Horticultural Science (IMRA26)

Subject: Career Development and Career and Technical Education
Grade: 11
Expectations: 49
Breakouts: 139

(a) Introduction.

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

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

(3) In Horticultural Science, students develop an understanding of common horticultural management practices as they relate to food and ornamental plant production. To prepare for careers in horticultural industry systems, students must attain academic knowledge and skills, acquire technical knowledge and skills related to horticulture and the workplace, and develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer knowledge and skills in a variety of settings.

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

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

(b) Knowledge and Skills Statements

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

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

(i) identify career opportunities in the field of plant science

(ii) identify entrepreneurship opportunities in the field of plant science

(iii) develop a plan for obtaining the education [for career opportunities in the field of plant science]

(iv) develop a plan for obtaining the training [for career opportunities in the field of plant science]

(v) develop a plan for obtaining the certifications required [for career opportunities in the field of plant science]

(vi) develop a plan for obtaining the education [for entrepreneurship opportunities in the field of plant science]

(vii) develop a plan for obtaining the training [for entrepreneurship opportunities in the field of plant science]

(viii) develop a plan for obtaining the certifications required [for entrepreneurship opportunities in the field of plant science]

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

(i) model professionalism by continuously exhibiting appropriate work habits

(ii) model professionalism by solving problems

(iii) model professionalism by taking initiative

(iv) model professionalism by communicating effectively

(v) model professionalism by listening actively

(vi) model professionalism by thinking critically

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

(i) model appropriate personal safety practices for the workplace

(ii) model appropriate personal health practices for the workplace

(iii) model appropriate occupational safety practices for the workplace

(iv) model appropriate occupational health practices for the workplace

(v) explain the importance of established safety protocols for the workplace

(vi) explain the importance of established health protocols for the workplace

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

(i) analyze the rights of employers

(ii) analyze the rights of employees

(iii) analyze the responsibilities, including ethical conduct, of employers

(iv) analyze the responsibilities, including legal responsibilities, of employers

(v) analyze the responsibilities, including ethical conduct, of employees

(vi) analyze the responsibilities, including legal responsibilities, of employees

(vii) interpret the rights of employers

(viii) interpret the rights of employees

(ix) interpret the responsibilities, including ethical conduct, of employers

(x) interpret the responsibilities, including legal responsibilities, of employers

(xi) interpret the responsibilities, including ethical conduct, of employees

(xii) interpret the responsibilities, including legal responsibilities, of employees

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

(i) describe characteristics of good citizenship in the agricultural workplace, including promoting stewardship

(ii) describe characteristics of good citizenship in the agricultural workplace, including community leadership

(iii) describe characteristics of good citizenship in the agricultural workplace, including civic engagement

(iv) describe characteristics of good citizenship in the agricultural workplace, including agricultural awareness

(v) describe characteristics of good citizenship in the agricultural workplace, including agricultural literacy

(vi) demonstrate characteristics of good citizenship in the agricultural workplace, including promoting stewardship

(vii) demonstrate characteristics of good citizenship in the agricultural workplace, including community leadership

(viii) demonstrate characteristics of good citizenship in the agricultural workplace, including civic engagement

(ix) demonstrate characteristics of good citizenship in the agricultural workplace, including agricultural awareness

(x) demonstrate characteristics of good citizenship in the agricultural workplace, including agricultural literacy

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

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

(i) plan a supervised agricultural experience program as an experiential learning activity

(ii) propose a supervised agricultural experience program as an experiential learning activity

(iii) conduct a supervised agricultural experience program as an experiential learning activity

(iv) document a supervised agricultural experience program as an experiential learning activity

(v) evaluate a supervised agricultural experience program as an experiential learning activity

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

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

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

(A) participate in youth agricultural leadership opportunities;

(i) participate in youth agricultural leadership opportunities [in an agricultural youth organization]

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

(i) review a local program of activities [in an agricultural youth organization]

(ii) participate in a local program of activities [in an agricultural youth organization]

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

(i) create or update documentation of relevant agricultural experience

(4) The student understands the history and progression of the horticulture industry. The student is expected to:

