(ii) store turf grass hand tools

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(iii) maintain turf grass hand tools
(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	(iv) identify turf grass power equipment
(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	(v) store maintain turf grass power equipment
(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	(vi) maintain turf grass power equipment
(7) The student manages turf grass maintenance equipment. The student is expected to:	(B) analyze the costs associated with turf grass hand tools and power equipment	(i) analyze the costs associated with turf grass hand tools
(7) The student manages turf grass maintenance equipment. The student is expected to:	(B) analyze the costs associated with turf grass hand tools and power equipment	(ii) analyze the costs associated with turf grass power equipment
(7) The student manages turf grass maintenance equipment. The student is expected to:	(C) analyze components of turf grass irrigation systems	(i) analyze components of turf grass irrigation systems

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.23. Horticultural Science (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Horticultural Science is designed to develop an understanding of common horticultural management practices as they relate to food and ornamental plant production. To prepare for careers in horticultural systems, students must 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.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 horticulture	(i) identify career development opportunities in the field of horticulture
(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 horticulture	(ii) identify entrepreneurship opportunities in the field of horticulture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in horticulture	(i) apply competencies related to resources in horticulture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in horticulture	(ii) apply competencies related to information in horticulture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in horticulture	(iii) apply competencies related to interpersonal skills in horticulture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in horticulture	(iv) apply competencies related to systems of operation in horticulture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety practices in the workplace	(i) demonstrate knowledge of personal safety practices in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety practices in the workplace	(ii) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employer expectations and appropriate work habits	(i) identify employer expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employer expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship, including advocacy
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(ii) demonstrate characteristics of good citizenship, including stewardship
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(iii) demonstrate characteristics of good citizenship, including community leadership
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(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 and other classifications	(i) classify horticultural plants based on physiology for taxonomic classifications
(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 and other classifications	(ii) classify horticultural plants based on physiology for other classifications
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(B) manage the horticultural production environment	(i) manage the horticultural production environment
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(C) propagate and grow horticultural plants	(i) propagate horticultural plants
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(C) propagate and grow horticultural plants	(ii) grow horticultural plants
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(D) create a design using plants that demonstrates an application of design elements and principles	(i) create a design using plants that demonstrates an application of design elements
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(D) create a design using plants that demonstrates an application of design elements and principles	(ii) create a design using plants that demonstrates an application of design principles

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(E) design and establish landscapes	(i) design landscapes
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(E) design and establish landscapes	(ii) establish landscapes
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(F) describe the processes of fruit, nut, and vegetable production	(i) describe the processes of fruit production
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(F) describe the processes of fruit, nut, and vegetable production	(ii) describe the processes of nut production
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(F) describe the processes of fruit, nut, and vegetable production	(iii) describe the processes of vegetable production
(3) The student develops technical skills associated with the management and production of horticultural plants. The student is expected to:	(G) demonstrate proper pruning techniques	(i) demonstrate proper pruning techniques
(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	(i) examine unique plant properties to identify functional differences in plant structures, including roots

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(ii) examine unique plant properties to describe functional differences in plant structures, including stems
(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	(iii) examine unique plant properties to describe functional differences in plant structures, including flowers
(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	(iv) examine unique plant properties to describe functional differences in plant structures, including leaves
(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	(v) examine unique plant properties to describe functional differences in plant structures, including fruit
(4) The student identifies structures and physiological processes used in plant production. The student is expected to:	(B) differentiate between monocots and dicots and male and female plants	(i) differentiate between monocots and dicots
(4) The student identifies structures and physiological processes used in plant production. The student is expected to:	(B) differentiate between monocots and dicots and male and female plants	(ii) differentiate between male plants and female plants
(4) The student identifies structures and physiological processes used in plant production. The student is expected to:	(C) germinate seeds and transplant seedlings	(i) germinate seeds

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student identifies structures and physiological processes used in plant production. The student is expected to:	(C) germinate seeds and transplant seedlings	(ii) transplant seedlings
(4) The student identifies structures and physiological processes used in plant production. The student is expected to:	(D) demonstrate asexual propagation techniques	(i) demonstrate asexual propagation techniques
(5) The student manages and controls common pests of horticultural plants. The student is expected to:	(A) identify common horticultural pests and pathogens	(i) identify common horticultural pests
(5) The student manages and controls common pests of horticultural plants. The student is expected to:	(A) identify common horticultural pests and pathogens	(ii) identify common horticultural pathogens
(5) The student manages and controls common pests of horticultural plants. The student is expected to:	(B) demonstrate safe practices in selecting, applying, storing, and disposing of chemicals	(i) demonstrate safe practices in selecting chemicals
(5) The student manages and controls common pests of horticultural plants. The student is expected to:	(B) demonstrate safe practices in selecting, applying, storing, and disposing of chemicals	(ii) demonstrate safe practices in applying chemicals
(5) The student manages and controls common pests of horticultural plants. The student is expected to:	(B) demonstrate safe practices in selecting, applying, storing, and disposing of chemicals	(iii) demonstrate safe practices in storing chemicals
(5) The student manages and controls common pests of horticultural plants. The student is expected to:	(B) demonstrate safe practices in selecting, applying, storing, and disposing of chemicals	(iv) demonstrate safe practices in disposing of chemicals
(5) The student manages and controls common pests of horticultural plants. The student is expected to:	(C) explain parts of a pesticide label	(i) explain parts of a pesticide label

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify hand tools
(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	(ii) maintain hand tools
(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	(iii) identify power tools
(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	(iv) maintain power tools
(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	(v) identify equipment
(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	(vi) maintain equipment
(6) The student demonstrates marketing and management skills used in the operation of horticultural businesses. The student is expected to:	(B) select appropriate tools and equipment	(i) select appropriate tools

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student demonstrates marketing and management skills used in the operation of horticultural businesses. The student is expected to:	(B) select appropriate tools and equipment	(ii) select appropriate equipment
(6) The student demonstrates marketing and management skills used in the operation of horticultural businesses. The student is expected to:	(C) demonstrate safe use of tools and equipment	(i) demonstrate safe use of tools
(6) The student demonstrates marketing and management skills used in the operation of horticultural businesses. The student is expected to:	(C) demonstrate safe use of tools and equipment	(ii) demonstrate safe use of equipment
(6) The student demonstrates marketing and management skills used in the operation of horticultural businesses. The student is expected to:	(D) identify options and opportunities for business ownership	(i) identify options for business ownership
(6) The student demonstrates marketing and management skills used in the operation of horticultural businesses. The student is expected to:	(D) identify options and opportunities for business ownership	(ii) identify opportunities for business ownership
(6) The student demonstrates marketing and management skills used in the operation of horticultural businesses. The student is expected to:	(E) analyze the role of small business in free enterprise	(i) analyze the role of small business in free enterprise

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.24. Greenhouse Operation and Production (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 10-12. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Greenhouse Operation and Production is designed to develop an understanding of greenhouse production techniques and practices. To prepare for careers in horticultural systems, students must attain academic skills and knowledge, acquire technical knowledge and skills related to horticultural systems and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of greenhouse operations and production
(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	(ii) identify entrepreneurship opportunities in the field of greenhouse operations and production
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in greenhouse operations and production	(i) apply competencies related to resources in greenhouse operations and production
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in greenhouse operations and production	(ii) apply competencies related to information in greenhouse operations and production
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in greenhouse operations and production	(iii) apply competencies related to interpersonal skills in greenhouse operations and production
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in greenhouse operations and production	(iv) apply competencies related to problem solving in greenhouse operations and production

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in greenhouse operations and production	(v) apply competencies related to critical thinking in greenhouse operations and production
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and legal requirements to maintain compliance with industry requirements	(i) examine licensing requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and legal requirements to maintain compliance with industry requirements	(ii) examine certification requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and legal requirements to maintain compliance with industry requirements	(iii) examine legal requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the industry	(i) demonstrate knowledge of personal health and safety practices in the industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the industry	(ii) demonstrate knowledge of occupational health and safety practices in the industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employers' expectations and appropriate work habits	(i) identify employers' expectations

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employers' expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship such as advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student identifies and classifies plants used in greenhouse production. The student is expected to:	(A) classify greenhouse plants according to taxonomy systems	(i) classify greenhouse plants according to taxonomy systems
(3) The student identifies and classifies plants used in greenhouse production. The student is expected to:	(B) develop knowledge of plant anatomical structures and functions for plant identification	(i) develop knowledge of plant anatomical structures for plant identification
(3) The student identifies and classifies plants used in greenhouse production. The student is expected to:	(B) develop knowledge of plant anatomical structures and functions for plant identification	(ii) develop knowledge of plant anatomical functions for plant identification
(3) The student identifies and classifies plants used in greenhouse production. The student is expected to:	(C) develop plant classifications based on cropping schedules and market demand for greenhouse crops	(i) develop plant classifications based on cropping schedules for greenhouse crops
(3) The student identifies and classifies plants used in greenhouse production. The student is expected to:	(C) develop plant classifications based on cropping schedules and market demand for greenhouse crops	(ii) develop plant classifications based on market demand for greenhouse crops

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(A) select greenhouse coverings	(i) select greenhouse coverings
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(B) compare greenhouse styles and construction materials	(i) compare greenhouse styles
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(B) compare greenhouse styles and construction materials	(ii) compare greenhouse construction materials
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(C) analyze the costs associated with greenhouse construction	(i) analyze the costs associated with greenhouse construction
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(D) evaluate greenhouse site orientation and construction concerns	(i) evaluate greenhouse site orientation
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(D) evaluate greenhouse site orientation and construction concerns	(ii) evaluate greenhouse construction concerns
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(E) integrate other growing structures such as cold frames, hotbeds, lath houses, and potting sheds	(i) integrate other growing structures

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(F) investigate local, state, and national regulations affecting greenhouse operations	(i) investigate local regulations affecting greenhouse operations
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(F) investigate local, state, and national regulations affecting greenhouse operations	(ii) investigate state regulations affecting greenhouse operations
(4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:	(F) investigate local, state, and national regulations affecting greenhouse operations	(iii) investigate 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	(i) investigate environmental factors controlled in the greenhouse
(5) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:	(B) determine and calculate factors used in heating and cooling a greenhouse	(i) determine factors used in heating and cooling a greenhouse
(5) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:	(B) determine and calculate factors used in heating and cooling a greenhouse	(ii) calculate factors used in heating and cooling a greenhouse
(5) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:	(C) investigate the effects of greenhouse climate conditions such as ventilation, carbon dioxide generation, and humidity on plant growth in the greenhouse	(i) investigate the effects of greenhouse climate conditions on plant growth in the greenhouse

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:	(D) explore the importance of light quality, quantity, and duration on the production of greenhouse crops	(i) explore the importance of light quality on the production of greenhouse crops
(5) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:	(D) explore the importance of light quality, quantity, and duration on the production of greenhouse crops	(ii) explore the importance of light quantity on the production of greenhouse crops
(5) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:	(D) explore the importance of light quality, quantity, and duration on the production of greenhouse crops	(iii) explore the importance of light duration on the production of greenhouse crops
(5) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:	(E) compare open and closed environmental systems in the greenhouse such as misting beds or hydroponics	(i) compare open and closed environmental systems in the greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(A) explain how to operate and maintain heating, cooling, and ventilation systems in a greenhouse	(i) explain how to operate heating systems in a greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(A) explain how to operate and maintain heating, cooling, and ventilation systems in a greenhouse	(ii) explain how to operate cooling systems in a greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(A) explain how to operate and maintain heating, cooling, and ventilation systems in a greenhouse	(iii) explain how to operate ventilation systems in a greenhouse

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(A) explain how to operate and maintain heating, cooling, and ventilation systems in a greenhouse	(iv) explain how to maintain heating systems in a greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(A) explain how to operate and maintain heating, cooling, and ventilation systems in a greenhouse	(v) explain how to maintain cooling systems in a greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(A) explain how to operate and maintain heating, cooling, and ventilation systems in a greenhouse	(vi) explain how to maintain ventilation systems in a greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(B) explain how to operate and maintain electrical systems in a greenhouse	(i) explain how to operate electrical systems in a greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(B) explain how to operate and maintain electrical systems in a greenhouse	(ii) explain how to maintain electrical systems in a greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(C) explain how to operate and maintain various water systems in a greenhouse	(i) explain how to operate various water systems in a greenhouse
(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:	(C) explain how to operate and maintain various water systems in a greenhouse	(ii) explain how to maintain various water systems in a greenhouse

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student propagates greenhouse crops. The student is expected to:	(A) analyze different methods of propagating greenhouse crops using sexual and asexual propagation methods	(i) analyze different methods of propagating greenhouse crops using sexual propagation methods
(7) The student propagates greenhouse crops. The student is expected to:	(A) analyze different methods of propagating greenhouse crops using sexual and asexual propagation methods	(ii) analyze different methods of propagating greenhouse crops using asexual propagation methods
(7) The student propagates greenhouse crops. The student is expected to:	(B) propagate greenhouse crops using various methods such as using seeds, seedlings, plugs, cuttings, and tissue culture	(i) propagate greenhouse crops using various methods
(7) The student propagates greenhouse crops. The student is expected to:	(C) investigate physiological conditions that affect plant propagation such as seed dormancy and root initiation	(i) investigate physiological conditions that affect plant propagation
(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	(i) explain the chemical differences in greenhouse media components
(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	(ii) explain the physical differences in greenhouse media components
(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	(iii) demonstrate the chemical differences in greenhouse media components
(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	(iv) demonstrate the physical differences in greenhouse media components

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(B) compare greenhouse growing mixes for factors such as drainage and nutrient-holding capacity	(i) compare greenhouse growing mixes for factors
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(C) compare and contrast different containers, benches, and other production equipment used in greenhouse crop production	(i) compare and contrast different containers used in greenhouse crop production
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(C) compare and contrast different containers, benches, and other production equipment used in greenhouse crop production	(ii) compare and contrast different benches used in greenhouse crop production
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(C) compare and contrast different containers, benches, and other production equipment used in greenhouse crop production	(iii) compare and contrast different production equipment used in greenhouse crop production
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(D) evaluate different methods of watering greenhouse crops	(i) evaluate different methods of watering greenhouse crops
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(E) analyze the effect of nutrients on greenhouse plant growth	(i) analyze the effect of nutrients on greenhouse plant growth
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(F) diagnose common nutrient deficiency symptoms found in greenhouse crops	(i) diagnose common nutrient deficiency symptoms found in greenhouse crops
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(G) develop fertilization plans that address greenhouse crop needs and environmental impacts	(i) develop fertilization plans that address greenhouse crop needs

