

# BIOL 13: MARINE BIOLOGY

## 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) Three 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 can describe the theory of evolution.
- The student can make well informed decisions as a consumer based on their understanding of sustainable fishing practices and evaluate how their own behavior affects future fish conservation.
- The student can understand how to collect scientific data quantitatively and present those data graphically.

## Description

An introduction to biology using marine animals, plants, and ecosystems. Major emphasis given to the ecology and conservation issues with examples drawn from California marine life. Conceptual development of seashore, estuaries, coral reefs, kelp forests, and pelagic life as interrelated ecosystems.

## Course Objectives

The student will be able to:

1. Describe the scientific method and explain its uses and limitations.
2. Explain the interrelationships between the biotic and abiotic environment.
3. Explain physical features of the ocean.
4. Identify the kingdoms and phyla of selected marine organisms.
5. Recognize the composition and major dynamics of selected marine ecosystems.
6. Explain the effect of global and personal human activity on marine ecosystems.
7. Make informed decisions on biological issues that affect our world.

## Course Content

1. Basic science
  - a. Rationale and application of the scientific method
  - b. Limitations of the scientific method
  - c. Attributes of living organisms
  - d. Cell theory, structure, and function
  - e. Levels of organization from atoms to biosphere
2. Interrelationships between the biotic and abiotic environment

- a. Nutrient cycling
    - i. Definition and types of nutrients
  - b. Producers
    - i. Primary production
    - ii. Relationship to nutrient cycles and energy flow
  - iii. Important marine producers
    1. Bacteria
    2. Protists
    3. Plants - vascular and non-vascular
    4. "Algae"
  - c. Consumers
  - d. Decomposers
  - e. Energy transfer
    - i. Kinds of energy
    - ii. Laws of thermodynamics
  - f. Ecosystem function
3. Physical features of the ocean
    - a. Plate tectonics and continental drift
    - b. Zonation and stratification
    - c. Characteristics of water
    - d. Salinity and osmosis
    - e. Tides, currents, and waves
    - f. Water cycle
  4. Marine organisms
    - a. Types of cells prokaryotic vs. eukaryotic
    - b. Methods of reproduction, mobility, and feeding
    - c. Systematics: Classification of organisms based on genetic relatedness - overview of the 3 domain compared to the traditional 5 kingdom classification system
    - d. Evolution and adaptations of major phyla and of vertebrate classes, with introduction to representative organisms
    - e. Classification of organisms based on lifestyle - return to zonation and define plankton, nekton, and benthon, and provide examples
  5. Marine ecosystems
    - a. Intertidal zone
    - b. Estuaries
    - c. Coral reefs
    - d. Continental shelf
    - e. Pelagic zone
      - i. Epipelagic
      - ii. Deep ocean
  6. Human impact on marine ecosystem
    - a. Population growth
    - b. Pollution
    - c. Endangered species
      - i. Habitat destruction
      - ii. Over hunting or over fishing
      - iii. Exotic species
    - d. Conservation efforts - successes and concerns
    - e. Current topics
      - i. Ozone depletion
      - ii. Global warming
      - iii. Ocean acidification

## Lab Content

Collaborative laboratory and field exercises as developed by course instructors.

1. Laboratory topics
  - a. Physical oceanography - the ocean as a habitat
    - i. Bathymetry
    - ii. Salinity
    - iii. Density
  - b. Properties of seawater
  - c. The scientific method
  - d. Phytoplankton and zooplankton - taxonomy and diversity
  - e. Invertebrate biology: Identification and classification of marine invertebrates
  - f. Vertebrate biology and ecology - chondrichthyes and osteichthyes
    - i. Identification of local species
    - ii. Hydrodynamics and locomotion
  - g. Marine mammal biology
    - i. Ecological adaptations to marine environment
    - ii. Diving physiology
  - h. Intertidal ecology - The Pacific Rocky Intertidal Zone
    - i. Marine conservation
2. Laboratory skills
  - a. Identification of major marine phyla
  - b. Use of laboratory materials, such as general laboratory equipment
  - c. Ability to collect simple data in the field, analyze data, and present data using charts and graphs
  - d. Ability to make experimental observations and draw conclusions for experiments involving topics such as fish hydrodynamics

## Special Facilities and/or Equipment

Fully equipped biology laboratory, lecture room, binoculars, marine aquaria, water test kits, and pollution test kits.

## Method(s) of Evaluation

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

Oral and/or written laboratory reports and projects  
 Demonstration of mastery of lecture material by written quizzes, midterm exams, and/or a comprehensive final

## Method(s) of Instruction

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

Lecture  
 Discussion  
 Oral presentations  
 Laboratory  
 Field trips

## Representative Text(s) and Other Materials

Castro, P., and M.E. Huber. *Marine Biology, 12th ed.*. 2024.

Keene State College students with K. Cangioli. *A Student's Guide to Tropical Marine Biology*. 2019.

Keddy, E.. *OCEAN 101 - Fundamentals of Oceanography*. 2021.

Dormann, C., and A. Schroeder. *Marine Ecology Notes, 2nd ed.*. 2021.

Link to *A Student's Guide to Tropical Marine Biology*: <https://pressbooks.pub/tropicalmarinebio/front-matter/introduction/>

Link to *OCEAN 101 - Fundamentals of Oceanography*: <https://commons.libretexts.org/book/geo-12962>

Link to *Marine Ecology Notes*: <https://open.umn.edu/opentextbooks/textbooks/marine-ecology-notes>

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

1. Students research and present on seafood consumption.
2. Students answer short essay questions about physical structure of ocean.
3. Students compare and contrast body shape, hydrodynamics, and niches of two different species.

## Discipline(s)

Biological Sciences