Plant & Soil Science

Laton High School

# Meets the UC “g” Admission Requirement

**Approved 2002**

**I. Course Information:**

**Course Title:** Plant & Soil Science

**Length of Course:** 1 Year

**Grade Level:**  11-12th Grade

**Prerequisites:**  Introduction to Agriculture & Agriculture Biology or Algebra I

**II. Course Goal & Outcomes:**

A. This course is designed to provide the student with theories and principles related to Plant & Soil Science. In this class students will learn about the structure, growth processes, propagation, physiology, growth media, biological competitors, and post-harvest factors of food, fiber, and plants. This course is intended to successfully prepare students who plan on majoring in agricultural sciences at a four-year college and/or university. Specific student outcomes are:

1. Utilize Plant & Soil Science principles as a relevant vehicle to teach biological principles and improve the science principles and scientific literacy of students.

2. Integrate mathematic standards, Language Arts, and science principles into an academically rigorous course that increases the student’s capacity to think analytically, problem solve, and utilize effective research practices.

**III. Course Objectives:**

1. The course objectives are as follows:

1. Categorize the roles of higher plants in the living world.

2. Describe the structural components of higher plants.

3. Recognizes the standard plant propagation methods.

4. Describe sexual and asexual reproduction in higher plants.

5. Explain photosynthesis, respiration, and translocation in higher plants.

6. Describe the physical and chemical properties of soils.

7. Hypothesize solutions for soil erosion problems.

8. Describe the climatic influences on plant growth and development.

9. Categorize the biological competitors of higher plants.

10. Develop theories for the harvest, preservation, transportation, storage, and marketing of an economic plant.

11. Incorporate scientific methods and biological principles with modern Plant & Soil Science practices.

12. Prepare students for college level entry in the various disciplines of Plant & Soil Science.

13. Be familiar with cell theory and its application to the organization of all plant organisms.

14. To recognize plant physiology, growth requirements, and nutrients needed for optimum plant growth.

**IV. Course Outline**

A. The Role of Higher Plants in the Living World

1. Fossil fuels

2. Food chains

3. Industrial products and environmental concerns

4. Lower forms of plant life

B. Structure of Higher Plants

1. The life cycle of a plant

2. The cell

3. Cell structure

4. The plant body

C. Naming and Classifying Plants

1. Climate

2. Botanical names

3. Botanical Classifications

4. Plant taxonomy

D. Origin, Domestication, and Improvement of Cultivated Plants

1. Origin of cultivated plants

2. Domestication of plants

3. Crop plants

4. Germplasm

5. Genetic concepts in plant improvement

E. Propagation of Plants

1. Propagation methods

2. Sexual propagation

3. Asexual propagation

F. Vegetative and Reproductive Growth and Development

1. Vegetative growth and development

2. Reproductive growth and development

3. Plant growth hormones and regulators

G. Photosynthesis, Respiration, and Translocation

1. Photosynthesis

2. Plant respiration

3. Electrontransport system

4. Assimilation

H. Soil and Soil Water

1. Factors involved in soil formation

2. Physical properties of soil

3. Chemical properties of soil

4. Soil organisms

5. Soil organic matter

6. Soil water

7. Water quality

I. Soil and Water Management and Mineral Nutrition

1. Land preparation

2. Irrigation

3. Mineral nutrition

4. Soil Conservation

J. Climate Influences on Crop Production

1. Climate factors affecting plant growth

2. Climatic requirements of some crop plants

3. Weather and climate

4. Climatic influences on plant diseases and pests

K. Biological Competitors of Useful Plants

1. Weeds

2. Plant diseases

3. Plant pests

4. Nematodes

5. Rodents

6. Pesticide impacts on the environment

L. Theories of Harvest, Preservation, and Marketing

1. Harvesting

2. Post-harvest preservation

1. Marketing of agricultural products
2. Plant Research Project
3. Development of environmental plant & soil science projects
4. Statistical management of project via Record Book
5. Instructional coordination and supervision
6. Analysis of project results
7. Professional Opportunities in Plant & Soil Science

1. Biotechnology & research fields

2. Other related plant & soil science fields

1. Agricultural Inter-Personal & Leadership Development

1. Completion of a Supervised Agricultural Experience Program and data collection

2. Development of listening, speaking, writing & reading skill activities

3. Critical thinking & group team building activities

4. Agriculture presentations

**V. TEXTS & SUPPLEMENTAL INSTRUCTIONAL RESOURCES:**

Stern, K (1998). Plant Biology – 5th Edition, Wm. C. Brown Publishing, NY, NY.

Biondo & Lee (2003). Plant & Soil Science and Technology, 2nd Edition, Prentice Hall-Interstate, New Jersery.

Arms. K (1996). Environmental Science, Harcourt Brace & Company, Orlando, Florida.

University of California, Davis & California Department of Education (1991). Agriculture Model Curriculum Lesson Plans for Plant & Soil Science. CDE Press. Sacramento, CA.

**VI. KEY ASSIGNMENTS:**

1. Research Paper on Plant & Soil Science
2. Seminar Presentation on Plant & Soil Science Practices
3. Development of Science Fair Project relating to Plant & Soil Science
4. Laboratory activities
5. Supervised Agricultural Experience Project & Record Book
6. FFA Leadership Participation

**VII. INSTRUCTIONAL METHODS:**

1. Lecture
2. Audio Visual Materials
3. Research Readings and Written Presentations
4. Homework Assignments
5. Group & Individual Activities
6. Laboratory Investigation – 1 per week (20% of grade)
7. Discussion & Group Dynamics
8. Quizzes, Tests & Final Exam
9. Guest Speakers
10. Field Trips
11. Internet Exploration
12. Seminar Presentation

**VIII.** **ASSESSMENT METHODS:**

A. Quizzes, Tests & Final Exam 40%

B. Laboratory Investigation & Write-ups 20%

C. Writing Assignments 10%

D. Leadership & Critical Thinking Activities 10%

E. Research Report and Seminar Presentation 10%

F. Supervised Agricultural Experience Project & Record Book 10%

**IX. LABORATORY ACTIVITIES:**

A. The Scientific Method

B. Food chains

C. Cell identification

D. Botanical identification and collections

E. Propagation techniques

F. Flower dissection and pollen growth germination

G. Secondary and microelements with N-P-K tissue tests on plants

H. Water germination test

I. Cold germination test

J. Determining salt tolerance

K. Factors affecting photosynthesis

L. Effects of leaf surface area, air movement, and light on transpiration rates

1. Effects of light quality on plant growth
2. Geotropism
3. Phototropism
4. The Hydrologic Cycle
5. Comparison of soil vs. non-soil plant culture
6. Effects of nutrient concentrations on plant growth
7. Effects of chemicals (herbicides) on plants
8. Herbicide biopsy
9. Effects of rooting hormone on root development
10. Effects of gibbarellic acid on seed germination
11. Anther culture
12. DNA extraction
13. Probability of trait inheritance
14. Tissue culture
15. Seed dispersal
16. Genetic probability
17. Insect identification
18. Environmental forcing structures

EE. Comparison of asexual propagation methods

1. Water quality
2. Plant pigment chromatography