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student identifies and investigates greenhouse crop production factors. The student is expected to:	(G) develop fertilization plans that address greenhouse crop needs and environmental impacts	(ii) develop fertilization plans that address 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 a greenhouse	(i) assess insect infestations in a greenhouse
(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 a greenhouse	(ii) assess pathogen infestations in a greenhouse
(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 a greenhouse	(iii) assess weed infestations in a greenhouse
(9) The student investigates pest identification and control methods in the greenhouse environment. The student is expected to:	(B) implement Integrated Pest Management in controlling an insect, pathogen, or weed problem	(i) implement Integrated Pest Management in controlling an insect, pathogen, or weed problem
(9) The student investigates pest identification and control methods in the greenhouse environment. The student is expected to:	(C) use appropriate greenhouse pesticide application techniques and equipment	(i) use appropriate greenhouse pesticide application techniques
(9) The student investigates pest identification and control methods in the greenhouse environment. The student is expected to:	(C) use appropriate greenhouse pesticide application techniques and equipment	(ii) use appropriate greenhouse pesticide application equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student investigates pest identification and control methods in the greenhouse environment. The student is expected to:	(D) research chemicals used to regulate plant growth in the greenhouse	(i) research chemicals used to regulate plant growth in the greenhouse
(9) The student investigates pest identification and control methods in the greenhouse environment. The student is expected to:	(E) examine pesticide labeling and safety data sheets	(i) examine pesticide labeling
(9) The student investigates pest identification and control methods in the greenhouse environment. The student is expected to:	(E) examine pesticide labeling and safety data sheets	(ii) examine safety data sheets
(10) The student performs greenhouse management business procedures. The student is expected to:	(A) market greenhouse crops	(i) market greenhouse crops
(10) The student performs greenhouse management business procedures. The student is expected to:	(B) transport greenhouse crops	(i) transport greenhouse crops
(10) The student performs greenhouse management business procedures. The student is expected to:	(C) analyze materials, labor, and administrative costs related to greenhouse production	(i) analyze materials costs related to greenhouse production
(10) The student performs greenhouse management business procedures. The student is expected to:	(C) analyze materials, labor, and administrative costs related to greenhouse production	(ii) analyze labor costs related to greenhouse production
(10) The student performs greenhouse management business procedures. The student is expected to:	(C) analyze materials, labor, and administrative costs related to greenhouse production	(iii) analyze administrative costs related to greenhouse production

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student performs greenhouse management business procedures. The student is expected to:	(D) analyze methods used to maintain crop quality during marketing and transport	(i) analyze methods used to maintain crop quality during marketing
(10) The student performs greenhouse management business procedures. The student is expected to:	(D) analyze methods used to maintain crop quality during marketing and transport	(ii) analyze methods used to maintain crop quality during transport
(10) The student performs greenhouse management business procedures. The student is expected to:	(E) prepare a production schedule for a greenhouse crop	(i) prepare a production schedule for a greenhouse crop

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.25 Advanced Plant and Soil Science (One Credit), Adopted 2015
<p>(a) General Requirements. This course is recommended for students in Grades 11 and 12. Recommended prerequisites: Biology, Integrated Physics and Chemistry, Chemistry, or Physics and a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster. Students must meet the 40% laboratory and fieldwork requirement. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Advanced Plant and Soil Science provides a way of learning about the natural world. Students should know how plant and soil science has influenced a vast body of knowledge, that there are still applications to be discovered, and that plant and soil science is the basis for many other fields of science. To prepare for careers in plant and soil science, students must attain academic skills and knowledge, acquire technical knowledge and skills related to plant and soil science and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(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.</p>	
<p>(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.</p> <p>(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).</p> <p>(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.</p> <p>(8) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of plant systems
(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	(ii) identify entrepreneurship opportunities in the field of plant systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in plant systems	(i) apply competencies related to resources in plant systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in plant systems	(ii) apply competencies related to information in plant systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in plant systems	(iii) apply competencies related to interpersonal skills in plant systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in plant systems	(iv) apply competencies related to systems of operation in plant systems

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety practices in the workplace	(i) demonstrate knowledge of personal safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate knowledge of personal and occupational safety practices in the workplace	(ii) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employer expectations and appropriate work habits	(i) identify employer expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) identify employer expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship, including advocacy
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(ii) demonstrate characteristics of good citizenship, including stewardship

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(iii) demonstrate characteristics of good citizenship, including community leadership
(2) 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	(i) demonstrate safe practices during laboratory investigations
(2) 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	(ii) demonstrate safe practices during field investigations
(2) 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:	(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials	(i) demonstrate an understanding of the use of resources
(2) 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:	(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials	(ii) demonstrate an understanding of the conservation of resources

Knowledge and Skill Statement	Student Expectation	Breakout
(2) 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:	(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials	(iii) demonstrate an understanding of the proper disposal or recycling of materials
(3) 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)(4) of this section	(i) know the definition of science, as specified in subsection (b)(4) [above]
(3) 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)(4) of this section	(ii) understand that [science] has limitations, as specified in subsection (b)(4) [above]
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(i) know that hypotheses are tentative statements that must be capable of being supported or not supported by observational evidence
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(ii) know that hypotheses are testable statements that must be capable of being supported or not supported by observational evidence

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(iii) [know that] hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(i) know [that] scientific theories are based on natural and physical phenomena
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(ii) know [that] scientific theories are capable of being tested by multiple independent researchers

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(iii) [know that] unlike hypotheses, scientific theories are well-established explanations
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(iv) [know that], unlike hypotheses, scientific theories are highly-reliable explanations
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(v) [know that] scientific theories may be subject to change as new areas of science are developed

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(vi) [know that] scientific theories may be subject to change as new technologies are developed
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(D) distinguish between scientific hypotheses and scientific theories	(i) distinguish between scientific hypotheses and scientific theories
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(i) plan descriptive investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(ii) plan descriptive investigations, including formulating testable hypotheses
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(iii) plan descriptive investigations, including selecting equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(iv) implement descriptive investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(v) implement descriptive investigations, including selecting equipment
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(vi) implement descriptive investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(vii) plan comparative investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(viii) plan comparative investigations, including formulating testable hypotheses

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(ix) plan comparative investigations, including selecting equipment
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(x) plan comparative investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xi) implement comparative investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xii) implement comparative investigations, including formulating testable hypotheses
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xiii) implement comparative investigations, including selecting equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xiv) implement comparative investigations, including selecting technology
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xv) plan experimental investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xvi) plan experimental investigations, including formulating testable hypotheses
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xvii) plan experimental investigations, including selecting equipment
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xviii) plan experimental investigations, including selecting technology

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xix) implement experimental investigations, including asking questions
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xx) implement experimental investigations, including formulating testable hypotheses
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xxi) implement experimental investigations, including selecting equipment
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology	(xxii) implement experimental investigations, including selecting technology

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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, analysis kits, sieve sets, sieve shakers, soil augers, soil moisture meters, hand lenses, Celsius thermometers, 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</p>	<p>(i) collect qualitative data using [various] tools</p>
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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, analysis kits, sieve sets, sieve shakers, soil augers, soil moisture meters, hand lenses, Celsius thermometers, 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</p>	<p>(ii) organize qualitative data using [various] tools</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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, analysis kits, sieve sets, sieve shakers, soil augers, soil moisture meters, hand lenses, Celsius thermometers, 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</p>	<p>(iii) collect quantitative data using [various] tools</p>
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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, analysis kits, sieve sets, sieve shakers, soil augers, soil moisture meters, hand lenses, Celsius thermometers, 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</p>	<p>(iv) organize quantitative data using [various] tools</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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, analysis kits, sieve sets, sieve shakers, soil augers, soil moisture meters, hand lenses, Celsius thermometers, 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</p>	<p>(v) make measurements with accuracy using [various] tools</p>
<p>(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:</p>	<p>(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, analysis kits, sieve sets, sieve shakers, soil augers, soil moisture meters, hand lenses, Celsius thermometers, 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</p>	<p>(vi) make measurements with precision using [various] tools</p>

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(G) analyze, evaluate, make inferences, and predict trends from data	(i) analyze data
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(G) analyze, evaluate, make inferences, and predict trends from data	(ii) evaluate data
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(G) analyze, evaluate, make inferences, and predict trends from data	(iii) make inferences from data
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(G) analyze, evaluate, make inferences, and predict trends from data	(iv) predict trends from data
(3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:	(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	(i) communicate valid conclusions supported by the data through [various] methods
(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	(i) in all fields of science, analyze scientific explanations by using empirical evidence

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(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:</p>	<p>(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</p>	<p>(ii) in all fields of science, analyze scientific explanations by using logical reasoning</p>
<p>(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:</p>	<p>(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</p>	<p>(iii) in all fields of science, analyze scientific explanations by using experimental testing</p>
<p>(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:</p>	<p>(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</p>	<p>(iv) in all fields of science, analyze scientific explanations by using observational testing</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(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:</p>	<p>(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</p>	<p>(v) in all fields of science, analyze scientific explanations, including examining all sides of scientific evidence of those scientific explanations</p>
<p>(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:</p>	<p>(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</p>	<p>(vi) in all fields of science, evaluate scientific explanations by using empirical evidence</p>
<p>(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:</p>	<p>(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</p>	<p>(vii) in all fields of science, evaluate scientific explanations by using logical reasoning</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(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:</p>	<p>(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</p>	<p>(viii) in all fields of science, evaluate scientific explanations by using experimental testing</p>
<p>(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:</p>	<p>(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</p>	<p>(ix) in all fields of science, evaluate scientific explanations by using observational testing</p>
<p>(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:</p>	<p>(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</p>	<p>(x) in all fields of science, evaluate scientific explanations, including examining all sides of scientific evidence of those scientific explanations</p>

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(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:</p>	<p>(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</p>	<p>(xi) in all fields of science, critique scientific explanations by using empirical evidence</p>
<p>(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:</p>	<p>(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</p>	<p>(xii) in all fields of science, critique scientific explanations by using logical reasoning</p>
<p>(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:</p>	<p>(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</p>	<p>(xiii) in all fields of science, critique scientific explanations by using experimental testing</p>

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(xiv) in all fields of science, critique scientific explanations by using observational testing
(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	(xv) in all fields of science, critique scientific explanations, including examining all sides of scientific evidence of those scientific explanations
(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:	(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials	(i) communicate scientific information extracted from various sources
(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:	(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials	(ii) apply scientific information extracted from various sources

Knowledge and Skill Statement	Student Expectation	Breakout
(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:	(C) draw inferences based on data related to promotional materials for products and services	(i) draw inferences based on data related to promotional materials for products
(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:	(C) draw inferences based on data related to promotional materials for products and services	(ii) draw inferences based on data related to promotional materials for services
(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:	(D) evaluate the impact of scientific research on society and the environment	(i) evaluate the impact of scientific research on society
(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:	(D) evaluate the impact of scientific research on society and the environment	(ii) evaluate the impact of scientific research on the environment
(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:	(E) evaluate models according to their limitations in representing biological objects or events	(i) evaluate models according to their limitations in representing biological objects or events
(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:	(F) research and describe the history of biology and contributions of scientists	(i) research the history of biology

Knowledge and Skill Statement	Student Expectation	Breakout
(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:	(F) research and describe the history of biology and contributions of scientists	(ii) research contributions of scientists
(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:	(F) research and describe the history of biology and contributions of scientists	(iii) describe the history of biology
(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:	(F) research and describe the history of biology and contributions of scientists	(iv) describe the contributions of scientists
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(5) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(5) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(5) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(5) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(6) The student analyzes plant and soil science as it relates to plant and soil relationships affecting the production of food, fiber, and other economic crops. The student is expected to:	(A) explain the importance and interrelationship of soil and plants	(i) explain the importance of soil

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student analyzes plant and soil science as it relates to plant and soil relationships affecting the production of food, fiber, and other economic crops. The student is expected to:	(A) explain the importance and interrelationship of soil and plants	(ii) explain the importance of plants
(6) The student analyzes plant and soil science as it relates to plant and soil relationships affecting the production of food, fiber, and other economic crops. The student is expected to:	(A) explain the importance and interrelationship of soil and plants	(iii) explain the interrelationship of soil and plants
(6) The student analyzes plant and soil science as it relates to plant and soil relationships affecting the production of food, fiber, and other economic crops. The student is expected to:	(B) practice soil and plant evaluation as it applies to agricultural and urban settings	(i) practice soil evaluation as it applies to agricultural settings
(6) The student analyzes plant and soil science as it relates to plant and soil relationships affecting the production of food, fiber, and other economic crops. The student is expected to:	(B) practice soil and plant evaluation as it applies to agricultural and urban settings	(ii) practice soil evaluation as it applies to urban settings
(6) The student analyzes plant and soil science as it relates to plant and soil relationships affecting the production of food, fiber, and other economic crops. The student is expected to:	(B) practice soil and plant evaluation as it applies to agricultural and urban settings	(iii) practice plant evaluation as it applies to agricultural settings

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student analyzes plant and soil science as it relates to plant and soil relationships affecting the production of food, fiber, and other economic crops. The student is expected to:	(B) practice soil and plant evaluation as it applies to agricultural and urban settings	(iv) practice plant evaluation as it applies to urban settings
(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 investigation to solve problems in plant and soil science	(i) design research in a laboratory or field investigation to solve problems in plant science and soil science
(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 investigation to solve problems in plant and soil science	(ii) conduct research in a laboratory or field investigation to solve problems in plant science and soil science
(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 investigation to solve problems in plant and soil science	(iii) complete research in a laboratory or field investigation to solve problems in plant science and soil science
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(B) use charts, tables, and graphs to prepare written summaries of results and data obtained in a laboratory or field investigation	(i) use charts to prepare written summaries of results obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(B) use charts, tables, and graphs to prepare written summaries of results and data obtained in a laboratory or field investigation	(ii) use charts to prepare written summaries of data obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(B) use charts, tables, and graphs to prepare written summaries of results and data obtained in a laboratory or field investigation	(iii) use tables to prepare written summaries of results obtained in a laboratory or field investigation

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(B) use charts, tables, and graphs to prepare written summaries of results and data obtained in a laboratory or field investigation	(iv) use tables to prepare written summaries of data obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(B) use charts, tables, and graphs to prepare written summaries of results and data obtained in a laboratory or field investigation	(v) use graphs to prepare written summaries of results obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(B) use charts, tables, and graphs to prepare written summaries of results and data obtained in a laboratory or field investigation	(vi) use graphs to prepare written summaries of data obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(C) organize, analyze, evaluate, make inferences, and predict trends from data obtained in a laboratory or field investigation	(i) organize data obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(C) organize, analyze, evaluate, make inferences, and predict trends from data obtained in a laboratory or field investigation	(ii) analyze data obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(C) organize, analyze, evaluate, make inferences, and predict trends from data obtained in a laboratory or field investigation	(iii) evaluate data obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(C) organize, analyze, evaluate, make inferences, and predict trends from data obtained in a laboratory or field investigation	(iv) make inferences from data obtained in a laboratory or field investigation

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(C) organize, analyze, evaluate, make inferences, and predict trends from data obtained in a laboratory or field investigation	(v) predict trends from data obtained in a laboratory or field investigation
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(D) communicate valid outcomes and solutions	(i) communicate valid outcomes
(7) The student develops scenarios for advances in plant and soil science. The student is expected to:	(D) communicate valid outcomes and solutions	(ii) communicate valid solutions
(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	(i) identify native plants
(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	(ii) identify introduced plants
(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	(iii) assess [native plants'] role in an ecosystem
(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	(iv) assess [introcuded plants'] role in an ecosystem

