

# BIOL 15: CALIFORNIA ECOLOGY/NATURAL HISTORY

## Foothill College Course Outline of Record

Heading	Value
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:

- 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.
- Describe and apply the scientific method and explain its uses and limitations as it pertains to ecology and field biology.
- Explain basic principles of biology which directly relate to work in the field, including especially evolution, systematics, and biological energetics.
- Explain basic principles of organismal, population, community, and ecosystem ecology.
- Describe the important climatic and geological features of California, and their biological significance.
- Appreciate the special physical features which affect life in marine environments, and the unique diversity of ocean communities.
- 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.
- Appreciate the special evolutionary and ecological importance of the arthropods, and especially the insects.

- 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.
- Discuss selected conservation issues in the San Francisco Bay Area.
- 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

- Basic field biology
  - Format and techniques for taking field notes
  - Frequent field trips to diverse localities to practice field identification
  - Non-disruptive collection techniques
  - Implementing survey and sampling techniques
- Scientific method
  - Components of the scientific method
  - Application and limitations in ecology and field biology
  - Implementation of scientific method during lab exercises
- Basic principles of biology
  - Evolution: Charles Darwin and the concept of natural selection
  - Evolution: Microevolutionary processes
  - Systematics: Principles and importance of biological classification and taxonomy
  - Biological energetics: Laws of Thermodynamics as applied to living things
  - Biological energetics: Photosynthesis and cellular respiration
- Basic ecology
  - Organismal ecology
  - Population ecology
    - Characteristics of populations
    - Population dynamics
  - Community ecology
    - Predation
    - Competition
    - Mutualism
    - Commensalism
    - Ecological succession
  - Ecosystem ecology
    - Energy flow through ecosystems
    - Matter re-cycling in ecosystems, biogeochemical cycles
- California as a biological province
  - Basic geology of California
  - The climate of California
  - Biodiversity of California in relation to global patterns
  - The concept of endemism
- The ocean and the bay
  - Physical factors in marine ecosystems - pressure, light, salinity, etc.
  - Diversity of animals in the ocean
  - Diversity of producers in the ocean
- Bay Area plant communities
  - Basic plant taxonomy
  - Common plant phyla and families
  - 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