Plant and Soil Science I

Levels: **Grades 9¥12**
Units of Credit: **1.00**
CIP Code: **02.0411**
Core Code: **30-02-00-00-080**
Prerequisite: **None**
Skill Test: **# 140**

COURSE DESCRIPTION
Students will develop knowledge and skills in a wide range of scientific principles, such as genetics, disease, pests, and management practices. The scientific processes of observation, measurement, hypothesizing, data gathering, interpretation, analysis, and application are stressed. Career opportunities and educational preparation are examined. Learning activities are varied, with classroom, laboratory, and field experiences emphasized.

CORE STANDARDS, OBJECTIVES, AND INDICATORS

Use the following Standard 1 and Standard 2 if this course is taught at the entry level.
STANDARD 1
Students will explain the role of FFA in agricultural education.

Objective 1: Discuss the history and organization of FFA as it relates to the complete program of agricultural education.

a. Explain the interrelationship of classroom and laboratory instruction, supervised agricultural experience, and FFA.
b. Describe how, when, and why FFA was organized.
c. Identify key FFA historical events.
d. Identify the mission and strategies, colors, motto, emblem and parts of the emblem, and organizational structure of FFA.
e. Recite and explain the meaning of the FFA Creed.
f. Discuss the meaning and purpose of a program of activities and its committee structure.
g. List FFA chapter officers, and discuss the role of each.

Objective 2: Identify opportunities in FFA.

a. Describe FFA opportunities that develop leadership skills, personal growth, and career success.
b. Summarize major state and national activities available to FFA members.

Objective 3: Describe FFA degrees, awards, and career development events.

a. List and explain the FFA degree areas.
b. Identify FFA proficiency awards.
c. List and discuss various team and individual CDEs.

STANDARD 2
Students will explain the role of supervised agricultural experience (SAE) programs in agricultural education.

Objective 1: Examine the responsibilities and benefits associated with an SAE.

a. Explain the meaning and benefits of supervised agricultural experience.
b. Explain the characteristics of an effective SAE program and the responsibilities of those

involved.

Objective 2: Determine the types of SAE programs.
a. Compare entrepreneurship and placement SAEs.
b. Describe research/experimentation SAEs.
c. Describe exploratory SAEs.

Objective 3: Plan an SAE program.
a. Identify the steps in planning an SAE program.
b. Describe the function of a business/training plan and/or agreement in an SAE program.
c. Develop a short-range plan and a long-range plan for an SAE program.
d. Relate classroom and laboratory instruction to an SAE program.

Objective 4: Maintain and use SAE records.
a. Explain the importance of keeping records on an SAE program.
b. Explain how SAE records are organized.
c. Follow approved procedures to make entries in the SAE records.

Use the following Standard 1 and Standard 2 if this course is taught at the advanced level.

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 horticulture
b. List and describe career development events appropriate for horticulture.
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.

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 and ownership SAE programs may be expanded.

STANDARD 3
Students will explain the history, importance, and scope of plant science.

Objective 1: Discuss the history of agriculture.
a. Explain how the science of agriculture helped develop civilization, including agronomic, horticultural, and forestry plants.
b. Identify the major innovators and milestones in the advancement of agriculture.

Objective 2: Discuss the importance of plant science.
a. Identify the various roles of plants in everyday life.
b. Identify agriculturally important plants, and explain their uses.

Objective 3: Identify career opportunities in plant science.
a. Identify and describe the major areas of plant science.
b. Identify career opportunities in plant science, and determine the education and training they entail.

STANDARD 4
Students will explain soil science concepts.

Objective 1: Explain the meaning and importance of soil.
a. Explain the importance of soil as a life-supporting layer.
b. Describe the agricultural and the nonagricultural uses of soil.

Objective 2: Describe basic physical, biological, and chemical properties of soil and soilless media.
a. Explain soil components.
b. Describe the physical characteristics of soil and soilless media.
c. Describe the biological activity within soil and soilless media.
d. Describe the chemical properties of soil and soilless media.
e. Explain the characteristics of water movement in soil and soilless media.

Objective 3: Explain soil fertility.
a. Describe the meaning and importance of soil fertility.
b. Explain the role of organic matter, soil depth, surface slope, soil organisms, and nutrient balance in soil productivity.

STANDARD 5
Students will describe plant anatomy and physiology concepts.

Objective 1: Explain plant classification.
a. Explain systems used to classify plants.
b. Compare and contrast the hierarchical classification of agricultural plants.
c. Classify plants according to life cycles, plant use, and status as monocotyledons or dicotyledons.

Objective 2: Explain the structures of plant cells and important cell processes.
a. Describe the structures of a typical plant cell and their functions.
b. Compare and contrast mitosis and meiosis.

Objective 3: Describe the anatomical features of a plant and their functions.
a. Describe the structures of a seed, the types of seeds, and the function of seeds.
b. Describe the components of a root, the types of roots, and the functions of roots.

c. Describe the structures of a stem, the types of stems, and the functions of stems.
d. Describe the structures of a leaf, the types of leaves, and the functions of leaves.
e. Describe the major parts of a flower, their functions, and the types of flowers and flower forms.
f. Describe the structures of fruit, the types of fruit, and the purpose of fruit.

Objective 4: Determine the influence of environmental factors on plant growth.

a. Describe the functions of water in plant growth.
b. Explain plant responses to a shortage or excess of water.
c. Describe efficient use of water in plant production.
d. Explain the qualities of light that affect plant growth, including color, intensity, and duration.
e. Explain plant responses to light.
f. Describe the effects of temperature on plant growth.
g. Describe plant responses to temperature extremes.
h. Describe the effect of diseases and insects on plant growth.

Objective 5: Explain plant physiology concepts and energy conversion in plants.

a. Explain the basic process of photosynthesis and its importance to life on Earth.
b. Explain requirements necessary for photosynthesis to occur, and identify the products and byproducts of photosynthesis.
c. Explain cellular respiration and its importance to plant life.
d. Explain factors that affect cellular respiration, and identify the products and byproducts of cellular respiration.

Objective 6: Explain plant reproduction.

a. Compare and contrast sexual and asexual reproduction.
b. Explain pollination, cross-pollination, and self-pollination of flowering plants.
c. Diagram the process of plant fertilization.
d. Describe the process of seed germination.
e. Explain the conditions required for seed germination.
f. Explain the importance of seed viability and vigor.
g. Describe optimal conditions for asexual propagation.
h. Demonstrate techniques used to propagate plants by cuttings, division, separation, and layering.
i. Describe grafting techniques.

Objective 7: Explain the management of plant growth and development.

a. Describe the role of the apical meristem in plant growth.
b. Identify plant hormones and explain their functions.
c. Explain plant tropisms.
d. Differentiate between synthetic growth regulators and plant hormones.
e. Describe the benefits of using plant growth regulators.

STANDARD 6
Students will explain principles of horticulture.

Objective 1: Explain plant management for food production.

a. Plan and prepare a vegetable/herb garden.
b. Describe the important techniques in producing tree fruits and small fruits.
c. Describe the elements of edible landscaping and limited space food production including roof top, container, and raised-bed gardening.
d. Explain the techniques involved in producing small grain and oil crops.
e. Discuss the importance of hay and forage production to the overall food system.

Objective 2: Explain plant management for ornamental horticulture production.

a. Describe lawn establishment and care.
b. Plan and prepare a flower garden.
c. Develop a home landscape plan.
d. Describe the important techniques of landscape maintenance.
e. Describe the elements of growing plants indoors.