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(v) compare [native plants] to plants in other ecosystems
(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	(vi) compare [introduced plants] to plants in other ecosystems
(8) The student explains the relationship of biotic and abiotic factors within habitats and ecosystems. The student is expected to:	(B) make observations and compile data about fluctuations in abiotic cycles and evaluate their effects on local ecosystems	(i) make observations about fluctuations in abiotic cycles
(8) The student explains the relationship of biotic and abiotic factors within habitats and ecosystems. The student is expected to:	(B) make observations and compile data about fluctuations in abiotic cycles and evaluate their effects on local ecosystems	(ii) compile data about fluctuations in abiotic cycles
(8) The student explains the relationship of biotic and abiotic factors within habitats and ecosystems. The student is expected to:	(B) make observations and compile data about fluctuations in abiotic cycles and evaluate their effects on local ecosystems	(iii) evaluate effects [of fluctuations of abiotic cycles] on local ecosystems
(8) The student explains the relationship of biotic and abiotic factors within habitats and ecosystems. The student is expected to:	(C) evaluate the impact of human activity such as pest control, hydroponics, and sustainable agriculture on ecosystems	(i) evaluate the impact of human activity on ecosystems
(8) The student explains the relationship of biotic and abiotic factors within habitats and ecosystems. The student is expected to:	(D) predict how the introduction, removal, or re-introduction of an organism may affect the food chain and existing populations	(i) predict how the introduction, removal, or re-introduction of an organism may affect the food chain

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student explains the relationship of biotic and abiotic factors within habitats and ecosystems. The student is expected to:	(D) predict how the introduction, removal, or re-introduction of an organism may affect the food chain and existing populations	(i) predict how the introduction, removal, or re-introduction of an organism may affect existing populations
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(A) explain soil formation	(i) explain soil formation
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(B) evaluate the properties and nature of soils	(i) evaluate the properties of soils
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(B) evaluate the properties and nature of soils	(ii) evaluate the nature of soils
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(C) recognize the importance of conservation of soil and agencies involved in conservation	(i) recognize the importance of conservation of soil
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(C) recognize the importance of conservation of soil and agencies involved in conservation	(ii) recognize the importance of agencies involved in conservation
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(D) recognize the application of soil mechanics to engineering and excavation operations	(i) recognize the application of soil mechanics to engineering operations

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(D) recognize the application of soil mechanics to engineering and excavation operations	(ii) recognize the application of soil mechanics to excavation operations
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(E) perform soil management practices such as tillage trials and sustainable soil management practices	(i) perform soil management practices
(9) The student analyzes soil science as it relates to food and fiber production. The student is expected to:	(F) practice soil evaluations related to experiential activities such as land judging	(i) practice soil evaluations related to experiential activities
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(A) summarize methods of land use and management	(i) summarize methods of land use
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(A) summarize methods of land use and management	(ii) summarize methods of land management
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(B) identify sources, use, quality, and conservation of water	(i) identify sources of water
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(B) identify sources, use, quality, and conservation of water	(ii) identify use of water

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(B) identify sources, use, quality, and conservation of water	(iii) identify quality of water
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(B) identify sources, use, quality, and conservation of water	(iv) identify conservation of water
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(C) explore the use and conservation of renewable and non-renewable resources	(i) explore the use of renewable resources
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(C) explore the use and conservation of renewable and non-renewable resources	(ii) explore the use of non-renewable resources
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(C) explore the use and conservation of renewable and non-renewable resources	(iii) explore the conservation of renewable resources
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(C) explore the use and conservation of renewable and non-renewable resources	(iv) explore the conservation of non-renewable resources
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(D) analyze and evaluate the economic significance and interdependence of components of the environment	(i) analyze the economic significance of components of the environment

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(D) analyze and evaluate the economic significance and interdependence of components of the environment	(ii) analyze the economic interdependence of components of the environment
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(D) analyze and evaluate the economic significance and interdependence of components of the environment	(iii) evaluate the economic significance of components of the environment
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(D) analyze and evaluate the economic significance and interdependence of components of the environment	(iv) evaluate the economic interdependence of components of the environment
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(E) evaluate the impact of human activity and technology on soil fertility and productivity	(i) evaluate the impact of human activity on soil fertility
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(E) evaluate the impact of human activity and technology on soil fertility and productivity	(ii) evaluate the impact of human activity on soil productivity
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(E) evaluate the impact of human activity and technology on soil fertility and productivity	(iii) evaluate the impact of technology on soil fertility
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(E) evaluate the impact of human activity and technology on soil fertility and productivity	(iv) evaluate the impact of technology on soil productivity

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(F) analyze and describe the effects on environments of events such as fire, hurricanes, deforestation, mining, population growth, and urban development	(i) analyze the effects on environments of events
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(F) analyze and describe the effects on environments of events such as fire, hurricanes, deforestation, mining, population growth, and urban development	(ii) describe the effects on environments of events
(10) The student describes the relationship between resources within environmental systems. The student is expected to:	(G) explain how regional changes in the environment may have a global effect	(i) explain how regional changes in the environment may have a global effect
(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	(i) identify sources of water in a watershed, including ground water
(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	(ii) identify sources of water in a watershed, including surface water
(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	(iii) calculate the amount of water in a watershed, including ground water
(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	(iv) calculate the amount of water in a watershed, including surface water

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student describes the origin and use of water in a watershed. The student is expected to:	(B) research and identify the type of water used in a watershed	(i) research the type of water used in a watershed
(11) The student describes the origin and use of water in a watershed. The student is expected to:	(B) research and identify the type of water used in a watershed	(ii) identify the type of water used in a watershed
(11) The student describes the origin and use of water in a watershed. The student is expected to:	(C) analyze water quality in a watershed	(i) analyze water quality in a watershed
(11) The student describes the origin and use of water in a watershed. The student is expected to:	(D) identify and use methods to evaluate water quantity available in a watershed	(i) identify methods to evaluate water quantity available in a watershed
(11) The student describes the origin and use of water in a watershed. The student is expected to:	(D) identify and use methods to evaluate water quantity available in a watershed	(ii) use methods to evaluate water quantity available in a watershed
(12) The student maps the process of soil formation influenced by weathering, including erosion processes due to water, wind, and mechanical factors influenced by climate. The student is expected to:	(A) illustrate the role of weathering in soil formations	(i) illustrate the role of weathering in soil formations

Knowledge and Skill Statement	Student Expectation	Breakout
(12) The student maps the process of soil formation influenced by weathering, including erosion processes due to water, wind, and mechanical factors influenced by climate. The student is expected to:	(B) distinguish chemical weathering from mechanical weathering	(i) distinguish chemical weathering from mechanical weathering
(12) The student maps the process of soil formation influenced by weathering, including erosion processes due to water, wind, and mechanical factors influenced by climate. The student is expected to:	(C) identify geological formations that result from differing weathering processes	(i) identify geological formations that result from differing weathering processes
(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	(i) identify the characteristics of a local watershed
(13) The student describes the dynamics of a watershed. The student is expected to:	(B) analyze the impact of floods, drought, irrigation, urbanization, and industrialization in a watershed	(i) analyze the impact of floods in a watershed
(13) The student describes the dynamics of a watershed. The student is expected to:	(B) analyze the impact of floods, drought, irrigation, urbanization, and industrialization in a watershed	(ii) analyze the impact of drought in a watershed
(13) The student describes the dynamics of a watershed. The student is expected to:	(B) analyze the impact of floods, drought, irrigation, urbanization, and industrialization in a watershed	(iii) analyze the impact of irrigation in a watershed

Knowledge and Skill Statement	Student Expectation	Breakout
(13) The student describes the dynamics of a watershed. The student is expected to:	(B) analyze the impact of floods, drought, irrigation, urbanization, and industrialization in a watershed	(iv) analyze the impact of urbanization in a watershed
(13) The student describes the dynamics of a watershed. The student is expected to:	(B) analyze the impact of floods, drought, irrigation, urbanization, and industrialization in a watershed	(v) analyze the impact of industrialization in a watershed
(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	(i) research the origin of fossil fuels
(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	(ii) describe the origin of fossil fuels
(14) The student explains how petroleum energy resources affect agriculture. The student is expected to:	(B) analyze issues regarding the use of fossil fuels and other non-renewable energy sources or alternative energy sources	(i) analyze issues regarding the use of fossil fuels or alternative energy sources
(14) The student explains how petroleum energy resources affect agriculture. The student is expected to:	(B) analyze issues regarding the use of fossil fuels and other non-renewable energy sources or alternative energy sources	(ii) analyze issues regarding the use of other non-renewable energy sources or alternative energy sources
(14) The student explains how petroleum energy resources affect agriculture. The student is expected to:	(C) analyze the significance and economic impact of the use of fossil fuels and alternative energy sources	(i) analyze the significance of the use of fossil fuels

Knowledge and Skill Statement	Student Expectation	Breakout
(14) The student explains how petroleum energy resources affect agriculture. The student is expected to:	(C) analyze the significance and economic impact of the use of fossil fuels and alternative energy sources	(ii) analyze the significance of the use of alternative energy sources
(14) The student explains how petroleum energy resources affect agriculture. The student is expected to:	(C) analyze the significance and economic impact of the use of fossil fuels and alternative energy sources	(iii) analyze the economic impact of the use of fossil fuels
(14) The student explains how petroleum energy resources affect agriculture. The student is expected to:	(C) analyze the significance and economic impact of the use of fossil fuels and alternative energy sources	(iv) analyze the economic impact of the use of alternative energy sources
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(A) analyze plant physiology, genetics, and reproduction of various crops	(i) analyze plant physiology
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(A) analyze plant physiology, genetics, and reproduction of various crops	(ii) analyze genetics
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(A) analyze plant physiology, genetics, and reproduction of various crops	(iii) analyze reproduction of various crops
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(B) recognize characteristics related to seed quality such as mechanical damage, viability, and grade	(i) recognize characteristics related to seed quality

Knowledge and Skill Statement	Student Expectation	Breakout
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(C) identify plant pests and diseases and their causes, prevention, and treatment	(i) identify plant pests and their causes
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(C) identify plant pests and diseases and their causes, prevention, and treatment	(ii) identify plant pests and their prevention
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(C) identify plant pests and diseases and their causes, prevention, and treatment	(iii) identify plant pests and their treatment
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(C) identify plant pests and diseases and their causes, prevention, and treatment	(iv) identify plant diseases and their causes
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(C) identify plant pests and diseases and their causes, prevention, and treatment	(v) identify plant diseases and their prevention
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(C) identify plant pests and diseases and their causes, prevention, and treatment	(vi) identify plant pests and their treatment
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(D) perform plant management practices such as germination tests, plant spacing trials, and fertilizer tests	(i) perform plant management practices

Knowledge and Skill Statement	Student Expectation	Breakout
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(E) measure trends in crop species and varieties grown locally in Texas and the United States and how they affect agriculture and consumers	(i) measure trends in crop species grown locally in Texas and how they affect agriculture
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(E) measure trends in crop species and varieties grown locally in Texas and the United States and how they affect agriculture and consumers	(ii) measure trends in crop species grown locally in Texas and how they affect consumers
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(E) measure trends in crop species and varieties grown locally in Texas and the United States and how they affect agriculture and consumers	(iii) measure trends in crop species grown in the United States and how they affect agriculture
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(E) measure trends in crop species and varieties grown locally in Texas and the United States and how they affect agriculture and consumers	(iv) measure trends in crop species grown in the United States and how they affect consumers
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(E) measure trends in crop species and varieties grown locally in Texas and the United States and how they affect agriculture and consumers	(v) measure trends in crop varieties grown locally in Texas and how they affect agriculture
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(E) measure trends in crop species and varieties grown locally in Texas and the United States and how they affect agriculture and consumers	(vi) measure trends in crop varieties grown locally in Texas and how they affect consumers

Knowledge and Skill Statement	Student Expectation	Breakout
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(E) measure trends in crop species and varieties grown locally in Texas and the United States and how they affect agriculture and consumers	(vii) measure trends in crop varieties grown in the United States and how they affect agriculture
(15) The student evaluates components of plant science as they relate to crop production. The student is expected to:	(E) measure trends in crop species and varieties grown locally in Texas and the United States and how they affect agriculture and consumers	(viii) measure trends in crop varieties grown in the United States and how they affect consumers
(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	(i) compare cells from different parts of the plant, including roots, to show specialization of structures
(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	(ii) compare cells from different parts of the plant, including stems, to show specialization of structures
(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	(iii) compare cells from different parts of the plant, including leaves, to show specialization of structures
(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	(iv) compare cells from different parts of the plant, including roots, to show specialization of functions

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(v) compare cells from different parts of the plant, including stems, to show specialization of functions
(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	(vi) compare cells from different parts of the plant, including leaves, to show specialization of functions
(16) The student identifies how plants grow and how specialized cells, tissues, and organs develop. The student is expected to:	(B) sequence the levels of organization in multicellular organisms that relate the parts to each other and the whole	(i) sequence the levels of organization in multicellular organisms that relate the parts to each other
(16) The student identifies how plants grow and how specialized cells, tissues, and organs develop. The student is expected to:	(B) sequence the levels of organization in multicellular organisms that relate the parts to each other and the whole	(ii) sequence the levels of organization in multicellular organisms that relate the parts to the whole
(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 (DNA) and illustrate how information for specifying the traits of an organism is carried in DNA	(i) describe components of deoxyribonucleic acid (DNA)
(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 (DNA) and illustrate how information for specifying the traits of an organism is carried in DNA	(ii) illustrate how information for specifying the traits of an organism is carried in DNA

Knowledge and Skill Statement	Student Expectation	Breakout
(17) The student diagrams the structure and function of nucleic acids in the mechanism of genetics. The student is expected to:	(B) identify and illustrate how changes in DNA cause phenotypic or genotypic changes	(i) identify how changes in DNA cause phenotypic or genotypic changes
(17) The student diagrams the structure and function of nucleic acids in the mechanism of genetics. The student is expected to:	(B) identify and illustrate how changes in DNA cause phenotypic or genotypic changes	(ii) illustrate how changes in DNA cause phenotypic or genotypic changes
(17) The student diagrams the structure and function of nucleic acids in the mechanism of genetics. The student is expected to:	(C) compare and contrast genetic variations observed in plants and animals	(i) compare and contrast genetic variations observed in plants
(17) The student diagrams the structure and function of nucleic acids in the mechanism of genetics. The student is expected to:	(C) compare and contrast genetic variations observed in plants and animals	(ii) compare and contrast genetic variations observed in animals
(17) The student diagrams the structure and function of nucleic acids in the mechanism of genetics. The student is expected to:	(D) compare the processes of mitosis and meiosis and their significance	(i) compare the processes of mitosis and meiosis
(17) The student diagrams the structure and function of nucleic acids in the mechanism of genetics. The student is expected to:	(D) compare the processes of mitosis and meiosis and their significance	(ii) compare [the] significance of [mitosis and meiosis]
(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	(i) describe the growth of major crops

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(ii) describe the development of major crops
(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:	(B) apply principles of genetics and plant breeding	(i) apply principles of genetics
(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:	(B) apply principles of genetics and plant breeding	(ii) apply principles of plant breeding
(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:	(C) examine the development of crop varieties through the origin of agriculture	(i) examine the development of crop varieties through the origin of agriculture

Knowledge and Skill Statement	Student Expectation	Breakout
(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:	(D) design and conduct investigations to support known principles of genetics	(i) design investigations to support known principles of genetics
(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:	(D) design and conduct investigations to support known principles of genetics	(ii) conduct investigations to support known principles of genetics
(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	(i) compare the structures of different types of organic molecules
(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	(ii) compare the functions of different types of organic molecules
(19) The student explains the chemistry involved in plants at the cellular level. The student is expected to:	(B) compare the energy flow in photosynthesis to the energy flow in cellular respiration	(i) compare the energy flow in photosynthesis to the energy flow in cellular respiration
(19) The student explains the chemistry involved in plants at the cellular level. The student is expected to:	(C) investigate and identify the effect of enzymes on plant cells	(i) investigate the effect of enzymes on plant cells
(19) The student explains the chemistry involved in plants at the cellular level. The student is expected to:	(C) investigate and identify the effect of enzymes on plant cells	(ii) identify the effect of enzymes on plant cells

