

COURSE OUTLINE**Biology 126**
Field and Laboratory Investigations in Marine Biology**I. Catalog Statement**

Biology 126 is an introductory science laboratory offering a general survey of the diversity of life in the marine environment and the ecology of some of its major ecosystems. This course covers aspects of marine geology/geography, microscopy, pH, cell respiration, photosynthesis, biodiversity, and ecology. The laboratory exercises utilize the comparative method in order to study the anatomy, physiology, and evolution of some of the major phyla of marine organisms. This course requires the participation in at least three field trips, which introduce the student to research methods, marine biodiversity, the biology of marine mammals, and the ecology of marine ecosystems. Field trips total a minimum of 9 hours.

Units - 1.0

Laboratory Hours - 3.0

Prerequisite: Biology 125 (Biology 125 may be taken concurrently.)

II. Course Entry Expectations

Skill Level Ranges: Reading 5; Writing 5; Listening/Speaking 5; Math 3.

Prior to enrolling or while enrolled in the course, the student should be able to:

1. explain concepts in general biology using examples from the marine environment;
2. identify the basic geological, chemical and physical characteristics of the marine environment in order to understand the adaptations of marine organisms for survival;
3. describe the adaptations of marine organisms for survival;
4. identify major phylogenetic groups of marine organisms;
5. compare and contrast the major marine ecosystems;
6. identify the problems caused by human impact on the marine environment and its resources.

III. Course Exit Standards

Upon successful completion of the required course work, the student will be able to:

1. describe the basics of plate tectonics and how they are responsible for the shaping of sea floor topography;
2. utilize a microscope and measure cell sizes;
3. prepare a culture of marine bacteria and stain samples for observation;
4. identify the main characteristics of the major groups of marine plankton and how they relate to their physiology;
5. explain the relation between pH, photosynthesis, and cell respiration;

6. identify photosynthetic pigments using chromatography and spectrophotometry;
7. identify the major groups of phytoplankton and macroalgae, and their structural and anatomical characteristics;
8. identify the main anatomical characteristics of some of the major phyla of marine animals and how they relate to their physiology;
9. describe the basic phylogeny and evolutionary trends of some of the major phyla of marine organisms;
10. identify the adaptations of marine organisms as they relate to specific ecosystems.

IV. Course Content

Total Contact Hours = 48

A. Basics of Marine Geography and Geological Oceanography	4 hours
1. Ocean basins and major seas	
2. Major surface currents	
3. Features of ocean floor topography	
4. Theory of plate tectonics	
5. Types of tectonic plate interactions	
B. Microscopy, Prokaryotes and Plankton	5 hours
1. Parts and functions of a compound microscope	
2. Measure cell sizes under the microscope	
3. Culture marine bacteria	
4. Stain and prepare slides of marine bacteria	
5. Identification of major groups of unicellular eukaryotic marine plankton	
C. pH, Photosynthesis and Cell Respiration	5 hours
1. The pH scale and use of pH meters	
2. Buffering capacity of seawater	
3. The relationship between photosynthesis, cell respiration, and pH	
D. Phytoplankton, Macroalgae, and Photosynthesis	4 hours
1. Major groups of phytoplankton, marine macroalgae, and their characteristics	
2. Separation of photosynthetic pigments using paper chromatography	
3. Identification of photosynthetic pigments using spectrophotometry	
E. Mollusca	5 hours
1. Major groups of marine molluscs	
2. Main anatomical characteristics of marine molluscs	
3. Dissection and the anatomy and physiology of a squid	
F. Arthropoda	4 hours
1. Major groups of marine arthropods	
2. Main anatomical characteristics of marine arthropods	
3. Dissection and anatomy and physiology of the blue crab	
G. Echinodermata	4 hours
1. Major groups of echinoderms	
2. Main anatomical characteristics of echinoderms	
3. Reproduction in sea urchins	
4. Dissection and anatomy and physiology of the sea star	
H. Invertebrate Chordates, "Agnatha" and Chondrichthyes	4 hours
1. Invertebrate chordates and the major groups of agnathans and chondrichthyans	

2. Main anatomical characteristics of agnathans and chondrichthyans
3. Dissection and anatomy and physiology of the dogfish
- I. "Osteichthyes" 4 hours
 1. Major groups of "osteichthyes"
 2. Main anatomical characteristics of marine osteichthyans
 3. Dissection and anatomy and physiology of a mackerel
- J. A total of three field trips from the following choices: 9 hours
 1. Natural History Museum
 2. Marine Aquarium
 3. Rocky/soft intertidal zone
 4. Research cruise off the coast of Southern California

V. **Methods of Presentation**

The following instructional methodologies may be used in the course:

1. lecture;
2. laboratory experiments;
3. multi-media;
4. online.

VI. **Assignments and Methods of Evaluation**

1. Completion of a laboratory manual.
2. Midterm examinations.
3. Final examination.
4. Field questionnaires.

VII. **Textbook**

Gago, F.J. and S.L. Bower, Biology 126. Laboratory Exercises in Marine Biology.
Glendale Community College, 2011.
13th Grade Textbook Reading Level.

VIII. **Student Learning Outcomes**

1. Students will be able to identify the defining anatomical and/or functional characteristics of some of the dominant phyla of marine organisms.
2. Students will be able to predict changes in the pH of water due to the interaction between photosynthesis and the carbonate-bicarbonate equilibrium, and use graphs and calculate Rf values in order to identify photosynthetic pigments.
3. Students will be able to list the basic steps in the method to describe new species, recognize examples of local marine biodiversity, and or identify the interactions between the abiotic and biotic factors in a major marine ecosystem.