BIO 25 Course Outline as of Summer 2019

CATALOG INFORMATION

Dept and Nbr: BIO 25 Title: MARINE BIOLOGY
Full Title: Marine Biology
Last Reviewed: 4/8/2019

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:

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. Examines human interactions with, and impacts upon, the marine environment. (Grade or P/NP)
Prerequisites/Corequisites:
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 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:
Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Apply the scientific method, laboratory and field skills to the investigation and evaluation of biological phenomena in the marine environment.
2. Synthesize knowledge of evolutionary mechanisms, trends, and history with patterns of marine biodiversity.
3. Integrate basic principles of cellular processes, anatomy, physiology, ecology, and evolution as they apply to marine biological systems.
4. Investigate how humans impact and are impacted by marine ecosystems.

Objectives:
Students will be able to:
1. Apply the scientific method to marine biological investigation.
2. Apply laboratory and field techniques, including microscope use, sampling techniques, and proper note-taking, to observing, identifying, and experimenting with marine organisms and biological phenomenon.
3. Compare and contrast the cell structure and function of prokaryotic and eukaryotic cells and of plant and animal cells.
4. Compare and contrast the mechanisms of evolution and explain how they lead to the major evolutionary patterns and adaptations in the biodiversity of major marine taxa (domains, kingdoms, phyla, and class).
5. Integrate knowledge of physical and biological oceanography, including the distribution of nutrients and plankton in the sea.

6. Describe the concepts of zonation, ecological succession, population growth and regulation in marine ecosystems.
7. Understand the role of biotic and/or abiotic factors in the structure of biomes, ecosystems, communities, and populations, and how humans interact with these systems.
8. Compare and contrast the physical and biological structure of selected marine communities, including distribution and trophic relationships.
9. Analyze and explain the impact of human activities on marine communities and methods used to mitigate these impacts and to restore marine habitats.

Topics and Scope:

I. Science as a Process
   A. Scientific method
   B. Techniques used specifically in marine research
II. 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
III. Physical Oceanography
   A. Tides
   B. Currents
   C. Waves
IV. Properties of Life
   A. Characteristics of life
   B. Overview of cell structure: eukaryotic and prokaryotic; algal and animal
   C. Overview of cell respiration and photosynthesis
V. Evolution and Systematics of Marine Organisms
   A. Mechanisms of evolution
   B. Diversity of marine organisms
   C. Species concepts and speciation
   D. Phylogeny
VI. General Marine Ecology
   A. Primary and secondary production distribution: patterns and causes
   B. Food chains, food webs, and trophic hierarchies
   C. Nutrient cycles: nitrogen, phosphorus and carbon
   D. Human impacts on the nutrient cycles listed above, including climate change and eutrophication
   E. Upwelling and El Nino-Southern Oscillation (ENSO) events
   F. Principles of population biology including the concept of carrying capacity
   G. Habitat disturbance and succession
VII. Marine Organisms
   A. Marine plants: the seagrasses and mangroves
   B. Protists: macroalgae, phytoplankton, protozoan zooplankton
   C. Fungi
   D. Bacteria: importance in primary production and nutrient cycles
   E. Animals: fish, marine mammals, sea turtles, marine invertebrates
VIII. Ecology of Major Habitat Types
   A. Kelp forest
   B. Intertidal: mudflats, sandy beaches, rocky intertidal
   C. Coral reefs

D. Estuaries
E. Pelagic: epipelagic, mesopelagic, deep sea
F. Deep sea benthos: hydrothermal vents, cold seeps and chemosynthesis

IX. 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

X. Ocean Pollution
A. Sources and types of pollution
B. Impact of toxins on marine organisms including the concept of biological magnification

XI. 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:

I. Compound and Dissecting Microscope Use
II. Properties of Sea Water
III. Osmoregulation in Marine Animals
IV. Taxonomy of Marine Organisms
V. Marine Animal Groups: Anatomy, Physiology, Ecology and Field Identification including Class or Order Level Differences
A. Invertebrates including: sponges, cnidarians, mollusks, arthropods, echinoderms
B. Vertebrates including: marine mammals and birds
VI. Vascular plants: Anatomy, Physiology, Ecology, and Field Identification
VII. Macroalgae: Anatomy, Physiology, Ecology, and Field Identification
A. Chlorophyta
B. Phaeophyta
C. Rhodophyta
VIII. Plankton Collection, Review, and Identification
A. Phytoplankton
1. Prokaryotic and eukaryotic
2. Net plankton vs. nano plankton
B. Zooplankton
1. Protistan vs. animal plankton
2. Mero plankton vs. holoplankton
IX. Intertidal Zonation: Zone Indicators in Rocky Intertidal and/or Mudflats
X. Human Impacts on Marine Environments
A. Fisheries and/or pollution
B. Habitat degradation and restoration ecology

Assignment:

Lecture-Related Assignments:
1. Reading: textbooks, case studies, and scientific articles (20-30 pages per week)
2. Written homework including analysis of readings (0-5 assignments)
3. Research paper that shows topic coverage and critical analysis (5-7 pages)
4. Lecture exams (2-3) and comprehensive final exam

Lab-Related Assignments:
1. Field/lab Work: Weekly laboratory experiments, observations and exercises including data

analysis and interpretation, lab exams, and field trip notes
2. Participation: class discussion and presentations

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.

Research paper	Writing 15 - 20%

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

Analysis of experiments and homework problems	Problem solving 10 - 25%

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

Field and laboratory work	Skill Demonstrations 20 - 30%

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

Exams and comprehensive final exam	Exams 40 - 55%

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

Participation, class discussion and presentations	Other Category 0 - 10%

Representative Textbooks and Materials:
Marine Biology. Castro, Peter and Huber, Michael. 11th ed. McGraw-Hill. 2018
An Introduction to the Biology of Marine Life. Morrisey, John and Sumich, James and Pinkard-Meier, Deanna. 11th ed. Jones & Bartlett Learning. 2016
Instructor prepared materials: lab manual