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) summarize forms of energy
(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	(ii) summarize sources of energy
(20) The student identifies the sources and flow of energy through environmental systems. The student is expected to:	(B) explain the flow of energy in an environment	(i) explain the flow of energy in an environment
(20) The student identifies the sources and flow of energy through environmental systems. The student is expected to:	(C) investigate and explain the effects of energy transformations in an ecosystem	(i) investigate the effects of energy transformations in an ecosystem
(20) The student identifies the sources and flow of energy through environmental systems. The student is expected to:	(C) investigate and explain the effects of energy transformations in an ecosystem	(ii) explain the effects of energy transformations in an ecosystem
(20) The student identifies the sources and flow of energy through environmental systems. The student is expected to:	(D) investigate and identify energy interaction in an ecosystem	(i) investigate energy interaction in an ecosystem
(20) The student identifies the sources and flow of energy through environmental systems. The student is expected to:	(D) investigate and identify energy interaction in an ecosystem	(ii) identify energy interaction in an ecosystem

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.26. Agricultural Mechanics and Metal Technologies (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p> <p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Agricultural Mechanics and Metal Technologies is designed to develop an understanding of agricultural mechanics as it relates to safety and skills in tool operation, electrical wiring, plumbing, carpentry, fencing, concrete, and metal working techniques. To prepare for careers in agricultural power, structural, and technical systems, students must attain academic skills and knowledge; acquire technical knowledge and skills related to power, structural, and technical agricultural systems and the industry; and develop knowledge and skills regarding career opportunities, entry requirements, industry certifications, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 power, structural, and technical agricultural systems	(i) identify career development opportunities in the field of power, structural, and technical agricultural systems
(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 power, structural, and technical agricultural systems	(ii) identify entrepreneurship opportunities in the field of power, structural, and technical agricultural systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation of power, structural, and technical agricultural systems	(i) apply competencies related to resources of power, structural, and technical agricultural systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation of power, structural, and technical agricultural systems	(ii) apply competencies related to information of power, structural, and technical agricultural systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation of power, structural, and technical agricultural systems	(iii) apply competencies related to interpersonal skills of power, structural, and technical agricultural systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation of power, structural, and technical agricultural systems	(iv) apply competencies related to problem solving of power, structural, and technical agricultural systems

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation of power, structural, and technical agricultural systems	(v) apply competencies related to critical thinking of power, structural, and technical agricultural systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation of power, structural, and technical agricultural systems	(vi) apply competencies related to systems of operation of power, structural, and technical agricultural systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(i) examine licensing requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(ii) examine certification requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(iii) examine credentialing requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health, safety, and first-aid practices in the industry	(i) demonstrate knowledge of personal health practices in the industry

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health, safety, and first-aid practices in the industry	(ii) demonstrate knowledge of occupational health practices in the industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health, safety, and first-aid practices in the industry	(iii) demonstrate knowledge of safety practices in the industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health, safety, and first-aid practices in the industry	(iv) demonstrate knowledge of first-aid practices in the industry
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employer expectations and appropriate work habits	(i) identify employer expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employer expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship, including advocacy
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(ii) demonstrate characteristics of good citizenship, including stewardship

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(iii) demonstrate characteristics of good citizenship, including community leadership
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(A) select, use, maintain, and store appropriate hand tools to perform a given task	(i) select appropriate hand tools to perform a given task
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(A) select, use, maintain, and store appropriate hand tools to perform a given task	(ii) use appropriate hand tools to perform a given task
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(A) select, use, maintain, and store appropriate hand tools to perform a given task	(iii) maintain appropriate hand tools to perform a given task
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(A) select, use, maintain, and store appropriate hand tools to perform a given task	(iv) store appropriate hand tools to perform a given task

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(B) select, use, maintain, and store appropriate power equipment such as tools powered by electric, pneumatic, and internal combustion engines	(i) select appropriate power equipment
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(B) select, use, maintain, and store appropriate power equipment such as tools powered by electric, pneumatic, and internal combustion engines	(ii) use appropriate power equipment
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(B) select, use, maintain, and store appropriate power equipment such as tools powered by electric, pneumatic, and internal combustion engines	(iii) maintain appropriate power equipment
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(B) select, use, maintain, and store appropriate power equipment such as tools powered by electric, pneumatic, and internal combustion engines	(iv) store appropriate power equipment
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(C) select and use measuring and marking devices	(i) select measuring devices
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(C) select and use measuring and marking devices	(ii) select marking devices
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(C) select and use measuring and marking devices	(iii) use measuring devices

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student follows operating instructions for tools and equipment to perform a given task. The student is expected to:	(C) select and use measuring and marking devices	(iv) use marking devices
(4) The student identifies and performs electric wiring skills. The student is expected to:	(A) identify principles of electricity and wiring terminology	(i) identify principles of electricity
(4) The student identifies and performs electric wiring skills. The student is expected to:	(A) identify principles of electricity and wiring terminology	(ii) identify wiring terminology
(4) The student identifies and performs electric wiring skills. The student is expected to:	(B) install electric wiring components and fixtures to comply with governmental regulations and applicable codes	(i) install electric wiring components to comply with governmental regulations
(4) The student identifies and performs electric wiring skills. The student is expected to:	(B) install electric wiring components and fixtures to comply with governmental regulations and applicable codes	(ii) install electric wiring components to comply with applicable codes
(4) The student identifies and performs electric wiring skills. The student is expected to:	(B) install electric wiring components and fixtures to comply with governmental regulations and applicable codes	(iii) install electric fixtures to comply with governmental regulations
(4) The student identifies and performs electric wiring skills. The student is expected to:	(B) install electric wiring components and fixtures to comply with governmental regulations and applicable codes	(iv) install electric fixtures to comply with applicable codes

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student identifies and performs electric wiring skills. The student is expected to:	(C) maintain electric motors	(i) maintain electric motors
(5) The student performs plumbing skills. The student is expected to:	(A) identify and use plumbing tools	(i) identify plumbing tools
(5) The student performs plumbing skills. The student is expected to:	(A) identify and use plumbing tools	(ii) use plumbing tools
(5) The student performs plumbing skills. The student is expected to:	(B) identify plumbing fixtures	(i) identify plumbing fixtures
(6) The student performs concrete construction skills. The student is expected to:	(A) project cost estimates for materials	(i) project cost estimates for materials
(6) The student performs concrete construction skills. The student is expected to:	(B) form and pour concrete slabs	(i) form concrete slabs
(6) The student performs concrete construction skills. The student is expected to:	(B) form and pour concrete slabs	(ii) pour concrete slabs
(7) The student performs carpentry skills. The student is expected to:	(A) identify materials used in agricultural construction	(i) identify materials used in agricultural construction
(7) The student performs carpentry skills. The student is expected to:	(B) identify elements of a cost estimate and prepare a bid package for a planned project	(i) identify elements of a cost estimate

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student performs carpentry skills. The student is expected to:	(B) identify elements of a cost estimate and prepare a bid package for a planned project	(ii) prepare a bid package for a planned project
(7) The student performs carpentry skills. The student is expected to:	(C) demonstrate basic carpentry skills	(i) demonstrate basic carpentry skills
(7) The student performs carpentry skills. The student is expected to:	(D) paint and protect a project with coatings	(i) paint a project with coatings
(7) The student performs carpentry skills. The student is expected to:	(D) paint and protect a project with coatings	(ii) protect a project with coatings
(8) The student identifies fencing methods. The student is expected to:	(A) select fencing materials	(i) select fencing materials
(8) The student identifies fencing methods. The student is expected to:	(B) plan and install fences	(i) plan fences
(8) The student identifies fencing methods. The student is expected to:	(B) plan and install fences	(ii) install fences
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(A) identify types of metal	(i) identify types of metal
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(B) cut, file, shape, and drill metal	(i) cut metal

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(B) cut, file, shape, and drill metal	(ii) file metal
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(B) cut, file, shape, and drill metal	(iii) shape metal
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(B) cut, file, shape, and drill metal	(iv) drill metal
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(C) select and operate oxy-fuel welding and cutting equipment to meet standards	(i) select oxy-fuel welding equipment
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(C) select and operate oxy-fuel welding and cutting equipment to meet standards	(ii) select oxy-fuel cutting equipment
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(C) select and operate oxy-fuel welding and cutting equipment to meet standards	(iii) operate oxy-fuel welding equipment to meet standards
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(C) select and operate oxy-fuel welding and cutting equipment to meet standards	(iv) operate oxy-fuel cutting equipment to meet standards
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(D) select and operate electric-arc welding equipment to meet standards	(i) select electric-arc welding equipment
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(D) select and operate electric-arc welding equipment to meet standards	(ii) operate electric-arc welding equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(E) perform specialty welding and cutting techniques to meet standards	(i) perform specialty welding techniques to meet standards
(9) The student performs appropriate cold and hot metal techniques. The student is expected to:	(E) perform specialty welding and cutting techniques to meet standards	(ii) perform specialty cutting techniques to meet standards
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(i) select appropriate tools
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(ii) select appropriate equipment
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(iii) select appropriate facilities
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(iv) use appropriate tools
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(v) use appropriate equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(vi) use appropriate facilities
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(vii) maintain appropriate tools
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(viii) maintain appropriate equipment
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(A) select, use, and maintain appropriate tools, equipment, and facilities	(ix) maintain appropriate facilities
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(B) identify and determine properties, types, and uses of metal	(i) identify properties of metal
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(B) identify and determine properties, types, and uses of metal	(ii) identify types of metal
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(B) identify and determine properties, types, and uses of metal	(iii) identify uses of metal

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(B) identify and determine properties, types, and uses of metal	(iv) determine properties of metal
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(B) identify and determine properties, types, and uses of metal	(v) determine types of metal
(10) The student applies processes relating to assembly of equipment in agricultural systems operations. The student is expected to:	(B) identify and determine properties, types, and uses of metal	(vi) determine 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	(i) analyze site requirements
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(A) analyze site, equipment, and permit requirements	(ii) analyze equipment requirements
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(A) analyze site, equipment, and permit requirements	(iii) analyze permit requirements
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(B) operate computer-aided drafting design software	(i) operate computer-aided drafting design software
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(C) develop, read, and interpret designs and sketches	(i) develop designs

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(C) develop, read, and interpret designs and sketches	(ii) develop sketches
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(C) develop, read, and interpret designs and sketches	(iii) read designs
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(C) develop, read, and interpret designs and sketches	(iv) read sketches
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(C) develop, read, and interpret designs and sketches	(v) interpret designs
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(C) develop, read, and interpret designs and sketches	(vi) interpret sketches
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(D) estimate material needs and costs	(i) estimate material needs
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(D) estimate material needs and costs	(ii) estimate material costs
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(E) measure, mark, and cut material	(i) measure material
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(E) measure, mark, and cut material	(ii) mark material

Knowledge and Skill Statement	Student Expectation	Breakout
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(E) measure, mark, and cut material	(iii) cut material
(11) The student plans and performs cost-effective construction techniques. The student is expected to:	(F) perform specialized nonmetallic fabrication techniques	(i) perform specialized nonmetallic fabrication techniques

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.27. Agricultural Structures Design and Fabrication (One Credit), Adopted 2015.
(a) General Requirements. This course is recommended for students in Grades 11 and 12. Recommended prerequisite: Agricultural Mechanics and Metal Technologies. Students shall be awarded one credit for successful completion of this course.	
(b) Introduction.	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) In Agricultural Structures Design and Fabrication, students will explore career opportunities, entry requirements, and industry expectations. To prepare for careers in mechanized agriculture and technical systems, students must attain knowledge and skills related to agricultural structures design and fabrication. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their academic knowledge and technical skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of mechanized agriculture
(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	(ii) identify entrepreneurship opportunities in the field of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture	(i) apply competencies related to resources of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture	(ii) apply competencies related to information of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture	(iii) apply competencies related to interpersonal skills of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture	(iv) apply competencies related to systems of operation of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) research licensing, certification, and credentialing requirements	(i) research licensing requirements

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) research licensing, certification, and credentialing requirements	(ii) research certification requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) research licensing, certification, and credentialing requirements	(iii) research credentialing requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(i) demonstrate knowledge of personal health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(ii) demonstrate knowledge of personal safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iii) demonstrate knowledge of occupational health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iv) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employer expectations and appropriate work habits	(i) identify employer expectations

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employer expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship, including advocacy
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(ii) demonstrate characteristics of good citizenship, including stewardship
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(iii) demonstrate characteristics of good citizenship, including community leadership
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:	(A) develop building plans	(i) develop building plans
(3) The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:	(B) select site and locate agricultural building placement	(i) select site [for] agricultural building placement

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:	(B) select site and locate agricultural building placement	(ii) locate agricultural building placement
(3) The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:	(C) estimate materials and costs needed for construction with an emphasis on renewable eco-friendly materials	(i) estimate materials needed for construction with an emphasis on renewable eco-friendly materials
(3) The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:	(C) estimate materials and costs needed for construction with an emphasis on renewable eco-friendly materials	(ii) estimate costs needed for construction with an emphasis on renewable eco-friendly materials
(3) The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:	(D) select appropriate environmental control systems with a special emphasis on green technology	(i) select appropriate environmental control systems with a special emphasis on green technology
(3) The student demonstrates principles of facilities design and fabrication related to agricultural structures. The student is expected to:	(E) use computer-aided design software as appropriate	(i) use computer-aided design software as appropriate
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(A) define the terms and principles of electricity	(i) define the terms of electricity
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(A) define the terms and principles of electricity	(ii) define the principles of electricity

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(B) estimate electrical needs and loads	(i) estimate electrical needs
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(B) estimate electrical needs and loads	(ii) estimate electrical loads
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(C) plan installations using local codes and National Electric Code guidelines	(i) plan installations using local codes
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(C) plan installations using local codes and National Electric Code guidelines	(ii) plan installations using National Electric Code guidelines
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(D) demonstrate the use of various meters	(i) demonstrate the use of various meters
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(E) select circuit wiring materials and supplies	(i) select circuit wiring materials
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(E) select circuit wiring materials and supplies	(ii) select circuit wiring supplies

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(F) demonstrate electrical systems repair	(i) demonstrate electrical systems repair
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(G) explore alternative power systems, including solar, wind, and biomass	(i) explore alternative power systems, including solar
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(G) explore alternative power systems, including solar, wind, and biomass	(ii) explore alternative power systems, including wind
(4) The student explores the different types of power systems used in agricultural structures. The student is expected to:	(G) explore alternative power systems, including solar, wind, and biomass	(iii) explore alternative power systems, including biomass
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(A) demonstrate appropriate use of surveying equipment	(i) demonstrate appropriate use of surveying equipment
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(B) demonstrate and apply Geographic Information System (GIS) and Global Positioning System (GPS) principles	(i) demonstrate Geographic Information System (GIS) principles
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(B) demonstrate and apply Geographic Information System (GIS) and Global Positioning System (GPS) principles	(ii) demonstrate Global Positioning System (GPS) principles

