GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: BIO 13 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2017 CURRICULUM APPROVAL DATE: 04/25/2016

SHORT TITLE: MARINE BIOLOGY

LONG TITLE: Marine Biology

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
4	18	Lecture:	3	54
		Lab:	3	54
		Other:	0	0
		Total:	6	108

COURSE DESCRIPTION:

The course provides a comprehensive overview of marine ecosystems, emphasizing the diversity of life inhabiting them. The physical, chemical and ecological features of the marine environment are reviewed and the evolutionary adaptations that allowed marine organisms to survive are emphasized. Although the overall focus will include ecosystems found in both tropical, subtropical, temperate and arctic regions, many of the practical examples will be drawn from the rich ecosystems of the central California coast and labs will provide hands-on experience of the diversity of life forms found in this area. Practical exercises will include viewing of specimen in the laboratory, short documentaries followed by discussion and field trips to coastal locations within the Monterey Bay and vicinity to view and explore specific ecosystems such as kelp forests, the intertidal, and estuarine areas, as well as learn about local marine species such as birds and mammals. ADVISORY: Eligible for English 250, English 260 and Mathematics 430.

PREREQUISITES:

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion
03 - Lecture/Laboratory
04 - Laboratory/Studio/Activity

STUDENT LEARNING OUTCOMES:

1. Explain the scientific method and demonstrate its application to critical thinking.

Measure: performance, written report, written exam

PLO: 1, 2, 3

ILO: 2, 7, 1

GE-LO: B5

Year assessed or anticipated year of assessment: Fall 2015

2. Discuss the physical constraints of the marine environment and describe how organisms have evolved adaptations to cope with these constraints;

Measure: performance, written report, written exam

PLO: 1, 2, 3, 4, 5, 6

ILO: 7, 3, 2

GE-LO: B2, B1

Year assessed or anticipated year of assessment: Fall 2015

3. Describe how communities of organisms interact with each other and their physical environment;

Measure: performance; written report, written exam

PLO: 1, 2, 3, 4, 5, 6

ILO: 2, 7

GE-LO: B1, B2

Year assessed or anticipated year of assessment: Fall 2015

4. Demonstrate basic laboratory and field skills.

Measure: performance, written report, oral report, demonstration

PLO: 3, 7

ILO: 6, 7, 4

GE-LO: B4, B7, B8

Year assessed or anticipated year of assessment: Fall 2015

5. Demonstrate the ability to communicate concisely and scientifically using the English language

Measure: oral and written report

PLO: 2, 3

ILO: 1, 3

GE-LO: A2, A5, A7

Year assessed or anticipated year of assessment: Fall 2015

PROGRAM LEARNING OUTCOMES:

1. Use raw experimental data to conduct statistical analysis, and present conclusions in a graphical and narrative form.

2. Find, select and evaluate various types of scientific information including primary research articles, mass media sources and world-wide web information.

3. Effectively communicate scientific concepts in both written and oral formats.

4. Identify the evolutionary processes that lead to adaptation and biological diversity.

5. Describe the relationship between life forms and their environment and ecosystems.

6. Explain the basic structures and fundamental processes of life at molecular, cellular and organismal levels.

7. Demonstrate the correct operating procedures in the use of common lab equipment such as compound micro-scopes, spectrophotometer,pH meter, electrophoresis gelapparatus, micropipetters, and centrifuges.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 04/25/2016

3 Hours

CONTENT: Seawater. geography and geomorphology of world's oceans. Plate-tectonic.

STUDENT PERFORMANCE OBJECTIVES: Describe the basic properties of seawater such as chemical composition, physical and chemical properties. Discuss the geography and geomorphology of the oceans, the location of the major ocean basins and their characteristics, temperature and vertical stratification and the circulation patterns of water masses. Describe plate-tectonic, mid-oceanic ridges and trenches, understand how the ocean floor has changed over time and how its current composition informs us about changes in climate and biology.