(A) trace how relevant historical advancements in the horticulture industry relate to current industry practices;

(i) trace how relevant historical advancements in the horticulture industry relate to current industry practices

(B) identify and describe different disciplines of horticulture such as arboriculture, floriculture, olericulture, pomology, viticulture, turf management, and ornamental horticulture;

(i) identify different disciplines of horticulture

(ii) describe different disciplines of horticulture

(C) identify and research emerging technology in the horticulture industry;

(i) identify emerging technology in the horticulture industry

(ii) research emerging technology in the horticulture industry

(D) identify current trends in the horticulture industry; and

(i) identify current trends in the horticulture industry

(E) compare types of horticulture industries in the different regions of Texas.

(i) compare types of horticulture industries in the different regions of Texas

(5) The student identifies plant structures and their functions and needs. The student is expected to:

(A) classify horticultural plants by their common and scientific names;

(i) classify horticultural plants by their common names

(ii) classify horticultural plants by their scientific names

(B) describe functional differences in plant structures, including roots, stems, flowers, leaves, and fruit;

(i) describe functional differences in plant structures, including roots

(ii) describe functional differences in plant structures, including stems

(iii) describe functional differences in plant structures, including flowers

(iv) describe functional differences in plant structures, including leaves

(v) describe functional differences in plant structures, including fruit

(C) identify pollination factors affecting plants and trees such as access to pollinators, wind, and hand pollination;

(i) identify pollination factors affecting plants

(ii) identify pollination factors affecting trees

(D) compare monocots and dicots;

(i) compare monocots and dicots

(E) analyze environmental needs of plants, including light, water, and nutrients; and

(i) analyze environmental needs of plants, including light

(ii) analyze environmental needs of plants, including water

(iii) analyze environmental needs of plants, including nutrients

(F) identify the components of a fertilizer label.

(i) identify the components of a fertilizer label

(6) The student develops technical knowledge and skills associated with the production of horticultural plants. The student is expected to:

(A) classify horticultural plants based on taxonomy;

(i) classify horticultural plants based on taxonomy

(B) identify classifications of plants, including annuals, perennials, biennials, and evergreens, based on growing cycles;

(i) identify classifications of plants, including annuals, based on growing cycles

(ii) identify classifications of plants, including perennials, based on growing cycles

(iii) identify classifications of plants, including biennials, based on growing cycles

(iv) identify classifications of plants, including evergreens, based on growing cycles

(C) identify horticultural plants based on their physical characteristics;

(i) identify horticultural plants based on their physical characteristics

(D) compare the reproduction of flowering and non-flowering horticultural plants;

(i) compare the reproduction of flowering and non-flowering horticultural plants

(E) select appropriate tools and equipment for production of horticultural plants;

(i) select appropriate tools for production of horticultural plants

(ii) select appropriate equipment for production of horticultural plants

(F) demonstrate safe and appropriate use of tools and equipment; and

(i) demonstrate safe use of tools

(ii) demonstrate safe use of equipment

(iii) demonstrate appropriate use of tools

(iv) demonstrate appropriate use of equipment

(G) identify maintenance practices for hand tools, power tools, and equipment.

(i) identify maintenance practices for hand tools

(ii) identify maintenance practices for power tools

(iii) identify maintenance practices for equipment

(7) The student understands plant propagation techniques and growing methods. The student is expected to:

(A) identify asexual propagation methods for horticultural plants, including cuttings, grafting, budding, layering, and tissue culture;

(i) identify asexual propagation methods for horticultural plants, including cuttings

(ii) identify asexual propagation methods for horticultural plants, including grafting

(iii) identify asexual propagation methods for horticultural plants, including budding

(iv) identify asexual propagation methods for horticultural plants, including layering

(v) identify asexual propagation methods for horticultural plants, including tissue culture

(B) propagate horticultural plants using asexual methods such as cuttings, grafting, budding, layering, and tissue culture;

(i) propagate horticultural plants using asexual methods

(C) manipulate the germination of seeds using various methods such as mechanical scarification, chemical scarification, and heat and cold treatments;

(i) manipulate the germination of seeds using various methods

(D) compare various soil-based growing media; and

(i) compare various soil-based growing media

(E) identify soilless growing methods used in the horticulture industry.