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(B) demonstrate and apply Geographic Information System (GIS) and Global Positioning System (GPS) principles	(iii) apply Geographic Information System (GIS) principles
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(B) demonstrate and apply Geographic Information System (GIS) and Global Positioning System (GPS) principles	(iv) apply Global Positioning System (GPS) principles
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(C) reinforce, place, finish, and cure concrete	(i) reinforce concrete
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(C) reinforce, place, finish, and cure concrete	(ii) place concrete
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(C) reinforce, place, finish, and cure concrete	(iii) finish concrete
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(C) reinforce, place, finish, and cure concrete	(iv) cure concrete
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(D) plan, establish, and maintain water-management systems	(i) plan water-management systems
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(D) plan, establish, and maintain water-management systems	(ii) establish water-management systems
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(D) plan, establish, and maintain water-management systems	(iii) maintain water-management systems

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(E) identify non-traditional structural building techniques, including industry trends that are eco-friendly	(i) identify non-traditional structural building techniques, including industry trends that are eco-friendly
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(F) discuss the use of masonry and drywall construction	(i) discuss the use of masonry construction
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(F) discuss the use of masonry and drywall construction	(ii) discuss the use of drywall construction
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(G) install doors, windows, and roofing materials	(i) install doors
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(G) install doors, windows, and roofing materials	(ii) install windows
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(G) install doors, windows, and roofing materials	(iii) install roofing materials
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(H) install plumbing equipment and fixtures to comply with governmental regulations and applicable codes	(i) install plumbing equipment to comply with governmental regulations
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(H) install plumbing equipment and fixtures to comply with governmental regulations and applicable codes	(ii) install plumbing equipment to comply with applicable codes
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(H) install plumbing equipment and fixtures to comply with governmental regulations and applicable codes	(iii) install plumbing fixtures to comply with governmental regulations

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student constructs agricultural structures using appropriate technology. The student is expected to:	(H) install plumbing equipment and fixtures to comply with governmental regulations and applicable codes	(iv) install plumbing fixtures to comply with 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	(i) explain the operations of safe oxy-fuel cutting
(6) The student demonstrates metal construction techniques related to agricultural design and fabrication of structures. The student is expected to:	(B) demonstrate safe electrical welding	(i) demonstrate safe electrical welding

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.28. Agricultural Equipment Design and Fabrication (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 11 and 12. Recommended prerequisite: Agricultural Mechanics and Metal Technologies. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) In Agricultural Equipment Design and Fabrication, students will acquire knowledge and skills related to the design and fabrication of agricultural equipment. To prepare for careers in mechanized agriculture and technical systems, students must attain knowledge and skills related to agricultural equipment design and fabrication. To prepare for success, students reinforce, apply, and transfer their academic knowledge and technical skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) identify career development opportunities in the field of mechanized agriculture
(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	(ii) identify entrepreneurship opportunities in the field of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture	(i) apply competencies related to resources of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture	(ii) apply competencies related to information of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture	(iii) apply competencies related to interpersonal skills of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, and systems of operation of mechanized agriculture	(iv) apply competencies related to systems of operation of mechanized agriculture
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) research licensing, certification, and credentialing requirements	(i) research licensing requirements

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) research licensing, certification, and credentialing requirements	(ii) research certification requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) research licensing, certification, and credentialing requirements	(iii) research credentialing requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(i) demonstrate knowledge of personal health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(ii) demonstrate knowledge of personal safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iii) demonstrate knowledge of occupational health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iv) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employer expectations and appropriate work habits	(i) identify employer expectations

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employer expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship, including advocacy
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(ii) demonstrate characteristics of good citizenship, including stewardship
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(iii) demonstrate characteristics of good citizenship, including community leadership
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(A) develop project construction plans	(i) develop project construction plans
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(B) select appropriate construction and finish materials for different types of agricultural equipment	(i) select appropriate construction materials for different types of agricultural equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(B) select appropriate construction and finish materials for different types of agricultural equipment	(ii) select appropriate finish materials for different types of agricultural equipment
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(C) estimate materials and costs needed for construction with an emphasis on renewable and eco-friendly materials	(i) estimate materials needed for construction with an emphasis on renewable materials
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(C) estimate materials and costs needed for construction with an emphasis on renewable and eco-friendly materials	(ii) estimate costs needed for construction with an emphasis on renewable materials
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(C) estimate materials and costs needed for construction with an emphasis on renewable and eco-friendly materials	(iii) estimate materials needed for construction with an emphasis on ecofriendly materials
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(C) estimate materials and costs needed for construction with an emphasis on renewable and eco-friendly materials	(iv) estimate costs needed for construction with an emphasis on ecofriendly materials
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(D) construct one or more agricultural equipment projects using measuring and mechanical skills	(i) construct one or more agricultural equipment projects using measuring skills
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(D) construct one or more agricultural equipment projects using measuring and mechanical skills	(ii) construct one or more agricultural equipment projects using mechanical skills

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(E) integrate a logical order of operations into the construction of an agricultural equipment project	(i) integrate a logical order of operations into the construction of an agricultural equipment project
(3) The student demonstrates principles of design and fabrication related to agricultural machinery and equipment. The student is expected to:	(F) use computer-aided design software	(i) 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	(i) select site
(4) The student plans, constructs, and maintains fences, corrals, and other agricultural enclosures. The student is expected to:	(A) select site and locate enclosures	(ii) locate enclosures
(4) The student plans, constructs, and maintains fences, corrals, and other agricultural enclosures. The student is expected to:	(B) estimate materials and building costs	(i) estimate materials
(4) The student plans, constructs, and maintains fences, corrals, and other agricultural enclosures. The student is expected to:	(B) estimate materials and building costs	(ii) estimate building costs
(4) The student plans, constructs, and maintains fences, corrals, and other agricultural enclosures. The student is expected to:	(C) define appropriate construction methods that are friendly to the environment	(i) define appropriate construction methods that are friendly to the environment

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:	(A) operate oxy-fuel and plasma cutting equipment safely	(i) operate oxy-fuel cutting equipment safely
(5) The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:	(A) operate oxy-fuel and plasma cutting equipment safely	(ii) operate plasma cutting equipment safely
(5) The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:	(B) proficiently demonstrate safe electrical welding	(i) proficiently demonstrate safe electrical welding
(5) The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:	(C) use hand and power tools safely in the construction and repair of agricultural equipment safely	(i) use hand tools safely in the construction of agricultural equipment
(5) The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:	(C) use hand and power tools safely in the construction and repair of agricultural equipment safely	(ii) use hand tools safely in the repair of agricultural equipment safely
(5) The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:	(C) use hand and power tools safely in the construction and repair of agricultural equipment safely	(iii) use power tools safely in the construction of agricultural equipment
(5) The student demonstrates construction techniques related to design and fabrication of agricultural equipment. The student is expected to:	(C) use hand and power tools safely in the construction and repair of agricultural equipment safely	(iv) use power tools safely in the repair of agricultural equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(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 American National Standards Institute (ANSI), American Society of Agricultural Engineers (ASAE), or Occupational Safety and Health Administration (OSHA) into the construction of agricultural equipment	(i) incorporate industry standards developed by entities into the construction 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:	(B) design and build equipment in compliance with state and federal laws enforced by agencies such as the U.S. Department of Transportation (DOT)	(i) design equipment in compliance with state laws enforced by agencies
(6) The student demonstrates knowledge of laws and regulations related to the construction, design and fabrication of agricultural equipment. The student is expected to:	(B) design and build equipment in compliance with state and federal laws enforced by agencies such as the U.S. Department of Transportation (DOT)	(ii) design equipment in compliance with federal laws enforced by agencies
(6) The student demonstrates knowledge of laws and regulations related to the construction, design and fabrication of agricultural equipment. The student is expected to:	(B) design and build equipment in compliance with state and federal laws enforced by agencies such as the U.S. Department of Transportation (DOT)	(iii) build equipment in compliance with state laws enforced by agencies
(6) The student demonstrates knowledge of laws and regulations related to the construction, design and fabrication of agricultural equipment. The student is expected to:	(B) design and build equipment in compliance with state and federal laws enforced by agencies such as the U.S. Department of Transportation (DOT)	(iv) build equipment in compliance with federal laws enforced by agencies

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.29. Agricultural Power Systems (Two Credits), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Agriculture, Food, and Natural Resources. Students shall be awarded two credits for successful completion of this course.</p>	
<p>(b) Introduction.</p> <p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Agricultural Power Systems is designed to develop an understanding of power and control systems as related to energy sources, small and large power systems, and agricultural machinery. To prepare for careers in agricultural power, structural, and technical systems, students must attain academic skills and knowledge; acquire technical knowledge and skills related to power, structural, and technical agricultural systems and the workplace; and develop knowledge and skills regarding career opportunities, entry requirements, industry certifications, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and technical skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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 power, structural, and technical systems	(i) identify career development opportunities in the field of power, structural, and technical systems
(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 power, structural, and technical systems	(ii) identify entrepreneurship opportunities in the field of power, structural, and technical systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in power, structural, and technical systems	(i) apply competencies related to resources in power, structural, and technical systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in power, structural, and technical systems	(ii) apply competencies related to information in power, structural, and technical systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in power, structural, and technical systems	(iii) apply competencies related to interpersonal skills in power, structural, and technical systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in power, structural, and technical systems	(iv) apply competencies related to problem solving in power, structural, and technical systems

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in power, structural, and technical systems	(v) apply competencies related to critical thinking in power, structural, and technical systems
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(i) examine licensing requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(ii) examine certification requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) examine licensing, certification, and credentialing requirements to maintain compliance with industry requirements	(iii) examine credentialing requirements to maintain compliance with industry requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(i) demonstrate knowledge of personal health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(ii) demonstrate knowledge of personal safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iii) demonstrate knowledge of occupational health practices in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) demonstrate knowledge of personal and occupational health and safety practices in the workplace	(iv) demonstrate knowledge of occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employer expectations and appropriate work habits	(i) identify employer expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) identify employer expectations and appropriate work habits	(ii) identify appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(i) demonstrate characteristics of good citizenship, including advocacy
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(ii) demonstrate characteristics of good citizenship, including stewardship
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) demonstrate characteristics of good citizenship, including advocacy, stewardship, and community leadership	(iii) demonstrate characteristics of good citizenship, including community leadership
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student connects power generation to differing energy sources. The student is expected to:	(A) examine benefits and detriments of petroleum and alternative energy sources	(i) examine benefits of petroleum
(3) The student connects power generation to differing energy sources. The student is expected to:	(A) examine benefits and detriments of petroleum and alternative energy sources	(ii) examine benefits of alternative energy sources
(3) The student connects power generation to differing energy sources. The student is expected to:	(A) examine benefits and detriments of petroleum and alternative energy sources	(iii) examine detriments of petroleum
(3) The student connects power generation to differing energy sources. The student is expected to:	(A) examine benefits and detriments of petroleum and alternative energy sources	(iv) examine detriments of alternative energy sources
(3) The student connects power generation to differing energy sources. The student is expected to:	(B) compare environmental impacts of varying energy sources	(i) compare environmental impacts of varying energy sources
(3) The student connects power generation to differing energy sources. The student is expected to:	(C) compare efficiency and characteristics of different energy sources	(i) compare efficiency of different energy sources
(3) The student connects power generation to differing energy sources. The student is expected to:	(C) compare efficiency and characteristics of different energy sources	(ii) compare characteristics of different energy sources
(3) The student connects power generation to differing energy sources. The student is expected to:	(D) investigate the efficiency of power generation systems that use various energy sources	(i) 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	(i) select standard tools common to power applications

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(ii) select standard equipment common to power applications
(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	(iii) select standard safety procedures common to power applications
(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	(iv) select standard tools common to control applications
(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	(v) select standard equipment common to control applications
(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	(vi) select standard safety procedures common to control applications
(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	(vii) identify standard tools common to power applications
(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	(viii) identify standard equipment common to power applications

Knowledge and Skill Statement	Student Expectation	Breakout
(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	(ix) identify standard safety procedures common to power applications
(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	(x) identify standard tools common to control applications
(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	(xi) identify standard equipment common to control applications
(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	(xii) identify standard safety procedures common to control applications
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(B) follow operating instructions of specialized tools and equipment such as micrometers, digital multimeters, and dynamometers	(i) follow operating instructions of specialized tools
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(B) follow operating instructions of specialized tools and equipment such as micrometers, digital multimeters, and dynamometers	(ii) follow operating instructions of specialized equipment
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(C) set up and adjust tools and equipment such as dynamometers, flow meters, torque wrenches, lathes, and mills	(i) set up tools

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(C) set up and adjust tools and equipment such as dynamometers, flow meters, torque wrenches, lathes, and mills	(ii) set up equipment
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(C) set up and adjust tools and equipment such as dynamometers, flow meters, torque wrenches, lathes, and mills	(iii) adjust tools
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(C) set up and adjust tools and equipment such as dynamometers, flow meters, torque wrenches, lathes, and mills	(iv) adjust equipment
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(D) maintain and store tools and equipment common to power and control applications	(i) maintain tools common to power applications
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(D) maintain and store tools and equipment common to power and control applications	(ii) maintain tools common to control applications
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(D) maintain and store tools and equipment common to power and control applications	(iii) maintain equipment common to power applications
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(D) maintain and store tools and equipment common to power and control applications	(iv) maintain equipment common to control applications

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(D) maintain and store tools and equipment common to power and control applications	(v) store tools common to power applications
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(D) maintain and store tools and equipment common to power and control applications	(vi) store tools common to control applications
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(D) maintain and store tools and equipment common to power and control applications	(vi) store equipment common to power applications
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(D) maintain and store tools and equipment common to power and control applications	(vii) store equipment common to control applications
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(E) inventory tools and equipment in a service or maintenance facility	(i) inventory tools in a service or maintenance facility
(4) The student selects the appropriate tool to perform a given task related to agricultural power systems. The student is expected to:	(E) inventory tools and equipment in a service or maintenance facility	(ii) inventory 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	(i) describe principles of operation of internal combustion engines
(5) The student selects, operates, and maintains small engines. The student is expected to:	(B) disassemble and reassemble small engines	(i) disassemble small engines

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student selects, operates, and maintains small engines. The student is expected to:	(B) disassemble and reassemble small engines	(ii) reassemble small engines
(5) The student selects, operates, and maintains small engines. The student is expected to:	(C) select, maintain, and troubleshoot small engines	(i) select small engines
(5) The student selects, operates, and maintains small engines. The student is expected to:	(C) select, maintain, and troubleshoot small engines	(ii) maintain small engines
(5) The student selects, operates, and maintains small engines. The student is expected to:	(C) select, maintain, and troubleshoot small engines	(iii) troubleshoot small engines
(5) The student selects, operates, and maintains small engines. The student is expected to:	(D) research small engine industry certifications	(i) 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	(i) identify agricultural equipment for appropriate tasks to obtain a desired result
(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	(ii) select agricultural equipment for appropriate tasks to obtain a desired result
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(B) identify and maintain component materials such as bearings, hydraulic cylinders, seals, chains, and drives on varying types of machines and equipment	(i) identify component materials on varying types of machines