HOMEWORK: Read chapter on lecture topic, be prepared to answer questions about the material discussed during lecture, complete critical thinking exercises in textbook

3 Lab Hours

CONTENT: Lab techniques. The Scientific Method. Properties of seawater. The microscope. Ancient plankton.

STUDENT PERFORMANCE OBJECTIVES: Operate safely in a laboratory environment. Explain the process of scientific inquiry and its limitations. Measure density, salinity and dissolved oxygen content of seawater samples. Recognize the parts of a compound light microscope. Practice how to focus the microscope on an object up to 400x magnification. Identify some ancient planktonic forms, describe their adaptations and discuss how the composition of the ocean floor provides a buffer explaining current chemical properties.

HOMEWORK: Complete questions in lab book, enter data on activities in lab/field book

3 Hours

CONTENT: Physical and biological oceanography basics.

STUDENT PERFORMANCE OBJECTIVES: Discuss basic physical oceanography phenomena such as tides, currents, general oceanic circulation, thermoclines and waves; Explain how oceans influence climate ; explain the significance of El Nino Southern Oscillations. Define autotrophy and eterotrophs and define bottom-up processes. Explain the difference between phyto-plankton and zooplankton. Discuss the purpose of vertical migrations and planktonic life stages. Explain the nutrients cycles and productivity patterns in the oceans. Define the terms standing crop, primary production, gross primary production & net primary production. Discuss the differences in location & production between attached benthic plants & pelagic phytoplanktyon. Explain means of measuring primary production. Discuss the properties of light & how it behaves in a marine environment. Discuss the role of pigments in the process of photosynthesis. Discuss nutrient requirements of the photosynthetic process. Discuss how nutrients cycle through the marine environment. Discuss the effects of grazing on rates of primary production. Describe the seasonal patterns of primary production in temperate, warm, & polar seas. Define upwelling.

HOMEWORK: Read chapter on lecture topic, be prepared to answer questions about the material discussed during lecture, complete critical thinking exercises in textbook

3 Lab Hours

CONTENT: Web learning tools for oceanography, weather and tides. Adaptations of plankton

STUDENT PERFORMANCE OBJECTIVES: Operate web-based programs that report on weather using NOAA websites, interpret weather forecasts and Coast Guard generated predictions. Demonstrate how to read a tide book. Apply systems of measurement and scales. Describe the classification of planktonic organism and discuss their form and function. Describe adaptations of phytoplankton to being heavier than water. Identify other unfavorable environmental conditions for phytoplankton & adaptions for coping them.

HOMEWORK: Complete questions in lab book, enter data on activities in lab/field book

3 Hours

CONTENT: Fish taxonomy and adaptations. Ocean necton. The open ocean

STUDENT PERFORMANCE OBJECTIVES: Talk about the basic classification of fishes and their adaptations to specific environments. Describe the major features of specific groups such as cartilaginous versus bony fishes, benthic fishes, larval stages and different modes of reproductions, and adaptations.

Discuss the composition of oceanic nekton and the environmental conditions found in the open ocean. Describe the characteristics of the open ocean as an environment and the subdivisions of the various provinces of the ocean.

HOMEWORK: Read chapter on lecture topic, be prepared to answer questions about the material discussed during lecture, complete critical thinking exercises in textbook

3 Lab Hours

CONTENT: Adaptation of Fishes

STUDENT PERFORMANCE OBJECTIVES: Observe major structures of bony and cartilaginous fishes and their function. Survey major fish classes and adaptations. Describe an overview of the major adaptations for open ocean living such as buoyancy, body shape, defense mechanisms and camouflage, sensory systems and migration .

HOMEWORK: Complete questions in lab book, enter data on activities in lab/field book

3 Hours

CONTENT: The Deep Sea. Benthos and benthic ecology.

STUDENT PERFORMANCE OBJECTIVES: Describe zonation, report on the history of deep sea exploration and its challenges, explain the issues associated with light, pressure, salinity, temperature, oxygen and food supply. Describe deep sea vents and the importance of carcasses on the bottom of the ocean. Describe benthic environments. Describe the classification of marine animals by location & size. Discuss the relationship between wave action, coastal features, & ocean bottom. Discuss the relationship between plants, animals, & bottom sediments.

