# Scope & Sequence

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| Course Name: Greenhouse Operation and Production**TSDS PEIMS Code:** 13002050 | **Course Credit:** 1.0**Course Requirements:**. Grades 10-12.**Prerequisites:** None. |
| **Course Description:** 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. |
| **NOTE:** This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered. |
| **Total Number of Periods****Total Number of Minutes****Total Number of Hours** | 175 periods7,875 minutes131.25 hours\* | \*Schedule calculations based on 175/180 calendar days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc.  |
| **Unit Number, Title, and Brief Description** | **# of Class Periods\***(assumes 45-minute periods)Total minutes per unite | **TEKS Covered****130.24 Knowledge and skills** |
| **Unit 1: Career Exploration in the Greenhouse Operations/Production Industry**Students will learn about careers in various areas in the greenhouse operations and production industry, the personal skills needed to obtain one of these jobs and how skills needed for success have changed over time. Students will understand the importance of time management, the importance of effective communication and appropriate interaction in the workplace as well as understand the importance of a first impression. This unit may culminate in an experiential activity designed to allow the students to create a resume and cover letter with a job description and to participate in a mock job interview with a panel of possible employees.  | 5 periods 225 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:(A) identify career development and entrepreneurship opportunities in the field of greenhouse operations and production;(B) apply competencies related to resources, information, interpersonal skills, problem solving, and critical thinking in greenhouse operations and production;(C) examine licensing, certification, and legal requirements to maintain compliance with industry requirements;(D) demonstrate knowledge of personal and occupational health and safety practices in the industry; (E) identify employers' expectations and appropriate work habits; and(F) demonstrate characteristics of good citizenship such as advocacy, stewardship, and community leadership. |
| **Unit 2: Supervised Agricultural Experience (SAE)** This unit, students will be able to define and describe Supervised Agricultural Experience (SAE) programs. Students will be able to explain how SAE’s are a vital part of the Agriculture Education Program by participating in local CTSO activities such as FFA as well as engage in a required SAE project. Students will be able to identify key partners in developing a successful SAE. Through involvement in an SAE, students will learn expected workplace behavior, develop specific skills within the industry, and will be given the opportunity to apply academic and occupational skills in the workplace. At the end of this unit, the students should develop an appropriate SAE. | 10 periods450 minutes | (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;(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;(C) participate in youth leadership opportunities to create a well-rounded experience program; and (D) produce and participate in a local program of activities using a strategic planning process. |
| **Unit 3: Plant Anatomy and Classification**In this unit, students will learn the six different plant structures and their functions within the plant. Students will be able to use the knowledge gained from understanding plant structure and function to help them correctly identify plants used in the horticulture industry. Students will use the taxonomic system in order to help them with classification of these plants. Additionally, students will understand what time of year certain plants are available and develop cropping schedules based on that information. They will learn about annuals, biennials, perennials and the difference between vascular and non-vascular plants. As a culminating activity, the students will prepare index cards with ways to identify common plants used in the greenhouse industry. The students may use leaf identification, reproductive method or any other plant function that will help them remember the plant. | 20 periods 900 minutes | (3) The student identifies and classifies plants used in greenhouse production. The student is expected to: (A) classify greenhouse plants according to taxonomy systems; (B) develop knowledge of plant anatomy structures and functions for plant identification; and(C) develop plant classifications based on cropping schedules and market demand for greenhouse crops. |
| **Unit 4: Greenhouse Design and Needs**This unit, students will gain an understanding of the variety of greenhouse structures and construction factors used in the horticulture industry. Students will determine the correct structure in which to use based on the factors needed to take into consideration when designing for greenhouse production. They will learn about customer needs, desires and different production methods utilized in the industry. Students will also explore local, state and national regulations affecting greenhouse operations. At the end of this unit, students will work in groups to design a greenhouse operation. They will discuss how the site is selected, choose structure(s) the position of the greenhouse and analyze costs associated with construction.  | 15 periods675 minutes | (4) The student identifies and investigates different greenhouse structures and construction factors. The student is expected to:(A) select greenhouse coverings; (B) compare greenhouse styles and construction materials;(C) analyze the costs associated with greenhouse construction;(D) evaluate greenhouse site orientation and construction concerns;(E) integrate other growing structures such as cold frames, hotbeds, lath houses, and potting sheds; and (F) investigate local, state, and national regulations affecting greenhouse operations. |