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(B) identify and maintain component materials such as bearings, hydraulic cylinders, seals, chains, and drives on varying types of machines and equipment	(ii) identify component materials on varying types of equipment
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(B) identify and maintain component materials such as bearings, hydraulic cylinders, seals, chains, and drives on varying types of machines and equipment	(iii) maintain component materials on varying types of machines
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(B) identify and maintain component materials such as bearings, hydraulic cylinders, seals, chains, and drives on varying types of machines and equipment	(iv) maintain component materials on varying types of equipment
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(C) ensure the presence and function of safety devices such as guards and shields and hardware on machinery and equipment	(i) ensure the presence of safety devices on machinery
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(C) ensure the presence and function of safety devices such as guards and shields and hardware on machinery and equipment	(ii) ensure the presence of safety devices on equipment
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(C) ensure the presence and function of safety devices such as guards and shields and hardware on machinery and equipment	(iii) ensure the function of safety devices on machinery
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(C) ensure the presence and function of safety devices such as guards and shields and hardware on machinery and equipment	(iv) ensure the function of safety devices on equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(D) calibrate metering, monitoring, and sensing equipment on various equipment such as tillage, harvest, transport, and haying equipment	(i) calibrate metering equipment on various equipment
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(D) calibrate metering, monitoring, and sensing equipment on various equipment such as tillage, harvest, transport, and haying equipment	(ii) calibrate monitoring equipment on various equipment
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(D) calibrate metering, monitoring, and sensing equipment on various equipment such as tillage, harvest, transport, and haying equipment	(iii) calibrate sensing equipment on various equipment
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(E) perform pre-operation inspection and appropriate start-up procedures, identify causes of equipment malfunctions and failures, perform scheduled preventive maintenance, and safely operate equipment	(i) perform pre-operation inspection
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(E) perform pre-operation inspection and appropriate start-up procedures, identify causes of equipment malfunctions and failures, perform scheduled preventive maintenance, and safely operate equipment	(ii) perform appropriate start-up procedures
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(E) perform pre-operation inspection and appropriate start-up procedures, identify causes of equipment malfunctions and failures, perform scheduled preventive maintenance, and safely operate equipment	(iii) identify causes of equipment malfunctions

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(E) perform pre-operation inspection and appropriate start-up procedures, identify causes of equipment malfunctions and failures, perform scheduled preventive maintenance, and safely operate equipment	(iv) identify causes of equipment failures
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(E) perform pre-operation inspection and appropriate start-up procedures, identify causes of equipment malfunctions and failures, perform scheduled preventive maintenance, and safely operate equipment	(v) perform scheduled preventive maintenance
(6) The student selects, operates, and maintains agricultural machines and equipment. The student is expected to:	(E) perform pre-operation inspection and appropriate start-up procedures, identify causes of equipment malfunctions and failures, perform scheduled preventive maintenance, and safely operate equipment	(vi) 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	(i) select tractors based upon application
(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	(ii) select tractors based upon power requirements
(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	(iii) describe or perform safe operation of tractors in various applications

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(i) maintain intake system components, including shrouds
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(ii) maintain intake system components, including screens
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(iii) maintain intake system components, including filters
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(iv) maintain intake system components, including piping
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(v) maintain intake system components, including after-coolers
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(vi) maintain intake system components, including air induction systems

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(viii) maintain intake system components, including manifolds
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(viii) maintain exhaust system components, including shrouds
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(ix) maintain exhaust system components, including screens
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(x) maintain exhaust system components, including filters
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(xi) maintain exhaust system components, including piping
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(xii) maintain exhaust system components, including manifolds

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(xiii) maintain exhaust system components, including exhaust scrubbers
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(B) maintain intake and exhaust system components, including shrouds, screens, filters, piping, after-coolers, air induction systems, manifolds, exhaust scrubbers, and mufflers	(xiv) maintain exhaust system components, including mufflers
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(C) select lubricants and apply appropriate lubrication as required by maintenance schedules	(i) select lubricants
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(C) select lubricants and apply appropriate lubrication as required by maintenance schedules	(ii) apply appropriate lubrication as required by maintenance schedules
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(D) identify and maintain various fuel systems, power trains, and hydraulic systems used on farm tractors	(i) identify various fuel systems used on farm tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(D) identify and maintain various fuel systems, power trains, and hydraulic systems used on farm tractors	(ii) identify various power trains used on farm tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(D) identify and maintain various fuel systems, power trains, and hydraulic systems used on farm tractors	(iii) identify various hydraulic systems used on farm tractors

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(D) identify and maintain various fuel systems, power trains, and hydraulic systems used on farm tractors	(iv) maintain various fuel systems used on farm tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(D) identify and maintain various fuel systems, power trains, and hydraulic systems used on farm tractors	(v) maintain various power trains used on farm tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(D) identify and maintain various fuel systems, power trains, and hydraulic systems used on farm tractors	(vi) maintain various hydraulic systems used on farm tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(E) explain charging, starting, operating, and igniting direct current electrical systems	(i) explain charging direct current electrical systems
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(E) explain charging, starting, operating, and igniting direct current electrical systems	(ii) explain starting direct current electrical systems
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(E) explain charging, starting, operating, and igniting direct current electrical systems	(iii) explain operating direct current electrical systems
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(E) explain charging, starting, operating, and igniting direct current electrical systems	(iv) explain igniting direct current electrical systems

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(F) maintain steering and braking systems	(i) maintain steering systems
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(F) maintain steering and braking systems	(ii) maintain braking systems
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(G) maintain tires and tracks and describe the role of ballasting and traction in farm tractors	(i) maintain tires
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(G) maintain tires and tracks and describe the role of ballasting and traction in farm tractors	(ii) maintain tracks
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(G) maintain tires and tracks and describe the role of ballasting and traction in farm tractors	(iii) describe the role of ballasting in farm tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(G) maintain tires and tracks and describe the role of ballasting and traction in farm tractors	(iv) describe the role of traction in farm tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(H) explain the operation of and maintain liquid- and air-cooling systems in tractors	(i) explain the operation of liquid-cooling systems in tractors

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(H) explain the operation of and maintain liquid- and air-cooling systems in tractors	(ii) explain the operation of air-cooling systems in tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(H) explain the operation of and maintain liquid- and air-cooling systems in tractors	(iii) maintain liquid-cooling systems in tractors
(7) The student selects, operates, and maintains tractors and agricultural power systems. The student is expected to:	(H) explain the operation of and maintain liquid- and air-cooling systems in tractors	(iv) maintain 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) collect data and troubleshoot electrical systems using various meters and test equipment such as digital multimeters	(i) collect data using various meters
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(A) collect data and troubleshoot electrical systems using various meters and test equipment such as digital multimeters	(ii) collect data using various test equipment
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(A) collect data and troubleshoot electrical systems using various meters and test equipment such as digital multimeters	(iii) troubleshoot electrical systems using various meters
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(A) collect data and troubleshoot electrical systems using various meters and test equipment such as digital multimeters	(iv) troubleshoot electrical systems using various test equipment

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(B) employ appropriate techniques for applying devices, controls, and grounding in electrical systems	(i) employ appropriate techniques for applying devices in electrical systems
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(B) employ appropriate techniques for applying devices, controls, and grounding in electrical systems	(ii) employ appropriate techniques for applying controls in electrical systems
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(B) employ appropriate techniques for applying devices, controls, and grounding in electrical systems	(iii) employ appropriate techniques for applying grounding in electrical systems
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(C) apply local and national codes and regulations relevant in electrical systems	(i) apply local codes relevant in electrical systems
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(C) apply local and national codes and regulations relevant in electrical systems	(ii) apply local regulations relevant in electrical systems
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(C) apply local and national codes and regulations relevant in electrical systems	(iii) apply national codes relevant in electrical systems
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(C) apply local and national codes and regulations relevant in electrical systems	(iv) apply national regulations relevant in electrical systems

Knowledge and Skill Statement	Student Expectation	Breakout
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(D) select and apply electric controls such as motor controls, switches, circuit breakers, timers, sensors, and relays	(i) select electric controls
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(D) select and apply electric controls such as motor controls, switches, circuit breakers, timers, sensors, and relays	(ii) apply electric controls
(8) The student monitors and controls electrical systems as related to agricultural machines and equipment. The student is expected to:	(E) interpret data generated by electrical monitoring systems	(i) interpret data generated by electrical monitoring systems
(9) The student implements control systems related to agricultural machines and equipment. The student is expected to:	(A) analyze schematic drawings for electrical control systems	(i) analyze schematic drawings for electrical control systems
(9) The student implements control systems related to agricultural machines and equipment. The student is expected to:	(B) describe uses of various electrical control system components	(i) describe uses of various electrical control system components
(9) The student implements control systems related to agricultural machines and equipment. The student is expected to:	(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	(i) install control system components
(9) The student implements control systems related to agricultural machines and equipment. The student is expected to:	(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	(ii) properly use appropriate tools

Knowledge and Skill Statement	Student Expectation	Breakout
(9) The student implements control systems related to agricultural machines and equipment. The student is expected to:	(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	(iii) properly use appropriate procedures
(9) The student implements control systems related to agricultural machines and equipment. The student is expected to:	(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	(iv) properly use appropriate safety practices
(9) The student implements control systems related to agricultural machines and equipment. The student is expected to:	(D) identify system performance problems and apply troubleshooting techniques using monitoring or troubleshooting devices	(i) identify system performance problems using monitoring or troubleshooting devices
(9) The student implements control systems related to agricultural machines and equipment. The student is expected to:	(D) identify system performance problems and apply troubleshooting techniques using monitoring or troubleshooting devices	(ii) apply troubleshooting techniques using monitoring 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	(i) describe the operation of open center hydraulic systems
(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	(ii) describe the operation of closed center hydraulic systems
(10) The student describes hydraulic controls and applications as related to agricultural machines and equipment. The student is expected to:	(B) explain the purpose and function of hydraulic controls such as valves, motors, pumps, cylinders, manifolds, and meters	(i) explain the purpose of hydraulic controls

Knowledge and Skill Statement	Student Expectation	Breakout
(10) The student describes hydraulic controls and applications as related to agricultural machines and equipment. The student is expected to:	(B) explain the purpose and function of hydraulic controls such as valves, motors, pumps, cylinders, manifolds, and meters	(ii) explain the function of hydraulic controls
(10) The student describes hydraulic controls and applications as related to agricultural machines and equipment. The student is expected to:	(C) create basic hydraulic circuits using a variety of hydraulic controls	(i) 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	(i) explain the application of pneumatic systems
(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	(ii) explain the application of pneumatic controls
(11) The student describes additional control systems as related to agricultural machines and equipment. The student is expected to:	(B) explain the application of water or other fluid control systems to agricultural machines and equipment and their components	(i) explain the application of water or other fluid control systems to agricultural machines
(11) The student describes additional control systems as related to agricultural machines and equipment. The student is expected to:	(B) explain the application of water or other fluid control systems to agricultural machines and equipment and their components	(ii) explain the application of water or other fluid control systems to agricultural equipment
(11) The student describes additional control systems as related to agricultural machines and equipment. The student is expected to:	(B) explain the application of water or other fluid control systems to agricultural machines and equipment and their components	(iii) explain [water or other fluid control systems] components

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.30. Agricultural Laboratory and Field Experience (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 11 and 12 as a corequisite course for students participating in a coherent sequence of career and technical education Courses in the the Agriculture Food and Natural Resources Career Cluster. This course provides an enhancement opportunity for students to develop the additional skills necessary to pursue industry certification. Recommended prerequisite: a minimum of one credit from the courses in Agriculture, Food, and Natural Resources Career Cluster. Corequisite: any course in the Agriculture, Food, and Natural Resources Career Cluster, excluding Principles of Agriculture, Food, and Natural Resources. This course must be taken concurrently with a corequisite course from the Agriculture, Food, and Natural Resources Career Cluster and may not be taken as a stand-alone course. Districts are encouraged to offer this lab in a consecutive block with the corequisite course to allow a students sufficient time to master the content of both courses. Students shall be awarded one credit for successful completion of this course.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Agriculture Laboratory and Field Experience is designed to provide students a laboratory and/or field experience opportunity. To prepare for careers in agriculture, food, and natural resources, students must acquire knowledge and skills that meet entry requirements and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer academic knowledge and technical skills in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(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	(i) investigate career development opportunities in agriculture, food, and natural resources
(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	(ii) investigate entrepreneurship opportunities in agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, and interpersonal skills	(i) apply competencies related to resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, and interpersonal skills	(ii) apply competencies related to information
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) apply competencies related to resources, information, and interpersonal skills	(iii) apply competencies related to interpersonal skills
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) practice personal and occupational health and safety practices in the workplace	(i) practice personal health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) practice personal and occupational health and safety practices in the workplace	(ii) practice personal safety practices in the workplace

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) practice personal and occupational health and safety practices in the workplace	(iii) practice occupational health practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) practice personal and occupational health and safety practices in the workplace	(iv) practice occupational safety practices in the workplace
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) examine employer expectations and exhibit appropriate work habits	(i) examine employer expectations
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) examine employer expectations and exhibit appropriate work habits	(ii) exhibit appropriate work habits
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) develop good characteristics of citizenship, including advocacy, stewardship, and community leadership	(i) develop good characteristics of citizenship, including advocacy
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) develop good characteristics of citizenship, including advocacy, stewardship, and community leadership	(ii) develop good characteristics of citizenship, including stewardship
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) develop good characteristics of citizenship, including advocacy, stewardship, and community leadership	(iii) develop good characteristics of citizenship, including community leadership

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) pursue appropriate licensing, certification, and credentialing requirements	(i) pursue appropriate licensing requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) pursue appropriate licensing, certification, and credentialing requirements	(ii) pursue appropriate certification requirements
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) pursue appropriate licensing, certification, and credentialing requirements	(iii) pursue appropriate credentialing requirements
(2) The student uses technology to research a project. The student is expected to:	(A) effectively use search engines, databases, and other digital electronic tools to locate information	(i) effectively use search engines to locate information
(2) The student uses technology to research a project. The student is expected to:	(A) effectively use search engines, databases, and other digital electronic tools to locate information	(ii) effectively use databases to locate information
(2) The student uses technology to research a project. The student is expected to:	(A) effectively use search engines, databases, and other digital electronic tools to locate information	(iii) effectively use other digital electronic tools to locate information
(2) The student uses technology to research a project. The student is expected to:	(B) evaluate quality, accuracy, completeness, reliability, and currency of information from any source	(i) evaluate quality of information from any source
(2) The student uses technology to research a project. The student is expected to:	(B) evaluate quality, accuracy, completeness, reliability, and currency of information from any source	(ii) evaluate accuracy of information from any source

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student uses technology to research a project. The student is expected to:	(B) evaluate quality, accuracy, completeness, reliability, and currency of information from any source	(iii) evaluate completeness of information from any source
(2) The student uses technology to research a project. The student is expected to:	(B) evaluate quality, accuracy, completeness, reliability, and currency of information from any source	(iv) evaluate reliability of information from any source
(2) The student uses technology to research a project. The student is expected to:	(B) evaluate quality, accuracy, completeness, reliability, and currency of information from any source	(v) evaluate currency of information from any source
(2) The student uses technology to research a project. The student is expected to:	(C) prepare, organize, present, and apply independent research	(i) prepare independent research
(2) The student uses technology to research a project. The student is expected to:	(C) prepare, organize, present, and apply independent research	(ii) organize independent research
(2) The student uses technology to research a project. The student is expected to:	(C) prepare, organize, present, and apply independent research	(iii) present independent research
(2) The student uses technology to research a project. The student is expected to:	(C) prepare, organize, present, and apply independent research	(iv) apply independent research
(2) The student uses technology to research a project. The student is expected to:	(D) accept constructive criticism and revise personal views when warranted by valid evidence	(i) accept constructive criticism
(2) The student uses technology to research a project. The student is expected to:	(D) accept constructive criticism and revise personal views when warranted by valid evidence	(ii) revise personal views when warranted by valid evidence