HOMEWORK: Read chapter on lecture topic, be prepared to answer questions about the material discussed during lecture, complete critical thinking exercises in textbook

3 Lab Hours

CONTENT: Phycology: algae form and function. Deep sea vents.

STUDENT PERFORMANCE OBJECTIVES: Describe the role of marine algae in the ocean and discuss photosynthesis. Explain light atenuation in the ocean. Discuss the content of the Monterey Bay Aquarium Research Institute video on the exploration of the deep; describe, discoveries and identify life forms seen through videos. Recall the content of videos of hydrothermal vents.

HOMEWORK: Complete questions in lab book, enter data on activities in lab/field book

3 Hours

CONTENT: Kelp forests. Invertebrates. Intertidal communities.

STUDENT PERFORMANCE OBJECTIVES: Describe kelp forests and their role as areas of high diversity and productivity. Explain kelp's specific adaptations. Describe the diversity of invertebrates found in kelp forests. List the main classes of invertebrates and their adaptations. Define intertidal. Describe the unique environment constraints of the littoral zone. Explain vertical zonations. Define ecological niche. Explain the richness of species diversity in the rocky intertidal. Describe a typical community of the upper intertidal. Describe a typical community of the middle intertidal. Describe a typical community of the lower intertidal. Describe the unique features of the sandy intertidal. Describe the unique features of the muddy intertidal. Describe a typical community of the sandy intertidal. Describe a typical community of the muddy intertidal. Explain biological rhythms.

HOMEWORK: Read chapter on lecture topic, be prepared to answer questions about the material discussed during lecture, complete critical thinking exercises in textbook

3 Lab Hours

CONTENT: Field trip.

STUDENT PERFORMANCE OBJECTIVES: Organize field notes collected during field trip to either the Monterey Bay Aquarium or Discovery Center in Santa Cruz and report on key experiences and findings to the rest of the class. Identify main species of invertebrates found in Monterey Bay. Use tools to dissect a sea urchin. Describe various marine invertebrates and their adaptations.

HOMEWORK: Complete questions in lab book, enter data on activities in lab/field book

3 Hours

CONTENT: Interstitial communities. Estuaries.

STUDENT PERFORMANCE OBJECTIVES: Define interstitial and the difference between endobenthos, meiobenthos and epibenthos. Define the influence of grain-size and oxygen tension on meiofaunal composition and capillary action. Survey the composition of interstitial assemblages and their adaptations.

Describe the physical characteristics of estuaries. Discuss the ecological & commercial importance of estuaries. Describe the types of estuaries. Discuss freshwater/saltwater interactions. Describe adaptation of organisms to fluctuating salinity. Describe the role of sediments in building the estuary environment. Describe the differences between temperate & tropical wetlands, mud flats & channels.

HOMEWORK: Read chapter on lecture topic, be prepared to answer questions about the material discussed during lecture, complete critical thinking exercises in textbook

3 Lab Hours

CONTENT: Field Trip to Elkhorn Slough

STUDENT PERFORMANCE OBJECTIVES: Use basic sampling techniques for studying meiofaunal assemblages. Discuss and report on an introductory video about the slough. Demonstrate the use of core sampling techniques. Report on the main species assemblages found in the slough and their interactions.

HOMEWORK: Complete questions in lab book, enter data on activities in lab/field book

3 Hours

CONTENT: Tropical communities and arctic ecosystems.

STUDENT PERFORMANCE OBJECTIVES: Describe reef building corals & their ecology. Describe the three types of coral reefs & their formation. Describe various reproductive strategies of corals. Describe zonation in coral reefs. Define symbiosis & give examples. Discuss the adaptive significance of coloration in the coral reef community. Review the features of an arctic ecosystem and the importance of primary production to the world's ocean. Discuss adaptations to very cold water, seasonality of food supply and energy transfer via migration of animals from arctic waters on a seasonal basis. Review an arctic food web.

