



El Camino College  
COURSE OUTLINE OF RECORD – Official

<b>Course Acronym:</b>	BIOL
<b>Course Number:</b>	8
<b>Descriptive Title:</b>	Biology of Plants
<b>Division:</b>	Natural Sciences
<b>Department:</b>	Biology
<b>Course Disciplines:</b>	Biological Sciences
<b>Catalog Description:</b>	This biology course focuses on the world of plants and plant-like organisms. Students will study vascular plant anatomy, physiology, and ecology as well as explore the significance of plants to human life. The laboratory work will include a survey of algae, fungi, and all representative plant groups.
<b>Prerequisite:</b>	
<b>Co-requisite:</b>	
<b>Recommended Preparation:</b>	Eligibility for English 1A or 1AH
<b>Enrollment Limitation:</b>	
<b>Hours Lecture (per week):</b>	3
<b>Hours Laboratory (per week):</b>	3
<b>Outside Study Hours:</b>	6
<b>Total Course Hours:</b>	108
<b>Course Units:</b>	4
<b>Grading Method:</b>	Letter Grade only
<b>Credit Status:</b>	Credit, degree applicable
<b>Transfer CSU:</b>	Yes
<b>Effective Date:</b>	05/19/1997
<b>Transfer UC:</b>	Yes
<b>Effective Date:</b>	Fall 1997
<b>General Education: ECC</b>	Area 1 - Natural Sciences
<b>Term:</b>	
<b>Other:</b>	
<b>CSU GE:</b>	Area B2 - Physical Universe and its Life Forms: Life Science, Area B3 - Physical Universe and its Life Forms: Laborator Activity
<b>Term:</b>	
<b>Other:</b>	
<b>IGETC:</b>	Area 5B - Biological Science
<b>Term:</b>	
<b>Other:</b>	

<p><b>Student Learning Outcomes:</b></p>	<p><b>SLO #1 Scientific Method</b></p> <p>The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.</p> <p><b>SLO #2 Tools</b></p> <p>The student will be able to use the compound and dissecting microscope to observe cells and microorganisms.</p> <p><b>SLO #3 Content Knowledge (Energy Flow)</b></p> <p>Students will use basic energy principles to explain the flow of energy in living systems, such as those that occur in the cellular metabolic pathways of photosynthesis and cell respiration, or the relationships observed between autotrophs and heterotrophs in ecosystems.</p>
<p><b>Course Objectives:</b></p>	<ol style="list-style-type: none"> <li>1. Describe the characteristics of life.</li> <li>2. Define basic chemical terms and show an understanding of the molecules that make up living things.</li> <li>3. Describe the anatomy of cells and relate cellular structures with their functions.</li> <li>4. Compare and contrast the processes, chemical reactions, and end products involved in photosynthesis and cellular respiration.</li> <li>5. Identify and describe the phases of mitosis and meiosis.</li> <li>6. Describe the processes of sexual and asexual reproduction and propagation in plants, and identify representative structures in plants capable of producing gametes.</li> <li>7. Solve genetic problems such as monohybrid and dihybrid crosses, and incomplete dominance.</li> <li>8. Explain the structure of DNA and its role in protein synthesis.</li> <li>9. Use the concepts of taxonomy to categorize representative plant specimens.</li> <li>10. Recognize the structural, functional, and ecological features that characterize the major groups of cyanobacteria, algae, and fungi.</li> <li>11. Name the major groups of plants, and describe their principle features.</li> <li>12. Describe the major cells, tissues, and organs in higher plants, and how they integrate structure and function.</li> <li>13. Compare and contrast the reproductive organs and processes of ferns, gymnosperms, and angiosperms.</li> <li>14. Identify the major families of angiosperms.</li> <li>15. Distinguish the different types of angiosperm fruits and identify representative examples of each type.</li> <li>16. Describe the primary and secondary growth of vascular plants and the role of hormones and cycles in plant growth.</li> <li>17. Identify representative domesticated, medicinal, edible, and poisonous plants.</li> <li>18. Describe the role and impact of plants in relation to ecology.</li> <li>19. Explain the process of natural selection and discuss the evolution of plants.</li> <li>20. Analyze a scientific article of hypothetical examples for the principles of the scientific method.</li> </ol>
<p><b>Major Topics:</b></p>	<p><b>I. Scope of Plant Biology; Scientific Method; Characteristics of Life (2 hours, lecture)</b></p> <p><b>II. Cell Chemistry (2 hours, lecture)</b></p> <p>A. Atoms and Elements</p>

