

BIOL 15: CALIFORNIA ECOLOGY/ NATURAL HISTORY

Foothill College Course Outline of Record

Effective Term:	Summer 2025
Units:	5
Hours:	4 lecture, 3 laboratory per week (84 total per quarter) All-day field trips.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Area 5: Natural Sciences w/ Lab
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- The student will master basic techniques of field biology, including taking field notes, identifying organisms in the field, and using survey and sampling techniques.
- The student will explain basic principles of organismal, population, community and ecology

Description

An introduction to ecology, natural history, and field biology through the study, largely in an outdoor setting, of the plants and animals of the San Francisco Bay Area.

Course Objectives

The student will be able to:

1. Master basic techniques of field biology, including taking field notes, identifying organisms in the field, using survey and sampling techniques, and having familiarity with non-disruptive collection techniques.
2. Describe and apply the scientific method and explain its uses and limitations as it pertains to ecology and field biology.
3. Explain basic principles of biology which directly relate to work in the field, including especially evolution, systematics, and biological energetics.
4. Explain basic principles of organismal, population, community, and ecosystem ecology.
5. Describe the important climatic and geological features of California, and their biological significance.
6. Appreciate the special physical features which affect life in marine environments, and the unique diversity of ocean communities.
7. Practice basic plant taxonomy, including the use of taxonomic keys; describe the commonest plant communities in the Bay Area; and identify their most prominent members.
8. Appreciate the special evolutionary and ecological importance of the arthropods, and especially the insects.
9. Discuss the evolutionary history of the four classes of terrestrial vertebrates, and describe the natural history of some of their more prominent Bay Area representatives.
10. Discuss selected conservation issues in the San Francisco Bay Area.
11. Explore and discuss scientific issues related to the topics in ecology and environmental issues, especially those impacting diversity, equity, inclusion, and social justice.

Course Content

1. Basic field biology
 - a. Format and techniques for taking field notes
 - b. Frequent field trips to diverse localities to practice field identification
 - c. Non-disruptive collection techniques
 - d. Implementing survey and sampling techniques
2. Scientific method
 - a. Components of the scientific method

- b. Application and limitations in ecology and field biology
- c. Implementation of scientific method during lab exercises
- 3. Basic principles of biology
 - a. Evolution: Charles Darwin and the concept of natural selection
 - b. Evolution: Microevolutionary processes
 - c. Systematics: Principles and importance of biological classification and taxonomy
 - d. Biological energetics: Laws of Thermodynamics as applied to living things
 - e. Biological energetics: Photosynthesis and cellular respiration
- 4. Basic ecology
 - a. Organismal ecology
 - b. Population ecology
 - i. Characteristics of populations
 - ii. Population dynamics
 - c. Community ecology
 - i. Predation
 - ii. Competition
 - iii. Mutualism
 - iv. Commensalism
 - v. Ecological succession
 - d. Ecosystem ecology
 - i. Energy flow through ecosystems
 - ii. Matter re-cycling in ecosystems, biogeochemical cycles
- 5. California as a biological province
 - a. Basic geology of California
 - b. The climate of California
 - c. Biodiversity of California in relation to global patterns
 - d. The concept of endemism
- 6. The ocean and the bay
 - a. Physical factors in marine ecosystems - pressure, light, salinity, etc.
 - b. Diversity of animals in the ocean

- c. Diversity of producers in the ocean
- 7. Bay Area plant communities
 - a. Basic plant taxonomy
 - b. Common plant phyla and families
 - c. The taxonomy and biology of flowering plants
 - d. Bay Area plant communities
 - e. The use of taxonomic keys in plant identification
- 8. The insects and other arthropods
 - a. Characteristics and taxonomy of the phylum Arthropoda
 - b. Characteristics and taxonomy of the class Insecta
 - c. Natural history of insects
 - d. Ecological and evolutionary importance of insects
- 9. Terrestrial vertebrates
 - a. Evolution and natural history of amphibians, emphasizing California species
 - b. Evolution and natural history of reptiles, emphasizing California species
 - c. Evolution and natural history of birds, emphasizing California species
 - d. Evolution and natural history of mammals, emphasizing California species
- 10. Current, local conservation issues
 - a. Issue(s) of the instructor's choice relevant to plants/vegetation
 - b. Issue(s) of the instructor's choice relevant to animals
 - c. Issue(s) of the instructor's choice relevant to the marine environment
- 11. Explore and discuss scientific issues related to the topics in ecology and environmental issues
 - a. Historic and current indigenous land and resource management uses practices
 - b. Ethnobotany
 - c. Access to nature and wild spaces for all people regardless of race, ethnicity, and/or socioeconomic status

Lab Content

Laboratory activities include:

1. Illustrate and employ the scientific method
2. Maintain a field notebook
3. Use of taxonomic keys
4. Demonstration of collection techniques, including plant presses, preservatives, nets, and animal traps
 - a. Students work together to collect aquatic invertebrates and physical and chemical characteristics of local water bodies
5. Implementation of non-destructive sampling and survey techniques for both animals and plants (e.g., transects, plots)
 - a. Groups of students will create transects to measure diversity in different ecosystems and then analyze the collected data for comparison with other groups
6. Examination of representatives from the current taxonomic domains and kingdoms, including microscopic organisms
7. Use of the microscope
8. Field trip(s) to examine local geology
9. Exploration of trophic relationships and ecosystem energetics
10. Learning basic plant morphology and identification to family
11. Introduction to bird identification and field marks
12. Exploration of six different ecosystems in the San Francisco Bay Area, including, but not limited to: Coastal Redwood forest, Oak savanna, Bay Marshland, Coastal estuary, tide pools, and serpentine grasslands

Special Facilities and/or Equipment

1. Fully equipped biology laboratory, lecture room, and computer facilities.
2. Students need internet access.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Grading on basis of mid-term exams, lab quizzes and/or exams, field note-book, special projects,

and/or reports

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture

Field work

Oral presentations

Laboratory

Field trips

Representative Text(s) and Other Materials

Marchetti, M.P., and P.B. Moyle. Protecting Life on Earth. 2010.

Although this text is older than the suggested "5 years or newer" standard, it remains a seminal text in this area of study. The same applies to the supplemental texts noted below.

Recommended supplemental texts and references:

Jameson, E.W., Jr., and H.J. Peeters. Mammals of California. 2004.

Ornduff, R., P.M. Faber, and T. Keeler-Wolf. Introduction to California Plant Life. 2003.

Schoenherr, A.A. A Natural History of California. 1992. (Latest edition available)

Sibley, D.A. The Sibley Field Guide to Birds of Western North America. 2003. (Most recent edition available)

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Students maintain a field journal with descriptions of ecosystems visited.
2. Students write field reports reflecting upon one field site as a representative of an ecosystem and what the ecosystem dynamics are within the site.
3. Students write and present a report on one California native species.

Discipline(s)

Biological Sciences or Ecology