(i) identify soilless growing methods used in the horticulture industry

(8) The student manages and controls common pests, diseases, and deficiencies of horticultural plants. The student is expected to:

(A) identify and manage common horticultural pests, diseases, and deficiencies;

(i) identify common horticultural pests

(ii) identify common horticultural diseases

(iii) identify common horticultural deficiencies

(iv) manage common horticultural pests

(v) manage common horticultural diseases

(vi) manage common horticultural deficiencies

(B) identify and manage common weeds that impact horticultural production;

(i) identify common weeds that impact horticultural production

(ii) manage common weeds that impact horticultural production

(C) develop a plan for disease control using integrated pest management;

(i) develop a plan for disease control using integrated pest management

(D) apply proper sanitation methods to prevent the spread of pests;

(i) apply proper sanitation methods to prevent the spread of pests

(E) demonstrate safe and proper practices in selecting, applying, storing, and disposing of chemicals; and

(i) demonstrate safe practices in selecting chemicals

(ii) demonstrate safe practices in applying chemicals

(iii) demonstrate safe practices in storing chemicals

(iv) demonstrate safe practices in disposing of chemicals

(v) demonstrate proper practices in selecting chemicals

(vi) demonstrate proper practices in applying chemicals

(vii) demonstrate proper practices in storing chemicals

(viii) demonstrate proper practices in disposing of chemicals

(F) review and explain the parts of a pesticide label.

(i) review the parts of a pesticide label

(ii) explain the parts of a pesticide label

(9) The student understands the concepts of ornamental plants and landscape design. The student is expected to:

(A) compare landscaping methods that account for environmental variables such as water availability, soil type, light availability, and climate;

(i) compare landscaping methods that account for environmental variables

(B) identify and select plants, including bedding plants, shrubs, trees, and turf grasses, for landscapes based on United States Department of Agriculture (USDA) hardiness zones;

(i) identify plants, including bedding plants, for landscapes based on United States Department of Agriculture (USDA) hardiness zones

(ii) identify plants, including shrubs, for landscapes based on United States Department of Agriculture (USDA) hardiness zones

(iii) identify plants, including trees, for landscapes based on United States Department of Agriculture (USDA) hardiness zones

(iv) identify plants, including turf grasses, for landscapes based on United States Department of Agriculture (USDA) hardiness zones

(v) select plants, including bedding plants, for landscapes based on United States Department of Agriculture (USDA) hardiness zones

(vi) select plants, including shrubs, for landscapes based on United States Department of Agriculture (USDA) hardiness zones

(vii) select plants, including trees, for landscapes based on United States Department of Agriculture (USDA) hardiness zones

(viii) select plants, including turf grasses, for landscapes based on United States Department of Agriculture (USDA) hardiness zones

(C) design a landscape using design elements and principles; and

(i) design a landscape using design elements

(ii) design a landscape using design principles

(D) compare sustainability practices such as planting native plants, water conservation, and irrigation technology used in a landscape.

(i) compare sustainability practices used in a landscape

(10) The student demonstrates business skills used in the horticulture industry. The student is expected to:

(A) identify opportunities for entrepreneurship in the horticulture industry;

(i) identify opportunities for entrepreneurship in the horticulture industry

(B) identify practices to maintain business relationships;

(i) identify practices to maintain business relationships

(C) describe and demonstrate correct procedures for handling customer sales transactions;

(i) describe correct procedures for handling customer sales transactions

(ii) demonstrate correct procedures for handling customer sales transactions

(D) calculate pricing to maximize profit for wholesale and retail settings;

(i) calculate pricing to maximize profit for wholesale settings

(ii) calculate pricing to maximize profit for retail settings

(E) develop a plan to market horticultural products and services; and

(i) develop a plan to market horticultural products

(ii) develop a plan to market horticultural services

(F) formulate a budget for a horticultural enterprise.

(i) formulate a budget for a horticultural enterprise