B. Molecules and Compounds

**III. Plant Cell Structure (2 hours, lecture)**

A. Nucleus

B. Other Organelles Common to Eukarya

1. Mitochondria

2. Golgi Apparatus

C. Organelles Common to Plants

1. Cell Wall

2. Large Central Vacuole

3. Plastids including Chloroplast

**IV. Cell Division (2 hours, lecture)**

A. General Properties and Steps of Mitosis

B. Contrast with Prokaryotic Binary Fission

C. Contrast with Meiosis

**V. Plant Tissues (2 hours, lecture)**

A. Primary Tissues

1. Epidermis

2. Ground Tissue (Pith and Cortex)

3. Vascular Tissues

B. Secondary Tissue Growth

1. Pericycle

2. Xylem

3. Phloem

**VI. Plant Organs (5 hours, lecture)**

A. Root

B. Stem

C. Leaf

**VII. Plant Reproduction (2 hours, lecture)**

A. Angiosperm Structures

1. Flowers
2. Fruits
3. Seeds

**VIII. Water and Mineral Uptake and Movement; Food Transport (2 hours, lecture)**

A. Water Pressures

1. Positive Flow
2. Negative Flow

B. Pressure Flow Hypothesis

1. Sources
2. Sinks

**IX. Plant Metabolism (4 hours, lecture)**

A. Photosynthesis Overview

1. C<sub>3</sub>
2. C<sub>4</sub>
3. CAM

B. Respiration

1. Aerobic
2. Contrast with Anaerobic
3. Photorespiration

**X. Plant Growth: Phytohormones, Movements, Photoperiodism (2 hours, lecture)**

A. Hormones

1. Auxin
2. Gibberellins
3. Cytokinins
4. Ethylene
5. Abscissic Acid

B. Photoperiodism - Light Effects on Seasonality, Growth, and Flowering

1. Day - Neutral Plants
2. Intermediate Day Plants
3. Short-Day Plants
4. Long-Day Plants

**XI. Meiosis and Alternation of Generations (3 hours, lecture)**

- A. Stages of Meiosis
- B. Examples of Eukarya with Variations in Alternation of Generations

**XII. Mendelian Genetics (5 hours, lecture)**

- A. History and Example Traits
- B. Dominance and Monohybrid Crosses
- C. Dihybrid Crosses
- D. Examples of Non-Mendelian Genetics

**XIII. Molecular Genetics: DNA, Protein Synthesis (3 hours, lecture)**

A. Molecular Architecture

1. DNA
2. mRNA
3. tRNA
4. rRNA

B. Protein Synthesis

1. Transcription
2. Translation

**XIV. Plant Biotechnology and Propagation (3 hours, lecture)**

- A. Plant Breeding
- B. Agriculture
- C. GMO's
- D. Horticulture Practices

**XV. Natural Selection and Plant Evolution (3 hours, lecture)**

- A. History of Evolutionary Concepts
- B. Darwin, Wallace, and Natural Selection
- C. Plant-Oriented Hypothesis of Phylogenetic Evolution

**XVI. Ecology (8 hours, lecture)**

- A. Energy Flow, Material Cycling, and Food Pyramids
  - 1. Producers
  - 2. Consumers
  - 3. Decomposers
- B. Population, Community, and Ecosystem Ecology
- C. Biomes

**XVII. Humanistic Botany and Representative Angiosperm Families (4 hours, lecture)**

- A. Case Studies in Plant Bio
  - 1. Agriculture
  - 2. Textiles and Construction
  - 3. Medicine

**XVIII. Use of the Microscope (4 hours, lab)**

- A. Compound Binocular Light Microscope
- B. Dissecting Binocular Microscope

**XIX. Plant Cells (4 hours, lab)**

- A. General Construction of Cell Parts
  - 1. Cell Wall Layers
  - 2. Chromoplasts
  - 3. Starch Granules
  - 4. Others
- B. Epidermal Cell Types
  - 1. Standard Epidermis

