GROSSMONT COLLEGE

COURSE OUTLINE OF RECORD

Curriculum Committee Approval: 05/18/2021

GCCCD Governing Board Approval: 06/15/2021

BIOLOGY 105 - MARINE BIOLOGY

1. Course Number Course Title Semester Units

 BIO 105 Marine Biology 4

Semester Hours

 3 hours lecture: 48-54 hours 96-108 outside-of-class hours 3 hours lab: 48-54 hours

 192-216 total hours

2. Course Prerequisites

 None

 Corequisite

 None

 Recommended Preparation

 A “Pass” grade in Math 090and a “C” grade or higher or Pass in English 120or equivalent.

3. Catalog Description

 Introductory college-level course that uses marine plants, animals and their interrelations with their aquatic environment in order to develop an understanding of modern biological principles and processes that are basic to all forms of life. Information dealing with several aspects of taxonomy, evolution, ecology, behavior and physiology of marine organisms is included.

4. Course Objectives

 The student will:

 a. List and define the basic approaches used in science to achieve understanding of natural marine systems.

 b. Use scientific methods and processes to analyze and select the most plausible of several alternative explanations for a set of observations.

 c. Define the basic mechanisms of organismal reproduction, genetic inheritance, and the process of organic evolution.

 d. Describe the physical structure found in all ecosystems and specifically the physical aspects of the ocean ecosystem and explain how those environmental factors select for organismal adaptations.

 e. List and describe the major steps involved in natural selection, and provide at least one example of how natural selection accounts for the observed diversity of life in the sea.

 f. List the general criteria that define the major kingdoms of life.

 g. Describe the dominant members and the biology of major taxonomic groups of marine organisms.

 h. Differentiate the structures of typical prokaryotic and eukaryotic cells and between typical plant and animal cells.

 i. Describe the concept of homeostasis, the self-regulation necessary to maintain optimal conditions for survival in changing marine environmental conditions.

 j. Apply a systems-oriented approach to explaining the interrelationships within living organisms, as well as between living organisms and their physical, chemical, and energy components of marine environments.

 k. Analyze the results of laboratory experiments performed in class that require data analysis;

 interpretation of data, graphs and tables; and mathematical calculations; and relate these

 results to the principles discussed in the lecture portion of the course.

 l. Complete laboratory assignments using proper English grammar, and correct spelling of all words including, and especially, technical language appropriate to subject matter.

 m.Exhibit basic Climate Change literacy. Explain and understand the Water Cycle and Carbon Cycle and the anthropogenic mechanisms in which the Carbon Cycle is being modified as it relates to Climate Change.

5. Instructional Facilities

 a. Standard Classroom

 b. Biological teaching laboratory equipped with running water, chilled marine tank, vacuum, air, hood and electrical outlets; also storage space for marine plant and animal specimens. Dedicated classroom computer and multimedia projectors, screen, black or white board. Proximity to biology laboratory prep room, computers with data analysis, graphics and web browsing software.

 c. Special requirements:

 1) Compound and dissecting microscopes.

 2) Selected charts and models.

 3) Preserved and living specimens for dissection and observation.

 4) Selected prepared microscopic slides.

 5) Refrigerated salt water aquarium.

6) Various required chemicals.

1. Facilities for multimedia presentations, including a computer at the instructor’s station.
2. Classroom computers in laboratory for student use during laboratory exercises.

6. Special Materials Required of Student

1. Camera or access to a camera.
2. Access to internet connected computer with printing capabilities.
3. Herbarium papers purchased by students.

7. Course Content

 LECTURE

 a. The world ocean.

 1) Ocean circulation patterns.

 2) Adaptations to and spatial distribution of life in the sea.

 b. Ecology of ocean ecosystems and biological magnification.

 c. Photosynthesis and reproduction in marine plants.

 d. The benthos.

 1) Animal-seafloor relationships.

 2) Larval dispersal.

 3) Coral reefs.

