

**Environmental Horticulture Science**  
**Meets the UC “g” Admission Requirement**  
**Approved 2003**

**I. COURSE INFORMATION:**

<b>Course Title:</b>	Environmental Horticulture Science
<b>Length of Course:</b>	One Year
<b>Grade Level:</b>	11-12
<b>Required or Elective:</b>	Elective – meets science related graduation requirements and meets the UC “g” admission requirement
<b>Prerequisites:</b>	Algebra I

**II. MAJOR GOAL AND STUDENT OUTCOMES:**

- A. This course will provide the student with theories and principles related to environmental horticulture science. This course is intended to successfully prepare those students who plan on majoring in agricultural sciences at a four-year college and/or university. Specific student outcomes are:
1. Utilize Environmental Horticulture 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:**

- A. The course objectives are as follows:
1. To develop an appreciation of horticulture.
  2. To incorporate scientific methods and biological principles with modern agricultural practices.
  3. To create an awareness of the importance of horticulture.
  4. To prepare students for college level entry in the various disciplines of horticulture.
  5. To understand the importance of plants, their uses, and incorporation of plants in our society.
  6. To be familiar with cell theory and its application to the organization of all organisms.
  7. To recognize plant physiology, growth requirements, and nutrients needed for optimum plant growth.
  8. To recognize the diversity of life and the interrelationships among all organisms

9. To understand the role of plants in our landscape, the process of design, installation, and maintenance of those plant materials.
10. To be aware of the historical and descriptive nature of horticulture as a science.
11. To acquire agricultural and biological vocabulary, and the reading, writing and critical thinking skills pertaining to the science.

#### IV. COURSE OUTLINE:

##### A. Agricultural Effects of Environmental Ecology

1. Categories and sources of pollution
2. Conserving natural and water resources
3. Agricultural practices beneficial and harmful to the environment
4. Chemical erosion & physical properties
5. Ecosystems
6. The Nitrogen Cycle
7. The Carbon Cycle
8. Water Cycle

##### B. Plant Reproduction

1. Asexual reproduction
2. Sexual reproduction

##### C. Nature of Life

1. Attributes of living organisms
2. Chemical and physical bases of plant life
3. Chemical components of protoplasm

##### D. Plant Physiology and Growth

1. Function of plant cells
2. Examination of cell wall and function
3. Cellular reproduction
4. DNA, RNA, and synthesis of proteins
5. Introduction of root, stem, and leaf structures and functions
6. Plant growth requirements
7. Environmental factors on growth
8. Specialized roots, stems, and leaves
9. Requirements for seed germination
10. Plant hormones
11. Phytochrome
12. Photoperiodism
13. Environmental modifications for growth
14. Managing plant growth

##### E. Plant Pathology and Entomology

1. Common diseases

2. Effect on development and growth
3. Method of controls
4. Orders of Insects
5. Insect structure and development
6. IPM practices

#### F. Biotechnology Applications in Environmental Horticulture

1. Biotechnology
2. Molecular biotechnology: genetic importance
3. Genetic engineering
4. Tissue culture

#### G. Soil Structure and Function

1. Components, function, economic uses, and relationship to the earth
2. Geologic Cycle
3. Chemical and physical weathering
4. Soil formation

#### H. Plant Nutrients

1. Primary, secondary, and micro-nutrients
2. Function of nutrients in plant growth
3. Nutrient deficiencies & symptoms
4. PH requirements and effects on plant life
5. Nitrogen fixation and absorption
6. Modifying growth

#### I. Plant Names and Classifications

1. Development of the binomial system of nomenclature
2. Development of kingdom concept
3. Classification of major groups of plants
4. Synoptic key to major groups of plants

#### J. Introduction to Seed Plants: Gymnosperms

1. Human and ecological relevance of gymnosperms
2. Examination of four major divisions of gymnosperms
3. History of gymnosperms

#### K. Flowering Plants

1. Structure and reproduction of flowering plants
2. Trends of specialization and classification in flowering plants
3. Division Anthophyta
4. Plant preservation

#### L. Fruits and Seeds

1. Kinds of fruits
2. Fruit and seed dispersal
3. Seed structure
4. Longevity of seeds & fruits

M. Plants and Civilizations

1. Origin of cultivated plants
2. Selected families of flowering plants
3. Agricultural and urban environment influence
4. Multiculturalism and plants
5. Ethno-botany
6. Pioneers of plants & civilizations

N. Plant Research Project

1. Development of environmental horticulture science projects
2. Statistical management of project via Record Book
3. Instructional coordination and supervision
4. Analysis of project results

O. Professional Opportunities in Environmental Horticulture Science

1. Biotechnology & research fields
2. Other related horticulture science fields

P. 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 – 5<sup>th</sup> Edition, Wm. C. Brown Publishing, NY, NY.  
 Arms. K (1996). Environmental Science, Harcourt Brace & Company, Orlando, Florida.  
 Schroeder, C., Seagle, E. & Felton, L. (2003). Horticulture – 4<sup>th</sup> Edition, Prentice Hall  
 Interstate, Upper Saddle River, New Jersey.  
 University of California, Davis & California Department of Education (1991).  
 Agriculture Model Curriculum Lesson Plans for Ornamental Horticulture. CDE Press.  
 Sacramento, CA.

Items listed below are commonly used as supplementary materials and are coordinated with the adopted course objectives:

CDE Biological Science Content Standards

Research Handouts

Videos

DVD's

Internet

**VI. KEY ASSIGNMENTS:**

- A. Research Paper on Environmental Horticulture
- B. Seminar Presentation on Horticulture Science Practices
- C. Development of Science Fair Project relating to Environmental Horticulture
- D. Laboratory activities
- E. Supervised Agricultural Experience Project & Record Book
- F. FFA Leadership Participation

**VII. INSTRUCTIONAL METHODS:**

- A. Lecture
- B. Audio Visual Materials
- C. Research Readings and Written Presentations
- D. Homework Assignments
- E. Group & Individual Activities
- F. Laboratory Investigation – 1 per week (20% of grade)
- G. Discussion & Group Dynamics
- H. Quizzes, Tests & Final Exam
- I. Guest Speakers
- J. Field Trips
- K. Internet Exploration
- L. Seminar Presentation

**VIII. ASSESSMENT METHODS:**

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|---|-----|
| 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. Analyzing Ecosystems
- C. Checking water for Coliform Bacteria
- D. Genotypic and phenotypic ratios
- E. Cell identification
- 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
- M. Effects of light quality on plant growth
- N. Geotropism
- O. Phototropism
- P. The Hydrologic Cycle

- Q. Comparison of soil vs. non-soil plant culture
- R. Effects of nutrient concentrations on hydroponics plant growth
- S. Effects of chemicals (herbicides) on plants
- T. Herbicide biopsy
- U. Effects of rooting hormone on root development
- V. Effects of gibberellic acid on seed germination
- W. Anther culture
- X. DNA extraction
- Y. Probability of trait inheritance
- Z. Tissue culture
- AA. Seed dispersal
- BB. Genetic probability
- CC. Insect identification
- DD. Environmental forcing structures
- EE. Comparison of asexual propagation methods
- FF. Water quality
- GG. Plant pigment chromatography

FOR  
REFERENCE  
ONLY