

# HARTNELL COLLEGE

## COURSE OUTLINE

CC Approval: 05/07/2015  
Board of Trustees: 06/02/2015  
Last Revised: 03/19/2009

DESIGNATOR & NUMBER: ABT 92

COURSE TITLE: Plant Science

CREDIT UNITS: 3

FACULTY INITIATOR: Steven Triano

SEMESTER HOURS:

32.00 - 36.00	Lecture Contact Hours
48.00 - 54.00	Lab Contact Hours
0.00	Total Contact Hours
4.00	Total Out-of-Class Hours
0.00	Total Student Learning Hours

TOTAL CONTACT HOURS (BASED ON 16-18 WEEKS)

32.00 - 36.00	Lecture
48.00 - 54.00	Lab
0.00	By Arrangement Lab Hours (DHR)

GRADING BASIS:

Grade Only

PREREQUISITE:

COREQUISITE:

ADVISORY:

OTHER:

COURSE DESCRIPTION:

An introduction to plant science including structure, growth processes, propagation, physiology, growth media, biological competitors, and post-harvest factors of food, fiber, and ornamental plants.

COURSE OBJECTIVES:

Upon satisfactory completion of the course, students will be able to

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

2. describe the structural components of higher plants.
3. explain the standard plant propagation methods.
4. describe sexual and asexual reproduction in higher plants.
5. explain photosynthesis, respiration, and translocation in higher plants.
6. compare the life cycles of annual and biennial plants.
7. compare and contrast the distinguishing characteristics of two commercially important plant families.
8. describe how climate influences plant growth and development.
9. categorize the biological competitors of higher plants.
10. describe the scientific method and explain its application in solving problems in plant science.

## COURSE CONTENT:

- I. The role of higher plants in the living world
  - A. Fossil fuels
  - B. Food chains
  - C. Industrial products
  - D. Lower forms of plant life
- II. Structure of higher plants
  - A. The life cycle of a plant
  - B. The cell
  - C. Cell structure
  - D. The plant body
- III. Naming and classifying plants
  - A. Climate
  - B. Botanical names
  - C. Botanical classifications
  - D. Plant taxonomy
- IV. Origin, domestication, and improvement of cultivated plants
  - A. Origin of cultivated plants
  - B. Domestication of plants
  - C. Crop plants
  - D. Germplasm
  - E. Genetic concepts in plant improvement
- V. Propagation of plants
  - A. Propagation methods
  - B. Sexual propagation
  - C. Vegetative propagation
- VI. Vegetative and reproductive growth and development
  - A. Vegetative growth and development
  - B. Reproductive growth and development
  - C. Plant growth regulators
- VII. Photosynthesis, respiration, and translocation
  - A. Photosynthesis
  - B. Plant respiration
  - C. Electron transport system
  - D. Assimilation
- VIII. Soil and soil water
  - A. Factors involved in soil formation
  - B. Physical properties of soil
  - C. Chemical properties of soil

- D. Soil organisms
- E. Soil organic matter
- F. Soil water
- G. Water quality
- IX. Soil and water management and mineral nutrition
  - A. Land preparation
  - B. Irrigation
  - C. Mineral nutrition
  - D. Soil conservation
- X. Climatic influences on crop production
  - A. Climatic factors affecting plant growth
  - B. Climatic requirements of some crop plants
  - C. Weather and climate
  - D. Climatic influences on plant diseases and pests
- XI. Biological competitors of useful plants
  - A. Weeds
  - B. Plant diseases
  - C. Plant pests
  - D. Nematodes
  - E. Rodents
  - F. Pesticide impacts on the environment

## LAB CONTENT:

- I. Scientific Method
  - A. Steps of the scientific method
  - B. Inductive vs deductive reasoning
- II. The Microscope
  - A. Proper use and care
  - B. Depth of field
  - C. Field of use
- III. The Cell
  - A. Basic plant cell anatomy
  - B. Microscopic visualization of plant cells
- IV. Plant Tissues
  - A. Cambium
  - B. Epidermis
  - C. Xylem and Phloem
- V. Gross plant anatomy
  - A. Roots
  - B. Stems
  - C. Leaves
- VI. Reproduction
  - A. Sexual and asexual reproduction
  - B. Alternation of generations
- VII. Plant Propagation and Lifecycles
  - A. Seed propagation
  - B. Grafting
  - C. Budding
  - D. Layering
- VIII. The Cell Cycle
  - A. Mitosis
  - B. Meiosis

- C. Cytokinesis
- IX. Genetics
  - A. Replication
  - B. Transcription
  - C. Translation
- X. Plant Hormones
  - A. Growth Regulators
  - B. Tropisms and Rapid Movements
- XI. Photosynthesis and Plant Pigments
  - A. Chromatography
  - B. Chlorophyll
  - C. Other pigments
- XII. Bacteria and Fungi
  - A. Microscopic analysis
  - B. Beneficial vs pathogenic
- XIII. Non-Flowering Plants and Photosynthetic Protists
  - A. Algae
  - B. Lichens
  - C. Bryophytes
  - D. Ferns and "Fern Allies"
  - E. Gymnosperms
- XIV. Flowering Plants
  - A. Diversity
  - B. Monocots vs dicots
- XV. Important Crop Families
  - A. Central Coast vegetable crops
  - B. Berries
  - C. Grapes

INSTRUCTIONAL METHODOLOGY:

- Lecture
- Lab Activity
- Individual Assistance
- Audiovisual (including PowerPoint or other multimedia)
- Demonstration
- Discussion
- Group Activity

Requires a minimum of three (3) hours of work per unit including class time and homework.

METHODS OF EVALUATING OBJECTIVES OR OUTCOMES:

Methods of evaluation to determine if students have met objectives may include, but are not limited to the following:

CLASSROOM	EXPLANATION
Class Activity	Students prepare for and participate in class activity.
Lab Activity	Students complete weekly lab activity, make plant and insect collections, and answer related questions.
Written Assignments	Completion of lab. questions and text assignments.

EXAMS	EXPLANATION
Skill Demonstration	Demonstrate identification of common plant families and insect orders.
Objective Test	Objective and short answer midterms

**MINIMUM STUDENT MATERIALS:**

Textbook(s) similar to:

McMahon, Margaret J., Kofranek and Rubatsky. *Plant Science: Growth, Development, and Utilization of Cultivated Plants*. 5th Ed, Prentice Hall, 2010  
Stern, Kingsley. *Stern's Introductory Plant Biology*. 13th Ed, McGraw-Hill, 2013  
Tschunko, Almuth. Plant Biology Laboratory Manual. Pearson, Benjamin Cummings, 07-28-2006.

**COURSE ASSIGNMENTS**

**Examples of Reading Assignments**

Plant Science: Growth, Development, and Utilization of Cultivated Plants, 5th ed.  
Students will complete reading assignments in the required text (approx 25-50 pages per week).

Plant Biology Laboratory Manual

Students will complete reading assignments in the laboratory manual (approx 5-10 pages per week).

**Examples of Writing Assignments**

Students will write a research summary paper (see Outside Assignments), including the development of an outline and an abstract.

Follow-up summaries of laboratory and lecture topics will be periodically assigned.

**Examples of Outside Assignments**

Students will develop a research paper on an assigned plant science topic. The assignment will be built in pieces: (1) Topic selection and refinement of focus, (2) Outline with citations and Works Cited, (3) Final Research Paper in MLA or CSE format, (4) Develop a PowerPoint or similar presentation, and (5) Present a 5 minute oral summary to the class.

Students will be assigned follow-up questions each week related to the laboratory exercises.