BIO 2.3 Course Outline as of Fall 2024

CATALOG INFORMATION

Dept and Nbr: BIO 2.3 Title: FUND BIO: BOTANY, ECO
Full Title: Fundamentals of Biology (Botany and Ecology)
Last Reviewed: 8/14/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	5.00	Lab Scheduled	6.00	8	Lab Scheduled	105.00
		Contact DHR	0		Contact DHR	0
		Contact Total	9.00		Contact Total	157.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 262.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	BIO 2B

Catalog Description:
Students will study the principles of ecology and the phylogeny of bacteria, protists, fungi, and plants with emphasis on development, morphology, and physiology of higher plants. Field trips taken. Intended for students majoring in biological sciences, pre-medical, or related pre-professional programs.

Prerequisites/Corequisites:
Course Completion of BIO 2.1

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Students will study the principles of ecology and the phylogeny of bacteria, protists, fungi, and plants with emphasis on development, morphology, and physiology of higher plants. Field trips taken. Intended for students majoring in biological sciences, pre-medical, or related pre-professional programs. (Grade Only)
Prerequisites/Corequisites: Course Completion of BIO 2.1

Recommended:
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
	C	Natural Sciences	Fall 2025	
	L5	Physical and Biological Sciences		
	C	Natural Sciences	Fall 1981	Fall 2025
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B2	Life Science	Fall 1981	
	B3	Laboratory Activity		
IGETC:	**Transfer Area**		Effective:	Inactive:
	5B	Biological Sciences	Fall 1981	
	5C	Fulfills Lab Requirement		

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:
UC Transfer:	Transferable	Effective:	Fall 1981	Inactive:

CID:
CID Descriptor: BIOL 155 Botany / Plant Diversity and Ecology
SRJC Equivalent Course(s): BIO2.3

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Compare and contrast the ecology and evolution of algal protists, cyanobacteria, plants, and fungi using cladistic classification.
2. Apply and integrate information from one or more levels of biological organization to study of cell mechanisms, anatomy, physiology, ecology, and evolution of plants, protists, or fungi.
3. Analyze global environmental problems with application of ecological principles to determine the impact of one on the other.
4. Investigate and evaluate biological phenomenon and summarize results in written scientific format.
5. Perform laboratory techniques, including microscopy, with a high level of expertise.

Objectives:
At the conclusion of this course, the student should be able to:
1. Outline the classification system for major groups within the bacteria, algal protists, fungi and plants, and be able to correctly identify and classify selected example organisms.
2. Examine endosymbiotic evidence linking cyanobacterial photosynthesis to protists and plants.
3. Differentiate between zygotic, sporic, and gametic meiosis life cycle patterns of protists, fungi, and plants life cycles.

4. Identify major evolutionary structural and reproductive advances in plants.
5. Explain the phylogenetic relationships between major taxonomic groups and relate these links to evolutionary history using cladistic models.
6. Identify and explain the functions of the basic structures of organisms (emphasis on plants) and describe the complementary relationships between these structures and their functions.
7. Describe the physiological functions of plants in relationship to the natural habitats in which plants have evolved.
8. Explain the processes of life histories and development in plants from the embryo to the mature adult, including the influences of hormones and environmental factors.
9. Explain the principles of ecology, emphasizing populations, communities, and ecosystems.
10. Describe the consequences of human impacts of the global and local environment with an emphasis on conservation biology.

Topics and Scope:

I. Introduction
- A. Review of scientific method
- B. Principles of biosystematics
- C. Phylogenetic classification of living things using cladistics

II. Cells
- A. Structure of the prokaryotic cell
- B. Eukaryotic cell structure and function, emphasizing the function of specialized plant organelles
- C. Review of cellular reproduction: mitosis and meiosis
- D. Benefits of multicellularity
- E. Representative life cycles including: sporic, gametic, and zygotic meiosis

III. Bacteria
- A. Bacterial diversity with emphasis on cyanobacteria
- B. Origin of photosynthetic mechanisms emphasizing cyanobacteria and chlorophyll a

IV. Photosynthetic Protists and Close Relatives
- A. Euglenoids
- B. Dinoflagellates
- C. Diatoms and brown algae
- D. Water molds
- E. Red and green algae

V. Fungi
- A. Chytridomycota
- B. Zygomycota
- C. Glomeromycota
- D. Ascomycota
- E. Basiciomycota
- F. Lichens
- G. Mycorrhiza

VI. Plants
- A. Origin and development of the Kingdom Plantae
- B. Diversity and evolutionary advances
  1. Bryophytes and seedless vascular plants
  2. Evolution of seed plants
  3. Gymnosperms
  4. Angiosperms
- C. Plant structure and function
  1. Tissues and tissue systems.

2. Seed plant anatomy (stems, roots, leaves, flowers, and fruit)
3. Primary and secondary growth

VII. Plant Physiology
- A. Water in living systems
  1. Diffusion
  2. Osmosis
  3. Water potential
- B. Active and passive transport in plants
  1. Transport of water
  2. Gas exchange and stomatal control mechanisms
  3. Transport of solutes in plants
- C. Metabolism
  1. Review respiration and energetics
  2. Photosynthesis
  3. Alternative photosynthetic pathways (C3, C4, and CAM) and photorespiration
- D. Soils and mineral nutrition
- E. Plant growth and development
- F. Plant hormones and their functions

VIII. Ecology
- A. Dynamics of biological systems
- B. Population biology
  1. Structure
  2. Demographics
- C. Community dynamics
  1. Structure and species interaction
  2. Succession and disequilibrium models
- D. Ecosystem
  1. Energy flow and trophic structure
  2. Water and nutrient cycling
  3. Human impacts
- E. Conservation Biology
  1. Endangered species and invasive species
  2. Habitat fragmentation
  3. Genetic diversity and extinction

IX. Laboratory Exercises
- A. Microscopy
  1. Plant cells
  2. Cyanobacteria
  3. Cell reproduction
- B. Diversity: taxonomy and identification
  1. Algae, fungi, and protists
  2. Seedless vascular plants
  3. Gymnosperms
  4. Angiosperms
- C. Physiology
  1. Plant transport
  2. Osmosis and water potential
  3. Mineral nutrition
  4. Photosynthesis
  5. Growth
- D. Ecology
  1. Perform field ecology sampling, such as vegetation analysis

2. Field trips to study local plant communities

Assignment:

Lecture-Related Assignments:
1. Reading in text and other sources (30-60 pages per week)
2. Exams (4-5)
3. Quiz(zes) (0-20)
4. Comprehensive final exam including objective and essay questions

Lab-Related Assignments:
1. Lab notebooks: notes and drawings from lab observations
2. Laboratory exercises including data collection and analysis
3. Scientific writing including calculations, graphing, data analysis and scientific paper format
4. Quiz(zes) (0-20)
5. Lab practical exams (3-4)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Scientific writing	Writing 15 - 30%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab exercises	Problem solving 0 - 10%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Lab notebooks	Skill Demonstrations 0 - 25%

Exams: All forms of formal testing, other than skill performance exams.

Exams; final exam; quiz(zes); lab practical exams	Exams 60 - 80%

Other: Includes any assessment tools that do not logically fit into the above categories.

Participation in class including field trips	Other Category 0 - 10%

Representative Textbooks and Materials:
Campbell Biology. 12th ed. Urry, Lisa and Cain, Michael and Wasserman, Steven and Minorsky, Peter and Orr, Rebecca. Pearson. 2021.
Instructor prepared materials and lab manual