

# Plant and Soil Science II

**Levels:** Grades 10–12  
**Units of Credit:** 1.00  
**CIP Code:** 02.0421  
**Core Code:** 30-02-00-00-010  
**Prerequisite:** Plant and Soil Science I  
**Skill Test:** # 143

## COURSE DESCRIPTION

Students will develop knowledge and skills in advanced areas of plant and soil science, including range resource management. The instruction will also include the importance of biotechnology in crop production. Students will also learn to identify common weeds, diseases, and insect pests.

## CORE STANDARDS, OBJECTIVES, AND INDICATORS

### STANDARD 1

**Students will develop personal, leadership, and career skills through FFA participation.**

**Objective 1:** Assess the role of FFA participation in developing personal and leadership skills.

- a. Identify important personal skills and the strategies to use in developing the skills.
- b. Identify important leadership skills and the role of FFA participation in developing the skills.

**Objective 2:** Assess the role of FFA participation in developing career skills.

- a. List and describe proficiency awards appropriate for plant science.
- b. List and describe career development events appropriate for plant science.
- c. Relate the importance of supervised agricultural experience to FFA achievement.
- d. Utilize FFA and supervised agricultural experience participation to gain advanced degrees of FFA membership.

### STANDARD 2

**Students will explain the maintenance and expansion of supervised agricultural experience (SAE) programs in agricultural education.**

**Objective 1:** Maintain and use SAE records.

- a. Explain how SAE records are maintained from year to year.
- b. Explain how to summarize and analyze SAE records.

**Objective 2:** Devise long-range plans for expanding SAE programs.

- a. Evaluate the overall quality of a current SAE, and determine how to make it more productive or profitable.
- b. Explain factors that should be considered in expanding an SAE program.
- c. Explain how placement SAE and ownership SAE programs may be expanded.

### STANDARD 3

**Students will describe plant physiology concepts.**

**Objective 1:** Explain plant physiology concepts and energy conversion in plants.

- a. Explain cell differentiation and the functions of the major types of plant cells.
- b. Relate the active and passive transport of minerals into and through the root system.
- c. Describe the processes of translocation.
- d. Explain the process of secondary plant growth.
- e. Explain the light-dependent and light-independent reactions that occur during

- photosynthesis, and apply the knowledge to plant management.
- f. Explain the four stages of aerobic respiration, and relate cellular respiration to plant growth, crop management, and post-harvest handling.

#### **STANDARD 4**

**Students will explain range resources and management practices.**

**Objective 1:** Describe practices associated with range management.

- a. Evaluate range management systems, economics, and improvement techniques.
- b. Determine livestock and wildlife use on rangeland.
- c. Describe range management practices related to plant growth and development.
- d. Establish a range transect, and use it to evaluate a specific location.

**Objective 2:** Collect and prepare plant tissue and soil samples for analysis, and interpret test results.

- a. Explain the reasons for analyzing plant tissue and soil samples.
- b. Describe the procedures in collecting and preparing plant tissue and soil samples for analysis.
- c. Test soil samples for nutrient content.
- d. Interpret test results from plant tissue and soil samples.

#### **STANDARD 5**

**Students will describe integrated pest management.**

**Objective 1:** Describe the principles of integrated pest management (IPM).

- a. Explain IPM.
- b. Identify benefits of IPM.
- c. Describe pest control strategies associated with IPM.

**Objective 2:** Identify and manage plant pests and diseases.

- a. Identify types of plant pests and disorders.
- b. Describe the classification of weeds.
- c. Explain the classification of insects and nematodes.
- d. Explain the classification of plant diseases.
- e. Identify weeds, insect pests, and infectious and noninfectious plant diseases.
- f. Explain scouting of field crops for pests.

**Objective 3:** Explain procedures for the safe handling, use, and storage of pesticides.

- a. Explain risks and benefits associated with the materials and methods used in plant pest management.
- b. Interpret pesticide labels.
- c. Explain procedures for mixing and storing pesticides.
- d. Describe types of pesticide controls and formulations.
- e. Explain the safety practices in applying pesticides.
- f. Calibrate equipment used in applying pesticides.
- g. Describe the proper disposal of surplus pesticides and empty containers.
- h. Evaluate environmental and consumer concerns regarding pest management strategies.

#### **STANDARD 6**

**Students will investigate principles of biotechnology as related to plant science.**

**Objective 1:** Explain biotechnology.

- a. Define biotechnology, and explore its historic impact on agriculture.
- b. Describe current applications of biotechnology in agriculture.
- c. Describe the role of agencies that regulate biotechnology.
- d. Identify examples of ethical, legal, social, and cultural biotechnology issues.

- e. Describe benefits and risks associated with biotechnology.

**Objective 2:** Explain selective plant breeding.

- a. Describe the selective plant breeding process.
- b. Explain how to estimate the heritability of certain traits.
- c. Predict the genotypes and phenotypes from monohybrid and dihybrid crosses by using the Punnett square.
- d. Describe sex determination, linkage, crossover, and mutation.
- e. Describe how biotechnology tools are used to monitor and direct plant breeding.

**Objective 3:** Examine genetic engineering of plants.

- a. Explain the reasons for genetic modification of plants.
- b. Identify transgenic plants on the market.
- c. Describe the processes and techniques used to produce transgenic plants.
- d. Describe how biotechnology can be used to evaluate existing transgenic plants.

**Objective 4:** Describe micropropagation techniques.

- a. Define micropropagation and its importance.
- b. Explain applications of micropropagation.
- c. Describe procedures used in micropropagation.