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student develops an elevated aptitude for the essential knowledge and skills listed for the corequisite course. The student is expected to:	(A) demonstrate deeper understanding of the corequisite course	(i) demonstrate deeper understanding of the corequisite course
(3) The student develops an elevated aptitude for the essential knowledge and skills listed for the corequisite course. The student is expected to:	(B) develop mastery of hands-on skills at an industry-accepted standard	(ii) develop mastery of hands-on skills at an industry-accepted standard
(3) The student develops an elevated aptitude for the essential knowledge and skills listed for the corequisite course. The student is expected to:	(C) exhibit progress toward achieving industry-recognized documentation of specific expertise in an agriculture, food, and natural resources field or skill	(iii) exhibit progress toward achieving industry-recognized documentation of specific expertise in an agriculture, food, and natural resources field or skill

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.31. Practicum in Agriculture, Food, and Natural Resources (Two Credits), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 11 and 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 Career Cluster. Recommended prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster. Students shall be awarded two credits for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Practicum in Agriculture, Food, and Natural Resources is designed to give students supervised practical application of knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experiences such as employment, independent study, internships, assistantships, mentorships, or laboratories. To prepare for careers in agriculture, food and natural resources, students must attain academic skills and knowledge, acquire technical knowledge and skills related to the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(A) adhere to policies and procedures	(i) adhere to policies
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(A) adhere to policies and procedures	(ii) adhere to procedures
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate positive work behaviors and attitudes, including punctuality, time management, initiative, and cooperation	(i) demonstrate positive work behaviors, including punctuality
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate positive work behaviors and attitudes, including punctuality, time management, initiative, and cooperation	(ii) demonstrate positive work behaviors, including time management
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate positive work behaviors and attitudes, including punctuality, time management, initiative, and cooperation	(iii) demonstrate positive work behaviors, including initiative
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate positive work behaviors and attitudes, including punctuality, time management, initiative, and cooperation	(iv) demonstrate positive work behaviors, including cooperation
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) demonstrate positive work behaviors and attitudes, including punctuality, time management, initiative, and cooperation	(v) demonstrate positive work attitudes

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) apply constructive criticism and critical feedback from supervisor and peers	(i) apply constructive criticism from supervisor
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) apply constructive criticism and critical feedback from supervisor and peers	(ii) apply constructive criticism from peers
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) apply constructive criticism and critical feedback from supervisor and peers	(iii) apply critical feedback from supervisor
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) apply constructive criticism and critical feedback from supervisor and peers	(iv) apply critical feedback from peers
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) apply ethical reasoning to a variety of situations in order to make ethical decisions	(i) apply ethical reasoning to a variety of situations in order to make ethical decisions
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) complete tasks with high standards to ensure quality products and services	(i) complete tasks with high standards to ensure quality products
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) complete tasks with high standards to ensure quality products and services	(ii) complete tasks with high standards to ensure quality services

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) model professional appearance, including using appropriate dress, grooming, and personal protective equipment	(i) model professional appearance, including using appropriate dress
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) model professional appearance, including using appropriate dress, grooming, and personal protective equipment	(ii) model professional appearance, including using appropriate grooming
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) model professional appearance, including using appropriate dress, grooming, and personal protective equipment	(iii) model professional appearance, including using appropriate personal protective equipment
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(G) comply with practicum setting safety rules and regulations to maintain safe and healthful working conditions and environments	(i) comply with practicum setting safety rules and regulations to maintain safe working conditions
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(G) comply with practicum setting safety rules and regulations to maintain safe and healthful working conditions and environments	(ii) comply with practicum setting safety rules and regulations to maintain safe environments
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(G) comply with practicum setting safety rules and regulations to maintain safe and healthful working conditions and environments	(iii) comply with practicum setting safety rules and regulations to maintain healthful working conditions
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(G) comply with practicum setting safety rules and regulations to maintain safe and healthful working conditions and environments	(iv) comply with practicum setting safety rules and regulations to maintain healthful environments

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(i) plan a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(ii) propose a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iii) conduct a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(iv) document a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity	(v) evaluate a supervised agriculture experience program as an experiential learning activity
(2) The student develops a supervised agriculture experience program. The student is expected to:	(B) apply proper record-keeping skills as they relate to the supervised agriculture experience	(i) apply proper record-keeping skills as they relate to the supervised agriculture experience
(2) The student develops a supervised agriculture experience program. The student is expected to:	(C) participate in youth leadership opportunities to create a well-rounded experience program	(i) participate in youth leadership opportunities to create a well-rounded experience program
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(i) produce a local program of activities using a strategic planning process

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student develops a supervised agriculture experience program. The student is expected to:	(D) produce and participate in a local program of activities using a strategic planning process	(ii) participate in a local program of activities using a strategic planning process
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(A) analyze elements of a problem to develop creative and innovative solutions	(i) analyze elements of a problem to develop creative solutions
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(A) analyze elements of a problem to develop creative and innovative solutions	(ii) analyze elements of a problem to develop innovative solutions
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(B) analyze information to determine value to the problem-solving task	(i) analyze information to determine value to the problem-solving task
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(C) compare and contrast alternatives using a variety of problem-solving and critical-thinking skills	(i) compare and contrast alternatives using a variety of problem-solving skills
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(C) compare and contrast alternatives using a variety of problem-solving and critical-thinking skills	(ii) compare and contrast alternatives using a variety of critical-thinking skills
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(D) conduct technical research to gather information necessary for decision making	(i) conduct technical research to gather information necessary for decision making
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(A) analyze leadership characteristics in relation to trust, positive attitude, integrity, and willingness to accept key responsibilities in a work situation	(i) analyze leadership characteristics in relation to trust in a work situation
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(A) analyze leadership characteristics in relation to trust, positive attitude, integrity, and willingness to accept key responsibilities in a work situation	(ii) analyze leadership characteristics in relation to positive attitude in a work situation

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(A) analyze leadership characteristics in relation to trust, positive attitude, integrity, and willingness to accept key responsibilities in a work situation	(iii) analyze leadership characteristics in relation to integrity in a work situation
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(A) analyze leadership characteristics in relation to trust, positive attitude, integrity, and willingness to accept key responsibilities in a work situation	(iv) analyze leadership characteristics in relation to willingness to accept key responsibilities in a work situation
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(B) demonstrate teamwork skills through working cooperatively with others to achieve tasks	(i) demonstrate teamwork skills through working cooperatively with others to achieve tasks
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(C) demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution	(i) demonstrate teamwork processes that promote team-building
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(C) demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution	(ii) demonstrate teamwork processes that promote consensus
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(C) demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution	(iii) demonstrate teamwork processes that promote continuous improvement

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(C) demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution	(iv) demonstrate teamwork processes that promote respect for the opinions of others
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(C) demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution	(v) demonstrate teamwork processes that promote cooperation
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(C) demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution	(vi) demonstrate teamwork processes that promote adaptability
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(C) demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution	(vii) demonstrate teamwork processes that promote conflict resolution
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(D) demonstrate responsibility for shared group and individual work tasks	(i) demonstrate responsibility for shared group work tasks
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(D) demonstrate responsibility for shared group and individual work tasks	(ii) demonstrate responsibility for shared individual work tasks

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(E) establish and maintain effective working relationships in order to accomplish objectives and tasks	(i) establish effective working relationships in order to accomplish objectives
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(E) establish and maintain effective working relationships in order to accomplish objectives and tasks	(ii) establish effective working relationships in order to accomplish tasks
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(E) establish and maintain effective working relationships in order to accomplish objectives and tasks	(iii) maintain effective working relationships in order to accomplish objectives
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(E) establish and maintain effective working relationships in order to accomplish objectives and tasks	(iv) maintain effective working relationships in order to accomplish tasks
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(F) demonstrate effective working relationships using interpersonal skills in order to accomplish objectives and tasks	(i) demonstrate effective working relationships using interpersonal skills in order to accomplish objectives
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(F) demonstrate effective working relationships using interpersonal skills in order to accomplish objectives and tasks	(ii) demonstrate effective working relationships using interpersonal skills in order to accomplish tasks
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(G) negotiate and work cooperatively with others using positive interpersonal skills	(i) negotiate with others using positive interpersonal skills

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(G) negotiate and work cooperatively with others using positive interpersonal skills	(ii) work cooperatively with others using positive interpersonal skills
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(H) demonstrate respect for individuals, including those from different cultures, genders, and backgrounds, and value for diversity	(i) demonstrate respect for individuals, including those from different cultures
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(H) demonstrate respect for individuals, including those from different cultures, genders, and backgrounds, and value for diversity	(ii) demonstrate respect for individuals, including those from different genders
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(H) demonstrate respect for individuals, including those from different cultures, genders, and backgrounds, and value for diversity	(iii) demonstrate respect for individuals, including those from different backgrounds
(4) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:	(H) demonstrate respect for individuals, including those from different cultures, genders, and backgrounds, and value for diversity	(iv) demonstrate value for diversity
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary when analyzing information and following directions	(i) apply appropriate content knowledge when analyzing information
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary when analyzing information and following directions	(ii) apply appropriate technical concepts when analyzing information

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary when analyzing information and following directions	(iii) apply appropriate vocabulary when analyzing information
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary when analyzing information and following directions	(iv) apply appropriate content knowledge when following directions
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary when analyzing information and following directions	(v) apply appropriate technical concepts when following directions
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary when analyzing information and following directions	(vi) apply appropriate vocabulary when following directions
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(B) employ verbal skills when obtaining and conveying information	(i) employ verbal skills when obtaining information
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(B) employ verbal skills when obtaining and conveying information	(ii) employ verbal skills when conveying information

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(C) review, use, and apply informational texts, Internet sites, or technical materials for occupational tasks	(i) review informational texts, Internet sites, or technical materials for occupational tasks
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(C) review, use, and apply informational texts, Internet sites, or technical materials for occupational tasks	(ii) use informational texts, Internet sites, or technical materials for occupational tasks
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(C) review, use, and apply informational texts, Internet sites, or technical materials for occupational tasks	(iii) apply informational texts, Internet sites, or technical materials for occupational tasks
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(D) evaluate the reliability of information from informational texts, Internet sites, or technical materials and resources	(i) evaluate the reliability of information from informational texts, Internet sites, or technical materials and resources
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(E) interpret verbal and nonverbal cues and behaviors to enhance communication	(i) interpret verbal cues to enhance communication
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(E) interpret verbal and nonverbal cues and behaviors to enhance communication	(ii) interpret verbal behaviors to enhance communication

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(E) interpret verbal and nonverbal cues and behaviors to enhance communication	(iii) interpret nonverbal cues to enhance communication
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(E) interpret verbal and nonverbal cues and behaviors to enhance communication	(iv) interpret nonverbal behaviors to enhance communication
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(F) apply active listening skills to obtain and clarify information	(i) apply active listening skills to obtain information
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(F) apply active listening skills to obtain and clarify information	(ii) apply active listening skills to clarify information
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(G) facilitate effective written and oral communication using academic skills	(i) facilitate effective written communication using academic skills
(5) The student demonstrates oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:	(G) facilitate effective written and oral communication using academic skills	(ii) facilitate effective oral communication using academic skills

Knowledge and Skill Statement	Student Expectation	Breakout
(6) 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	(i) discuss the importance of agricultural resources to individuals
(6) 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	(ii) discuss the importance of agricultural resources to society
(6) 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	(iii) discuss the importance of natural resources to individuals
(6) 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	(iv) discuss the importance of natural resources to society
(6) The student develops management skills for agricultural resources. The student is expected to:	(B) develop long-range land, water, and air quality management plans	(i) develop long-range land quality management plans
(6) The student develops management skills for agricultural resources. The student is expected to:	(B) develop long-range land, water, and air quality management plans	(ii) develop long-range water quality management plans
(6) The student develops management skills for agricultural resources. The student is expected to:	(B) develop long-range land, water, and air quality management plans	(iii) develop long-range air quality management plans
(6) The student develops management skills for agricultural resources. The student is expected to:	(C) practice equipment maintenance procedures	(i) practice equipment maintenance procedures
(6) The student develops management skills for agricultural resources. The student is expected to:	(D) analyze the cost and maintenance of tools, equipment, and structures used in agriculture	(i) analyze the cost of tools used in agriculture

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student develops management skills for agricultural resources. The student is expected to:	(D) analyze the cost and maintenance of tools, equipment, and structures used in agriculture	(ii) analyze the cost of equipment used in agriculture
(6) The student develops management skills for agricultural resources. The student is expected to:	(D) analyze the cost and maintenance of tools, equipment, and structures used in agriculture	(iii) analyze the cost of structures used in agriculture
(6) The student develops management skills for agricultural resources. The student is expected to:	(D) analyze the cost and maintenance of tools, equipment, and structures used in agriculture	(iv) analyze the maintenance of tools used in agriculture
(6) The student develops management skills for agricultural resources. The student is expected to:	(D) analyze the cost and maintenance of tools, equipment, and structures used in agriculture	(v) analyze the maintenance of equipment used in agriculture
(6) The student develops management skills for agricultural resources. The student is expected to:	(D) analyze the cost and maintenance of tools, equipment, and structures used in agriculture	(vi) analyze the maintenance of structures used in agriculture
(6) The student develops management skills for agricultural resources. The student is expected to:	(E) describe and develop marketing strategies for agricultural and natural resources	(i) describe marketing strategies for agricultural resources
(6) The student develops management skills for agricultural resources. The student is expected to:	(E) describe and develop marketing strategies for agricultural and natural resources	(ii) describe marketing strategies for natural resources
(6) The student develops management skills for agricultural resources. The student is expected to:	(E) describe and develop marketing strategies for agricultural and natural resources	(iii) develop marketing strategies for agricultural resources
(6) The student develops management skills for agricultural resources. The student is expected to:	(E) describe and develop marketing strategies for agricultural and natural resources	(iv) develop marketing strategies for natural resources

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student develops management skills for agricultural resources. The student is expected to:	(F) decide between replacement, maintenance, repair, and reconditioning of agricultural vehicles and machinery	(i) decide between replacement, maintenance, repair, and reconditioning of agricultural vehicles
(6) The student develops management skills for agricultural resources. The student is expected to:	(F) decide between replacement, maintenance, repair, and reconditioning of agricultural vehicles and machinery	(ii) decide between replacement, maintenance, repair, and reconditioning of agricultural machinery
(6) The student develops management skills for agricultural resources. The student is expected to:	(G) describe and perform hazard analysis and follow safety laws	(i) describe hazard analysis
(6) The student develops management skills for agricultural resources. The student is expected to:	(G) describe and perform hazard analysis and follow safety laws	(ii) perform hazard analysis
(6) The student develops management skills for agricultural resources. The student is expected to:	(G) describe and perform hazard analysis and follow safety laws	(iii) follow safety laws
(7) The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources Career Cluster. The student is expected to:	(A) develop advanced technical knowledge and skills related to the personal occupational objective	(i) develop advanced technical knowledge related to the personal occupational objective
(7) The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources Career Cluster. The student is expected to:	(A) develop advanced technical knowledge and skills related to the personal occupational objective	(ii) develop advanced technical skills related to the personal occupational objective