2. Trichomes

3. Guard Cells

C. Ground Tissues (Cortex and Pith)

1. Parenchyma

2. Collenchyma

3. Sclerenchyma

D. Vascular Tissues

1. Vessels

2. Tracheids

3. Sieve Tube Cells

4. Companion Cells

**XX. Mitosis (4 hours, lab)**

A. Stages

1. Plant Cell Division Including Cell Plate Formation

2. Reasons for and Locations of Mitosis-Based Growth

**XXI. Plant Organs: Root, Stem, and Leaf (8 hours, lab)**

**XXII. Plant Reproduction: Flowers, Fruit, and Seed (8 hours, lab)**

**XXIII. Photosynthesis (2 hours, lab)**

A. Processes, Demonstrations, and Hands-On Activities

1. Water - Transpiration and Guttation

2. Carbon-Fixing - Leaf Stain Comparison

B. Anatomical and Physiological Variance by C-3 C-4 and CAM Plant Species

**XXIV. Cellular Respiration and Water Transport Evidence (2 hours, lab)**

**XXV. Microbiology: Bacteria, Protists, and Fungi (10 hours, lab)**

**XXVI. Evolution of Plants Survey: Nonvascular and Vascular Plant Phyla (12 hours, lab)**

A. Non-Vascular and Non-Seed Plants

	B. Vascular Non-Seed Plants C. Vascular Seed Plants
<b>Total Lecture Hours:</b>	54
<b>Total Laboratory Hours:</b>	54
<b>Total Hours:</b>	108
<b>Primary Method of Evaluation:</b>	2) Problem solving demonstrations (computational or non-computational)
<b>Typical Assignment Using Primary Method of Evaluation:</b>	In pea plants, round peas (R) are dominant over wrinkled (r), and yellow peas (Y) are dominant over green (y). Cross two pea plants which are heterozygous for round and yellow peas, and give the phenotypic ratio of the offspring.
<b>Critical Thinking Assignment 1:</b>	Select a plant to research, and write a term paper based on the information gathered from a minimum of three references. The term paper will include the taxonomy, reproductive biology, morphological description, and humanistic uses of the plant.
<b>Critical Thinking Assignment 2:</b>	Using actual fruit samples, use the provided dichotomous key to identify the fruit classification for each fruit.
<b>Other Evaluation Methods:</b>	Completion, Homework Problems, Laboratory Reports, Matching Items, Multiple Choice, Other Exams, Quizzes, Term or Other Papers, True/False
<b>Instructional Methods:</b>	Demonstration, Discussion, Lab, Lecture, Multimedia presentations, Other (specify)
<b>If other:</b>	Off campus or on-campus walks or field trips to highlight plant diversity, anatomy, and ecology. Off campus sites would include Madrona Marsh, South Coast Botanic Garden, and locations with the Palos Verdes Peninsula Land Conservancy
<b>Work Outside of Class:</b>	Answer questions, Problem solving activity, Required reading, Study, Written work (such as essay/composition/report/analysis/research) With lecture hours at 3 per week, it is estimated a student would require 6 hours of time outside of class to stay engaged and on track with course content.
<b>If Other:</b>	
<b>Up-To-Date Representative Texts:</b>	<b>Print (and/or electronic e-book) Text:</b> Stern, Introductory Plant Biology, 15th ed., McGraw-Hill, 2020.  ISBN # 9781260240832  Stern, Introductory Plant Biology, Laboratory Manual, 15th ed., McGraw-Hill, 2020. ISBN # 978-1260488630
<b>Alternative Texts:</b>	
<b>Required Supplementary Readings:</b>	
<b>Other Required Materials:</b>	
<b>Requisite:</b>	
<b>Category:</b>	
<b>Requisite course(s): List both prerequisites and corequisites in this box.</b>	
<b>Requisite and Matching skill(s): Bold the</b>	

requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	
Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable	
Requisite course:	
Requisite and Matching skill(s):Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	Eligibility for English 1A
<p>Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable</p>	<p>Students' chance of success in Biology is directly related to their ability to read the Biology textbook with comprehension. Completion of English 1A or 1AH provides the student with experience in reading and comprehension of a college-level textbook. Biology students are also evaluated with the use of writing assignments. Completion of English1A or 1AH prepares the student to write essays and topical papers similar to the assignments required in Biology.  <b>Students will be able to read the Biology textbook with comprehension.</b></p> <p>Select and employ reading strategies to interpret the content of a college-level textbook, with special focus on constructing a thesis statement and providing valid support.  <b>Students will be able to read and comprehend information found in reference books or articles, identifying main ideas and major details that are useful for their research.</b></p> <p>Identify an implied main idea (thesis), and support with major and minor details, from a longer text or novel.  <b>Students will be able to write and in-class essay as part of the unit exam.</b></p> <p>Plan, write, and revise 500-word multi-paragraph expository essays including an introduction and conclusion, exhibiting coherence and unity, avoiding major grammatical and mechanical errors that interfere with meaning, and demonstrating awareness of audience, purpose, and language choice.  <b>Students will be able to research information on a particular plant of their choosing, and write a paper about that plant.</b></p> <p>Read and apply critical thinking skills to college-level expository prose for the purposes of writing and discussion.</p> <p>Apply appropriate strategies in the writing process including prewriting, composing, revising, and editing techniques.</p> <p>Utilize guidelines to format a document, to cite sources in the text of an essay, and to compile a Works Cited list.</p>
Enrollment Limitations and Category:	

<b>Enrollment Limitations Impact:</b>	
<b>Course Created by:</b>	Stephen Leonelli
<b>Date:</b>	01/01/1997
<b>Original Board Approval Date:</b>	05/19/1997
<b>Last Reviewed and/or Revised by:</b>	Bryan Carey
<b>Date:</b>	10/14/2024
<b>Last Board Approval Date:</b>	01/13/2025
<b>Effective Term:</b>	FA 2025