

Clifton-Clyde High School
Plant and Soil Science

Course Length: 152.5 Hours, 1 Credit

Grade Level: 9-12

Prerequisites: None

Teaching Resources: *Introduction to Plant Science*, R.O. Parker, 2000, Delmar Publishing

Land Judging and Homesite Evaluation, Cooperative Extension Service, Kansas State University, 1994

Course Description: This course is designed as a college prep program for any biological and/or related area of study. Plant and Soil Science will offer an in-depth look into soil chemistry, anatomy and physiology of plants, careers in horticulture, principles of landscaping, and landscaping design. Students will also prepare and compete in the FFA Floriculture and Nursery CDEs.

Course Outline

I. Soils

- A. Introduction to soils
- B. Physical properties
- C. Organic matter
- D. Soil classification
- E. Soil management
- F. Compost
- G. Organic Farming
- H. Student Activities:
 - 1. Separate soil into sand, silt, and clay
 - 2. Outline ways to maintain soil

II. Soil Evaluation

- A. Soil factors
- B. Interpretation of soil factors
- C. Recommended land treatments
- D. Lime and nutrients
- E. Homesite evaluation
- F. Student Activities:
 - 1. Prepare and compete in the Land Judging Contest

III. Careers in Plant Science and Horticulture

- A. General skills and knowledge
- B. Jobs and careers
- C. Education and experience
- D. Entrepreneurship
- E. Identifying a job
- F. Getting a job
- G. Student Activities:
 - 1. Prepare a speech over a career in plant science
 - 2. Attend a career show and pick up literature about careers

- IV. The Plant Kingdom
 - A. Evolution of plants
 - B. Geographical distribution
 - C. Roles of plants
 - D. Taxonomy
 - E. Student Activities:
 - 1. Identify 5 plants by their common and scientific names
 - 2. Use the Tree ID book to identify a tree around the school
- V. Structure of Cultivated Plants
 - A. Plan of the entire plant
 - B. Seeds
 - C. Using plant structure
 - D. Student Activities:
 - 1. Collect plants and classify them by leaf shape
 - 2. Draw a plant from a garden and label as many parts as possible
- VI. Anatomy of Plants
 - A. The cell and its structure
 - B. Tissues
 - C. Anatomy of primary organs
 - D. Primary and secondary growth
 - E. Student Activities:
 - 1. Dissect a monocot and dicot root and stem
- VII. Water
 - A. Characteristics of water
 - B. Role of water in plants
 - C. Precipitation
 - D. Water loss in plants
 - E. Water for plants
 - F. Movement of water
 - G. Water in the soil
 - H. Irrigation
 - I. Student Activities:
 - 1. Keep a precipitation log and compare it to research data
 - 2. Put food coloring in water and watch as it moves throughout a plant
- VIII. Nutrients
 - A. Essential nutrients and their roles in plants
 - B. Fertilizers
 - C. Secondary and micronutrients
 - D. Soil pH
 - E. Soil testing
 - F. Foliar symptoms
 - G. Choosing a fertilizer source
 - H. Fertilizer placement
 - I. Student Activities:
 - 1. Take a soil test from their yard
 - 2. Calculate amounts of actual nutrients in commercial fertilizers

3. Test nutrient deficiencies on growing plants
- IX. Temperature
 - A. Biological temperature range
 - B. Climatic classifications
 - C. Growing degree days
 - D. Vernalization
 - E. Temperature stress
 - F. Student Activities:
 1. Research first and last frost dates, compare to the current year's dates
 2. Test effects of freezing on plants
 - X. Light
 - A. Nature of light
 - B. Sunlight
 - C. Photoperiodism
 - D. Artificial illumination
 - E. Student Activities:
 1. Grow plants under different conditions of light, record results
 - XI. Photosynthesis
 - A. Nature of light
 - B. Structure of the plant photosystem
 - C. Changing light energy into chemical energy
 - D. Factors affecting photosynthesis
 - E. The carbon cycle
 - F. Storage of the products of photosynthesis
 - G. Student Activities:
 1. Diagram the process of photosynthesis
 - XII. Respiration
 - A. Sugar into energy
 - B. Necessity of respiration
 - C. How plant respiration affects agriculture
 - D. Fermentation
 - E. Student Activities:
 1. Diagram the process of respiration
 2. Compare and contrast photosynthesis and respiration
 - XIII. Basics of Plant Growth
 - A. Regions of growth
 - B. Concepts and components of growth
 - C. Cells
 - D. Basic genetics
 - E. Measuring and modeling plant growth
 - F. Student Activities:
 1. Extract strawberry DNA
 2. Calculate a punnett square
 - XIV. Vegetative Growth
 - A. Growth
 - B. Seed germination

- C. Roots
- D. Shoot growth
- E. Factors affecting plant growth and development
- F. Phase changes
- G. Student Activities:
 - 1. Test germination rate of seeds
 - 2. Compare the seeds of annuals and perennials
- XV. Plant Propagation
 - A. Sexual propagation
 - B. Asexual reproduction
 - C. Micropropagation
 - D. Plant improvement
 - 1. Take leaf, stem, and root cuttings from plants
- XVI. Genetic Engineering and Biotechnology
 - A. Biotechnology defined
 - B. Genetic engineering
 - C. Targeting agriculture
 - D. Transgenic plants
 - E. Biotechnology policy
 - 1. Identify commonly genetically modified organisms
 - 2. Write a paper explaining your thoughts about genetic engineering and its uses.
- XVII. Principles of Landscaping
 - A. Landscape industry
 - B. Objectives of residential landscaping
 - C. Principles of landscape design
 - D. Student Activities:
 - 1. Analyze local landscapes for landscape principles
 - 2. Develop an outdoor recreation area and draw in the landscape
- XVIII. FFA/SAE
 - A. Recordbook
 - B. Student Activities:
 - 1. Finish Cash Flow
 - 2. Year End Inventory
 - 3. Proficiency Awards/Degrees