Knowledge and Skill Statement	Student Expectation	Breakout
(7) The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources Career Cluster. The student is expected to:	(B) evaluate strengths and weaknesses in technical skill proficiency	(i) evaluate strengths in technical skill proficiency
(7) The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources Career Cluster. The student is expected to:	(B) evaluate strengths and weaknesses in technical skill proficiency	(ii) evaluate weaknesses in technical skill proficiency
(7) The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources Career Cluster. The student is expected to:	(C) explain the principles of safe operation of tools and equipment related to the practicum	(i) explain the principles of safe operation of tools related to the practicum
(7) The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources Career Cluster. The student is expected to:	(C) explain the principles of safe operation of tools and equipment related to the practicum	(ii) explain the principles of safe operation of equipment related to the practicum
(7) The student demonstrates technical knowledge and skills required to pursue a career in the Agriculture, Food, and Natural Resources Career Cluster. The student is expected to:	(D) pursue opportunities for licensure or certification related to chosen career path	(i) pursue opportunities for licensure or certification related to chosen career path

Knowledge and Skill Statement	Student Expectation	Breakout
<p>(8) The student documents technical knowledge and skills. The student is expected to:</p>	<p>(A) create a professional portfolio to include information such as: (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) resume; (vii) samples of work; and (viii) evaluation from the practicum supervisor</p>	<p>(i) create a professional portfolio to include information</p>
<p>(8) The student documents technical knowledge and skills. The student is expected to:</p>	<p>(B) present the portfolio to interested stakeholders</p>	<p>(i) present the portfolio to interested stakeholders</p>

Subject	Chapter 130. Career and Technical Education, Subchapter A. Agriculture, Food, and Natural Resources
Course Title	§130.32. Extended Practicum in Agriculture, Food, and Natural Resources (One Credit), Adopted 2015.
<p>(a) General Requirements. This course is recommended for students in Grades 11 and 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 Career Cluster. Recommended prerequisite: a minimum of one credit from the courses in the Agriculture, Food, and Natural Resources Career Cluster. Corequisite: Practicum in Agriculture, Food, and Natural Resources. This course must be taken concurrently with Practicum in Agriculture, Food, and Natural Resources and may not be taken as a stand-alone course. Students shall be awarded one credit for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.</p>	
<p>(b) Introduction.</p>	
<p>(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.</p> <p>(2) The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.</p> <p>(3) Extended Practicum in Agriculture, Food, and Natural Resources is designed to give students supervised practical application of knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experiences such as employment, independent study, internships, assistantships, mentorships, or laboratories. To prepare for careers in agriculture, food, and natural resources, students must attain academic skills and knowledge, acquire technical knowledge and skills related to the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills and technologies in a variety of settings.</p> <p>(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.</p> <p>(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.</p>	

(c) Knowledge and Skills.		
Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(A) participate in a paid or unpaid, laboratory- or work-based application of previously studied knowledge and skills related to agriculture, food, and natural resources	(i) participate in a paid or unpaid, laboratory- or work-based application of previously studied knowledge related to agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(A) participate in a paid or unpaid, laboratory- or work-based application of previously studied knowledge and skills related to agriculture, food, and natural resources	(ii) participate in a paid or unpaid, laboratory- or work-based application of previously studied skills related to agriculture, food, and natural resources
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(B) participate in training, education, or preparation for licensure, certification, or other relevant credentials to prepare for employment	(i) participate in training, education, or preparation for licensure, certification, or other relevant credentials to prepare for employment
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate professional standards and personal qualities needed to be employable such as punctuality, time management, initiative, and cooperation with increased fluency	(i) demonstrate professional standards needed to be employable
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(C) demonstrate professional standards and personal qualities needed to be employable such as punctuality, time management, initiative, and cooperation with increased fluency	(ii) demonstrate personal qualities needed to be employable
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) complete tasks with high standards to ensure quality products and services	(i) complete tasks with high standards to ensure quality products

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(D) complete tasks with high standards to ensure quality products and services	(ii) complete tasks with high standards to ensure quality services
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) employ teamwork and conflict-management skills with increased fluency to achieve collective goals	(i) employ teamwork with increased fluency to achieve collective goals
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(E) employ teamwork and conflict-management skills with increased fluency to achieve collective goals	(ii) employ conflict-management skills with increased fluency to achieve collective goals
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) employ planning and time-management skills and tools with increased fluency to enhance results and complete work tasks	(i) employ planning skills with increased fluency to enhance results
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) employ planning and time-management skills and tools with increased fluency to enhance results and complete work tasks	(ii) employ planning skills with increased fluency to complete work tasks
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) employ planning and time-management skills and tools with increased fluency to enhance results and complete work tasks	(iii) employ planning tools with increased fluency to enhance results
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) employ planning and time-management skills and tools with increased fluency to enhance results and complete work tasks	(iv) employ planning tools with increased fluency to complete work tasks

Knowledge and Skill Statement	Student Expectation	Breakout
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) employ planning and time-management skills and tools with increased fluency to enhance results and complete work tasks	(v) employ time-management skills with increased fluency to enhance results
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) employ planning and time-management skills and tools with increased fluency to enhance results and complete work tasks	(vi) employ time-management skills with increased fluency to complete work tasks
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) employ planning and time-management skills and tools with increased fluency to enhance results and complete work tasks	(vii) employ time-management tools with increased fluency to enhance results
(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	(F) employ planning and time-management skills and tools with increased fluency to enhance results and complete work tasks	(viii) employ time-management tools with increased fluency to complete work tasks
(2) The student implements advanced professional communications strategies. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary with increased fluency when analyzing information and following directions	(i) apply appropriate content knowledge with increased fluency when analyzing information
(2) The student implements advanced professional communications strategies. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary with increased fluency when analyzing information and following directions	(ii) apply appropriate content knowledge with increased fluency when following directions
(2) The student implements advanced professional communications strategies. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary with increased fluency when analyzing information and following directions	(iii) apply appropriate technical concepts with increased fluency when analyzing information

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student implements advanced professional communications strategies. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary with increased fluency when analyzing information and following directions	(iv) apply appropriate technical concepts with increased fluency when following directions
(2) The student implements advanced professional communications strategies. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary with increased fluency when analyzing information and following directions	(v) apply appropriate vocabulary with increased fluency when analyzing information
(2) The student implements advanced professional communications strategies. The student is expected to:	(A) apply appropriate content knowledge, technical concepts, and vocabulary with increased fluency when analyzing information and following directions	(vi) apply appropriate vocabulary with increased fluency when following directions
(2) The student implements advanced professional communications strategies. The student is expected to:	(B) demonstrate verbal and non-verbal communication consistently in a clear, concise, and effective manner	(i) demonstrate verbal communication consistently in a clear, concise, and effective manner
(2) The student implements advanced professional communications strategies. The student is expected to:	(B) demonstrate verbal and non-verbal communication consistently in a clear, concise, and effective manner	(ii) demonstrate non-verbal communication consistently in a clear, concise, and effective manner
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(i) analyze information
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(ii) analyze data
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(iii) analyze observations

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(iv) interpret information
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(v) interpret data
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(vi) interpret observations
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(vii) effectively communicate information
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(viii) effectively communicate data
(2) The student implements advanced professional communications strategies. The student is expected to:	(C) analyze, interpret, and effectively communicate information, data, and observations	(ix) effectively communicate observations
(2) The student implements advanced professional communications strategies. The student is expected to:	(D) observe and interpret verbal and nonverbal cues and behaviors to enhance communication	(i) observe verbal cues to enhance communication
(2) The student implements advanced professional communications strategies. The student is expected to:	(D) observe and interpret verbal and nonverbal cues and behaviors to enhance communication	(ii) observe nonverbal cues to enhance communication
(2) The student implements advanced professional communications strategies. The student is expected to:	(D) observe and interpret verbal and nonverbal cues and behaviors to enhance communication	(iii) observe behaviors to enhance communication

Knowledge and Skill Statement	Student Expectation	Breakout
(2) The student implements advanced professional communications strategies. The student is expected to:	(D) observe and interpret verbal and nonverbal cues and behaviors to enhance communication	(iv) interpret verbal cues to enhance communication
(2) The student implements advanced professional communications strategies. The student is expected to:	(D) observe and interpret verbal and nonverbal cues and behaviors to enhance communication	(v) interpret nonverbal cues to enhance communication
(2) The student implements advanced professional communications strategies. The student is expected to:	(D) observe and interpret verbal and nonverbal cues and behaviors to enhance communication	(vi) interpret behaviors to enhance communication
(2) The student implements advanced professional communications strategies. The student is expected to:	(E) apply active listening skills to obtain and clarify information	(i) apply active listening skills to obtain information
(2) The student implements advanced professional communications strategies. The student is expected to:	(E) apply active listening skills to obtain and clarify information	(ii) apply active listening skills to clarify information
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(A) employ critical-thinking skills with increased fluency both independently and in groups to solve problems and make decisions	(i) employ critical-thinking skills with increased fluency independently to solve problems
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(A) employ critical-thinking skills with increased fluency both independently and in groups to solve problems and make decisions	(ii) employ critical-thinking skills with increased fluency in groups to solve problems
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(A) employ critical-thinking skills with increased fluency both independently and in groups to solve problems and make decisions	(iii) employ critical-thinking skills with increased fluency independently to make decisions

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(A) employ critical-thinking skills with increased fluency both independently and in groups to solve problems and make decisions	(iv) employ critical-thinking skills with increased fluency in groups to make decisions
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(B) analyze elements of a problem to develop creative and innovative solutions	(i) analyze elements of a problem to develop creative solutions
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(B) analyze elements of a problem to develop creative and innovative solutions	(ii) analyze elements of a problem to develop innovative solutions
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(C) demonstrate the use of content, technical concepts, and vocabulary when analyzing information and following directions	(i) demonstrate the use of content when analyzing information
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(C) demonstrate the use of content, technical concepts, and vocabulary when analyzing information and following directions	(ii) demonstrate the use of content when following directions
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(C) demonstrate the use of content, technical concepts, and vocabulary when analyzing information and following directions	(iii) demonstrate the use of technical concepts when analyzing information
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(C) demonstrate the use of content, technical concepts, and vocabulary when analyzing information and following directions	(iv) demonstrate the use of technical concepts when following directions
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(C) demonstrate the use of content, technical concepts, and vocabulary when analyzing information and following directions	(v) demonstrate the use of vocabulary when analyzing information

Knowledge and Skill Statement	Student Expectation	Breakout
(3) The student applies concepts of critical thinking and problem solving. The student is expected to:	(C) demonstrate the use of content, technical concepts, and vocabulary when analyzing information and following directions	(vi) demonstrate the use of vocabulary when following directions
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(A) demonstrate an understanding of and consistently follow workplace safety rules and regulations	(i) demonstrate an understanding of workplace safety rules and regulations
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(A) demonstrate an understanding of and consistently follow workplace safety rules and regulations	(ii) consistently follow workplace safety rules and regulations
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(B) demonstrate safe operation of tools and equipment	(i) demonstrate safe operation of tools
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(B) demonstrate safe operation of tools and equipment	(ii) demonstrate safe operation of equipment
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(C) describe and perform hazard analysis	(i) describe hazard analysis
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(C) describe and perform hazard analysis	(ii) perform hazard analysis

Knowledge and Skill Statement	Student Expectation	Breakout
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(D) demonstrate knowledge of procedures for reporting and handling accidents and safety incidents	(i) demonstrate knowledge of procedures for reporting accidents
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(D) demonstrate knowledge of procedures for reporting and handling accidents and safety incidents	(ii) demonstrate knowledge of procedures for reporting safety incidents
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(D) demonstrate knowledge of procedures for reporting and handling accidents and safety incidents	(iii) demonstrate knowledge of procedures for handling accidents
(4) The student understands and applies proper safety techniques in the workplace. The student is expected to:	(D) demonstrate knowledge of procedures for reporting and handling accidents and safety incidents	(iv) demonstrate knowledge of procedures for handling safety incidents
(5) The student understands the professional, ethical, and legal responsibilities in agriculture, food, and natural resources. The student is expected to:	(A) demonstrate a positive, productive work ethic by performing assigned tasks as directed	(i) demonstrate a positive, productive work ethic by performing assigned tasks as directed
(5) The student understands the professional, ethical, and legal responsibilities in agriculture, food, and natural resources. The student is expected to:	(B) apply ethical reasoning to a variety of situations in order to make ethical decisions	(i) apply ethical reasoning to a variety of situations in order to make ethical decisions
(5) The student understands the professional, ethical, and legal responsibilities in agriculture, food, and natural resources. The student is expected to:	(C) comply with all applicable rules, laws, and regulations in a consistent manner	(i) comply with all applicable rules in a consistent manner

Knowledge and Skill Statement	Student Expectation	Breakout
(5) The student understands the professional, ethical, and legal responsibilities in agriculture, food, and natural resources. The student is expected to:	(C) comply with all applicable rules, laws, and regulations in a consistent manner	(ii) comply with all applicable laws in a consistent manner
(5) The student understands the professional, ethical, and legal responsibilities in agriculture, food, and natural resources. The student is expected to:	(C) comply with all applicable rules, laws, and regulations in a consistent manner	(iii) comply with all applicable regulations in a consistent manner
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(A) conduct, document, and evaluate learning activities in a supervised agriculture, food, or natural resources experience	(i) conduct learning activities in a supervised agriculture, food, or natural resources experience
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(A) conduct, document, and evaluate learning activities in a supervised agriculture, food, or natural resources experience	(ii) document learning activities in a supervised agriculture, food, or natural resources experience
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(A) conduct, document, and evaluate learning activities in a supervised agriculture, food, or natural resources experience	(iii) evaluate learning activities in a supervised agriculture, food, or natural resources experience
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(B) develop advanced technical knowledge and skills related to the student's occupational objective	(i) develop advanced technical knowledge related to the student's occupational objective
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(B) develop advanced technical knowledge and skills related to the student's occupational objective	(ii) develop advanced technical skills related to the student's occupational objective

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(C) demonstrate proper record-keeping skills related to the supervised agriculture, food, or natural resources experience	(i) demonstrate proper record-keeping skills related to the supervised agriculture, food, or natural resources experience
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(D) practice equipment maintenance procedures, as appropriate	(i) practice equipment maintenance procedures, as appropriate
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(E) decide between replacement, maintenance, repair, and reconditioning of agricultural vehicles and machinery, as appropriate	(i) decide between replacement, maintenance, repair, and reconditioning of agricultural vehicles, as appropriate
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(E) decide between replacement, maintenance, repair, and reconditioning of agricultural vehicles and machinery, as appropriate	(ii) decide between replacement, maintenance, repair, and reconditioning of agricultural machinery, as appropriate
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(F) demonstrate growth of technical skill competencies	(i) demonstrate growth of technical skill competencies
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(G) evaluate strengths and weaknesses in technical skill proficiency	(i) evaluate strengths in technical skill proficiency
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(G) evaluate strengths and weaknesses in technical skill proficiency	(ii) evaluate weaknesses in technical skill proficiency

Knowledge and Skill Statement	Student Expectation	Breakout
(6) The student participates in an agriculture, food, or natural resources experience. The student is expected to:	(H) collect representative work samples	(i) collect representative work samples