 4) Abyssal communities.

 5) Intertidal communities.

 6) Estuaries.

 7) Benthic plant communities.

 e. Phytoplankton and patterns of marine primary productivity.

 f. Pelagic animals.

 1) The pelagic environment.

 2) Feeding and migration.

 3) Buoyancy.

 4) Locomotion.

 5) Reproduction.

 g. Characteristics, taxonomy and evolution of marine invertebrates.

 h Taxonomy, evolution and adaptations in marine mammals.

1. Effects of human intervention in oceans.

 1) Fishing activities and consequences.

 2) Complicating effects of marine pollutants.

 3)Climate Change

 j. The process of achieving understanding in science.

 LAB

 a. Proper use of scientific method to explore questions in marine biology and proper use of

laboratory equipment: e**.**g. microscopes, spectrophotometers, pH meters, fume hood, salinity hydrometers and refractometers.

 b. Marine invertebrate identification and classification.

 c. Adaptations to and spatial distribution of marine plant life as a result of photosynthetic pigments.

 d. Phytoplankton and zooplankton biology, identification, and adaptive advantages of zooplankton vertical migration.

 e. Marine molluskfunctional anatomy, dissection.

 f. Homeostasis in ectotherms compared to endotherms.

 g. Echinoderm functional anatomy, reproduction and larval dispersal.

 h. Marine fish functional anatomy, dissection and identification.

 i. Marine mammal functional anatomy, and acoustics of toothed whales.

 j. Intertidal zonation, plant and invertebrate adaptation and diversity field studies.

 k. Public marine aquarium study.

 LECTURE AND LAB

 a. Properties of seawater.

 b. Classification, taxonomy and systematics of organisms.

 c. Evolution, natural selection and adaptation.

 d. Taxonomy and adaptations of phytoplankton groups.

8. Method of Instruction

 a. Lecture and discussion.

 b. Multimedia presentations.

 c. Use of Learning Resource Center resources.

 d. Laboratory demonstrations, experiments, dissections and studies with small working groups of students.

 e. Field studies.

9. Methods of Evaluating Student Performance

a. Written exams include both essay and objective questions and a final exam.

b. Laboratory quizzes.

c. Term projects utilizing library and internet resources and fieldwork, e.g.: study of various species of marine invertebrates and/or study of marine plants.

d. Laboratory assignments requiring data analysis, interpretation of data, graphs and tables and

 mathematical calculations.

e. The use of proper English grammar and correct spelling of all words including and especially technical language appropriate to subject matter in lab reports and term project**.**

10. Outside Class Assignments

a. Textbook reading assignments.

b. Written lab exercises and reports, including sketching, answering questions, collecting data, graphing data and writing summaries of analysis.

c. Reading assigned journal articles.

d. Term project requiring research skills and application of detailed directions.

e. Student use of online resources to find information for assignments and term project, such as Google Scholar, science-in-the-news sites, or web sites of scientific institutions such as universities, zoos and museums.

11. Representative Texts

1. Representative Text(s):

 1) Virginia Cass-Dudley, Dudley, G. and Sumich, J., *Laboratory and Field Investigations in Marine Biology, 11th ed.* 2018 Jones and Bartlett Learning.

 2) John F. Morrissey, *Introduction to the Biology of Marine Life,* 11th ed. 2018 Jones and Bartlett Learning.

1. Supplementary texts and workbooks:

None

Addendum: Student Learning Outcomes

 Upon completion of this course, our students will be able to do the following:

1. Draw the two types of horizontal ocean gyres and describe how these rotational patterns affect submergence and upwelling and be able to depict the resulting nutrient levels.
2. Analyze and describe the role of organisms in a given marine food web and their response to a biologically magnified event.
3. Describe the advantages marine animals gain by living in the intertidal compared to living sub-tidally.
4. Explain why there are no mouse-sized marine mammals.
5. List and/or describe the steps used in the Scientific Method.