

CATALOG INFORMATION

Dept and Nbr: BIO 25

Title: MARINE BIOLOGY

Full Title: Marine Biology

Last Reviewed: 11/4/2024

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	4.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	4.00	Lab Scheduled	3.00	6	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	6.00		Contact Total	105.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 210.00

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

Catalog Description:
Introduction to biological oceanography, natural history, taxonomy and ecology of major plant and animal groups of the world's oceans with emphasis on the Pacific Coast of North America. Examines human interactions with, and impacts upon, the marine environment.

Prerequisites/Corequisites:

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Schedule of Classes Information:
Description: Introduction to biological oceanography, natural history, taxonomy, and ecology of major plant and animal groups of the world's oceans with emphasis on the Pacific Coast of North America. (Grade or P/NP)
Prerequisites/Corequisites:
Recommended: Eligibility for ENGL 100 or ESL 100
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 1981	
	H	Global Perspective and Environmental Literacy		
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:

Certificate/Major Applicable:

Not Certificate/Major Applicable

COURSE CONTENT

Outcomes and Objectives:

Upon completion of this course, students will be able to:

1. Describe and explain the physical and geological aspects of the world's oceans and how they influence the success and distribution of marine life.
2. Describe how tides, currents, and waves are formed and distributed, and how each effects the circulation and distribution of nutrients and organisms in the sea.
3. Describe the characteristics of life and explain basic cell structure and properties including photosynthesis and cell respiration.
4. Compare and contrast the mechanisms of evolution and explain how they lead to diversity of marine life.
5. Explain the role and significance of nutrient cycles in the sea, relate these cycles to photosynthesis, primary production, secondary production, and trophic structure, and analyze human impacts on these cycles.
6. Describe the concepts of zonation, ecological succession, and population growth and regulation in marine ecosystems.
7. Compare and contrast the types, roles, and life histories of the major groups of marine organisms in marine ecosystems.
8. Compare and contrast the structure, distribution, and trophic relationships of selected marine communities, including the intertidal zone, subtidal kelp forests, estuaries, coral reefs, and the deep sea.
9. Evaluate the impact of human activities on the marine communities

listed above and describe methods used to mitigate these impacts and to restore these habitats.

10. Compare the types, distributions and adaptations of the major groups of the nekton, including marine tetrapods.
11. Analyze and explain marine fisheries methods and problems of management and overexploitation.
12. Analyze and explain the problems and issues of toxic pollutants in marine ecosystems and compare and contrast methods used to reduce these impacts.
13. Analyze and explain the effectiveness of marine conservation methods including marine protected areas.
14. Effectively communicate biological observations from activities in the field.

Topics and Scope:

LECTURE MATERIAL:

1. The ocean as a habitat
 - a. Light and temperature
 - b. Dissolved gases
 - c. Pressure changes with depth
 - d. Salinity, temperature, and density
 - e. Stratification of the ocean
2. Marine geology
 - a. Plate tectonics
 - b. The sizes of ocean basins and distributions of continents, past and present
3. Physical oceanography
 - a. Tides
 - b. Currents
 - c. Waves
4. Properties of life
 - a. Characteristics of life
 - b. Overview of cell structure: eukaryotic and prokaryotic
 - c. Overview of cell respiration and photosynthesis
5. Evolution and systematics of marine organisms
 - a. Mechanisms of evolution
 - b. Diversity of marine organisms
 - c. Biological species concept and methods of taxonomy and systematics
6. Nutrient cycles
 - a. Nitrogen, phosphorus and carbon cycles
 - b. Human impacts on the nutrient cycles listed above, including global warming and eutrophication caused by fertilizers and sewage
 - c. Upwelling and El Nino (ENSO) events
7. Marine Ecology
 - a. Primary and secondary production distribution: patterns and causes
 - b. Food chains, food webs, and trophic hierarchies
 - c. Energy flow through ecosystems
 - d. Principles of population biology including the concept of