| **Unit 5: Greenhouse Management** Students will learn the basics of greenhouse management. The students will learn about environmental factors to take into consideration in the green house such as: light, temperature, humidity and air quality. Students will also explore and learn to operate and maintain greenhouse environmental and mechanical controls. Students will learn about different irrigation systems that may be used in the greenhouse operation based on the production of the greenhouse. As a culminating activity, students will create a maintenance sheet for a greenhouse operation. The student will need to define the operation, understand the environmental factors that need to be considered and the irrigation methods used. Students will report their findings to the class.  | 25 periods1,125 minutes | (5) The student identifies and assesses environmental conditions within the greenhouse. The student is expected to:(A) investigate environmental factors controlled in the greenhouse;(B) determine and calculate factors used in heating and cooling a greenhouse;(C) investigate the effects of greenhouse climate conditions such as ventilation, carbon dioxide generation, and humidity on plant growth in the greenhouse;(D) explore the importance of light quality, quantity, and duration on the production of greenhouse crops; and(E) compare open and closed environmental systems in the greenhouse such as misting beds or hydroponics.(6) The student identifies, operates, and maintains greenhouse environmental and mechanical controls. The student is expected to:(A) explain how to operate and maintain heating, cooling, and ventilation systems in a greenhouse;(B) explain how to operate and maintain electrical systems in a greenhouse; and(C) explain how to operate and maintain various water systems in a greenhouse. |
| **Unit 6: Plant Propagation** This unit covers plant reproduction and propagation. Students will learn how to correctly propagate plants using various techniques such as using: seeds, seedlings, cuttings, and tissue culture to name a few. Students will learn when to propagate plants and the physiological conditions required for successful propagation. As a culminating activity, students will choose a plant in which can be propagated by vegetative means and by seed. The students will propagate the plant using both methods and record the growth of each. The students will present their findings to the class.  | 20 periods900 minutes | (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;(B) propagate greenhouse crops using various methods such as using seeds, seedlings, plugs, cuttings, and tissue culture; and(C) investigate physiological conditions that affect plant propagation such as seed dormancy and root initiation. |
| **Unit 7: Greenhouse Crop Production**This unit, students will learn considerations that need to be made when planning crop production for the greenhouse. Students will gain a better understanding of various media used in the horticulture industry to grow crops as well as learn how to create growing mixes suited for the crop being grown. Students will understand about the importance of fertilization and delivery methods of nutrients in greenhouse production. They will gain a better understanding of macro and micronutrients and recognize nutrient deficiencies. As a culminating activity, students will develop a fertilization/irrigation plan that addresses a specific greenhouse crop. They will identify the media for the crop, irrigation method and fertilizers to be used. Students will share this information with the class. | 30 periods1,350 minutes | (8) The student identifies and investigates greenhouse crop production factors. The student is expected to:(A) explain and demonstrate the chemical and physical differences in greenhouse media components;(B) compare greenhouse growing mixes for factors such as drainage and nutrient-holding capacity;(C) compare and contrast different containers, benches, and other production equipment used in greenhouse crop production;(D) evaluate different methods of watering greenhouse crops;(E) analyze the effect of nutrients on greenhouse plant growth;(F) diagnose common nutrient deficiency symptoms found in greenhouse crops; and(G) develop fertilization plans that address greenhouse crop needs and environmental impacts. |
| **Unit 8: Pest Management**This unit prepares the student to be able to assess and determine a treatment method for greenhouse crops that have been affected by weeds, disease, insects, or pathogens. Students will learn how to read labels and how to use appropriate pesticide application techniques and equipment. Students will learn about Integrated Pest Management (IPM) for greenhouse production. Students will select a common pesticide that is used in greenhouse production. They will report the correct methods for handling and applying this chemical.  | 25 periods1,125 minutes | (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;(B) implement Integrated Pest Management in controlling an insect, pathogen, or weed problem;(C) use appropriate greenhouse pesticide application techniques and equipment;(D) research chemicals used to regulate plant growth in the greenhouse; and(E) examine pesticide labeling and safety data sheets. |
| **Unit 9: Greenhouse Production**Many plants and crops today are produced in a greenhouse operation because of the grower’s ability to manipulate/control so many factors. This unit focuses on students understanding greenhouse production from start to finish. The students will gain knowledge of stepping up plants, how to prepare finished plants for market and how to maintain quality during marketing and transport. Students will analyze the cost of production and prepare a production schedule for a greenhouse crop.  | 25 periods1,125 minutes | (10) The student performs greenhouse management business procedures. The student is expected to:(A) market greenhouse crops;(B) transport greenhouse crops;(C) analyze materials, labor, and administrative costs related to greenhouse production;(D) analyze methods used to maintain crop quality during marketing and transport; and(E) prepare a production schedule for a greenhouse crop. |