HOMEWORK: Read chapter on lecture topic, be prepared to answer questions about the material discussed during lecture, complete critical thinking exercises in textbook

3 Lab Hours

CONTENT: Identify basic types of coral through CD-ROM activity. Discuss the anatomy of coral. Discuss the characteristics of arctic systems and report on video on their ecology.

STUDENT PERFORMANCE OBJECTIVES: Review the diversity and adaptations of organisma living in tropical and arctic environments. Review some of the main species of reef-building corals. Discuss the importance and extreme adaptation of arctic organisms.

HOMEWORK: Complete questions in lab book, enter data on activities in lab/field book

3 Hours

CONTENT: Large vertebrates: sharks, sea turtles and marine birds and mammals.

STUDENT PERFORMANCE OBJECTIVES: Describe ecological challenges faced by large migratory vertebrates (sea turtles, marine birds, sharks). Review the importance of nesting areas versus feeding areas. Describe the influence of top predators on the marine ecosystems. Explain top down processes and how predation shapes the marine food web. Review marine mammal taxonomy. Discuss adaptations to diving and physiology. Describe social structure such as polygyny, sperm-competition, reproductive strategies, feeding assemblages and relationship with ocean productivity. Describe various types of cultural transmission. Describe sound transmission in the ocean, and how marine mammals use echolocation and communication.

HOMEWORK: Read chapter on lecture topic, be prepared to answer questions about the material discussed during lecture, complete critical thinking exercises in textbook

3 Lab Hours

CONTENT: Field trip to Monterey Bay to view birds and mammals

STUDENT PERFORMANCE OBJECTIVES: Demonstrate the ability to identify common marine birds and mammals found along the central California coast. Collect and analyze basic field data on abundance, distribution, and habits.

HOMEWORK: Complete review of lab book and turn in to professor for evaluation

3 Hours

Final

METHODS OF INSTRUCTION:

Instruction will use lecture with audio-visual aids,

laboratory exercises and field studies.

METHODS OF EVALUATION:

CATEGORY 1 - The types of writing assignments required:
Percent range of total grade: 55 % to 60 %
Written Homework
Reading Reports
Lab Reports
Essay Exams

Term or Other Papers
CATEGORY 2 -The problem-solving assignments required:
Percent range of total grade: 30 % to 35 %
Field Work
Lab Reports

Quizzes
Exams
CATEGORY 3 -The types of skill demonstrations required:
Percent range of total grade: 15 % to 5 %

Class Performance/s
CATEGORY 4 - The types of objective examinations used in the course:
Percent range of total grade: 0 % to %
CATEGORY 5 - Any other methods of evaluation:
Percent range of total grade: 0 % to %

REPRESENTATIVE TEXTBOOKS:

Required: P. Castro and M. Huber, Marine Biology, NY USA: McGraw Hill, Year of Publication: 2013. Or other appropriate college level text.

ISBN: 978-007-352420-7

Reading level of text, Grade: 13 Verified by: Microsoft

Other textbooks or materials to be purchased by the student: Discovering the Living Ocean: A Manual of Field and Laboratory Activities. Paul Detwiler. Published by Kendall Hunt Publishing (2012). ISBN 10: 0757584853

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
- GAV B2, effective 201070
- GAV B3, effective 201070

CSU GE:
- CSU B2, effective 201070
- CSU B3, effective 201070

IGETC:
- IGETC 5B, effective 201070
- IGETC 5C, effective 201070

CSU TRANSFER:
- Transferable CSU, effective 201070

UC TRANSFER:
Transferable UC, effective 201070

SUPPLEMENTAL DATA:
Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN:
CAN Sequence:
CSU Crosswalk Course Department: BIO
CSU Crosswalk Course Number: 13
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000359031
Sports/Physical Education Course: N
Taxonomy of Program: 049900