- carrying capacity
- e. Habitat disturbance (natural and human impacts) and succession
- 8. Marine plants, protists, and bacteria
 - a. Vascular plants in the sea: the seagrasses and mangroves
 - b. Protists in the sea: macroalgae and phytoplankton diversity
 - c. Bacteria in the sea: importance in primary production and nutrient cycles
- 9. Kelp forest ecology
 - a. Kelp forest structure: physical and biological factors
 - b. Human impacts including harvesting of the kelp itself and its inhabitants, habitat destruction, and removal of keystone predators
 - c. Interrelationship of this habitat with other marine and terrestrial habitats, discussion of how human impacts in this habitat ultimately impacts other habitats
- 10. Intertidal community structure
 - a. Intertidal structure: physical and biological factors, zonation patterns
 - b. Human impacts including harvesting and habitat destruction
 - c. Interrelationship of this habitat with other marine and terrestrial habitats, discussion of how human impacts in this habitat ultimately impacts other habitats
- 11. Coral reefs
 - a. Coral reef structure: physical and biological factors including the importance of zooxanthellae
 - b. Human impacts including harvesting (including dynamite fishing and cyanide fishing practices), habitat destruction, sedimentation, eutrophication, and global warming
 - c. Interrelationship of this habitat with other marine and terrestrial habitats, discussion of how human impacts in this habitat ultimately impacts other habitats
- 12. Estuaries
 - a. Estuary structure: physical and biological factors
 - b. Human impacts including harvesting and habitat destruction
 - c. Interrelationship of this habitat with other marine and terrestrial habitats, discussion of how human impacts in this habitat ultimately impacts other habitats
- 13. Deep water ecology
 - a. Physical and biological components of deep sea environments including benthic and non-benthic types
 - b. Hydrothermal vents, cold seeps and chemosynthesis
 - c. Human impacts including harvesting and habitat destruction
 - d. Impact of whaling on the deep-sea benthic community
- 14. Marine nekton
 - a. Diversity of fish species
 - b. Diversity of marine tetrapods including human impacts on tetrapod populations caused by harvesting and habitat destruction
 - c. Osmoregulatory and thermoregulatory adaptations of the nekton
- 15. Fisheries
 - a. Maximum sustainable yield
 - b. Historical fisheries practices and collapses, causes and consequences

- c. Current problems related to overexploitation and new methods of stock management
- d. Aquaculture promise and problems including genetically modified organisms
- 16. Ocean pollution
 - a. Sources and types of pollution
 - b. Impact of toxins on marine organisms including the concept of biological magnification
- 17. Marine Conservation and Protected Areas
 - a. History of marine resource use
 - b. Current methods used to protect marine habitats and resources worldwide including marine reserves and marine sanctuaries.

LABORATORY/FIELD MATERIAL:

- 1. Compound and dissecting microscope
- 2. Analysis of sea water
- 3. Osmoregulation in marine animals
- 4. Taxonomy of marine organisms
- 5. Major marine animal groups
 - a. Sponges
 - b. Cnidarians
 - c. Mollusks
 - d. Arthropods
 - e. Echinoderms
- 6. Major marine plant groups
 - a. Vascular plants: sea grasses
 - b. Macroalgae
- 7. Phytoplankton collection and review
- 8. Zooplankton - collection and review
- 9. Intertidal zonation - zone indicators in rocky intertidal and mudflats
- 10. Marine fish
- 11. Marine birds
- 12. Marine mammals
- 13. Fisheries
- 14. Marine pollution

Assignment:

- 1. Read textbooks and scientific articles
- 2. Field/lab study and report/paper analysis and writing
- 3. Library research paper or data analysis and interpretation reports required.

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.

Lab reports, Term papers, FIELD NOTEBOOKS

Writing 15 - 30%

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

Field work, Laboratory work

Problem solving
10 - 15%

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

Field work

Skill Demonstrations
5 - 15%

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

Multiple choice, True/false, Matching items, Completion, Essay

Exams
50 - 70%

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

None

Other Category
0 - 0%

Representative Textbooks and Materials:

MARINE BIOLOGY: Castro and Huber, Third Edition, McGraw-Hill, 2000

AN INTRODUCTION TO THE BIOLOGY OF MARINE LIFE, Seventh Edition, by James Sunrich, McGraw-Hill Publishers, 1999

MARINE BIOLOGY AN ECOLOGICAL APPROACH, Fifth Edition, by James Nybakken, Addison Wesley Longman, Inc. Publishers, 2001

MARINE BIOLOGY: FUNCTION, BIODIVERSITY, ECOLOGY, by Jeffery Levinton, Second Edition, Oxford University Press, 2001

ISSUES IN OCEANOGRAPHY, 2nd Edition, by Abel, McConnell, and Koepfler, Prentice Hall Publishers, 2001.