

Science Department Guide Marine Biology Overview

Course Description: Marine Biology

This course is for students who are interested in developing an understanding of the basic concepts of Marine Biology. It is intended for students at all levels who are motivated to learn more about the oceans of the world and organisms that live in them. The course is designed to include the study of the marine organisms of our own coastal area. Field trips and laboratory activities will be an integral part of the course. The major areas of study will include the following topics: (1) The World's Oceans, (2) Chemical and Physical Factors, (3) Evolution of Life, (4) Marine Plants, (5) Invertebrates, (6) Marine Vertebrates (fish, reptile, bird, and mammal), (7) Marine Ecology, and (8) Sand Beaches, Dunes, Rocky Shores, Coral Reefs, and Marine Biomes. The students' progress will be evaluated using tests, quizzes, class participation, and projects, where applicable.

Prerequisite: Grade 11 or 12

Major Course Objectives

When students have completed Marine Biology, they will know and be able to:

1. Apply the scientific method to solve problems
2. Explain what happened to the Titanic when it hit the iceberg
3. Discuss some of the important people and discoveries in the field of oceanography
4. Describe some of the important events and developments in the history of ocean exploration
5. Appreciate the diversity of marine life
6. Distinguish between the different life zones along a shore
7. Discuss the characteristics of a variety of marine environments
8. Describe the typical inhabitants of these marine environments
9. Describe the basic characteristics and behaviors of the cetaceans
10. Discuss adaptations of pinnipeds and other marine mammals
11. Identify unique diving response features of marine mammals
12. Understand the processes underlying the productivity of marine environments
13. List the types of reptiles and birds that are found in the marine environment
14. Discuss the special adaptations reptiles have for living in the sea
15. Discuss the special adaptations sea birds have for an oceanic life
16. List the distinguishing features of the three classes of fishes
17. Identify some important adaptations of fishes to ocean life
18. Discuss various unusual adaptations that fishes have evolved
19. List the basic characteristics of the crustaceans
20. Describe the structures and functions of lobsters and crabs
21. Identify important features of smaller crustaceans and other marine arthropods
22. Describe the basic structures and functions of the bivalves
23. Distinguish among the variety of gastropod forms and functions

24. Discuss the unique shapes and adaptations of the cephalopods
25. Discuss the impact of sewage pollution on aquatic ecosystems
26. Describe the effects of toxic chemicals on marine organisms
27. Explain the importance of clean waters to aquatic life forms
28. Discuss the problem of solid wastes in marine ecosystems
29. Relate the theories of continental drift and plate tectonics to the formation of the continents and the oceans
30. Explain the development of seafloor topographic features
31. Describe the formation of coastal features and reef types

Relationship to the Massachusetts Science Curriculum Framework

Students engage in problem solving, communicating, reasoning as they

1. Explain how biotic and abiotic factors cycle in an ecosystem.
2. Use a food web to identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy through trophic levels.
3. Identify the factors in an ecosystem that influence fluctuations in population size.
4. Analyze changes in an ecosystem resulting from natural causes, changes in climate, human activity, or introduction of non-native species.
5. Explain how symbiotic behavior produces interactions within ecosystems.
6. Describe how the taxonomic system classifies things into domains and kingdoms
7. Illustrate how genetic variation is preserved or eliminated from a population through Darwinian natural selection resulting in biodiversity.

Assessment Tools

Success in Marine Biology will be measured by the following methods:

1. Homework may be checked for completeness, accuracy, and/or understanding.
2. Classwork will be evaluated overall by the teacher.
3. Formative and summative quizzes are given as needed.
4. Tests are primarily summative, yet various parts may, as needed, be treated as formative.
5. Unit tests may consist of multiple choice, short answer, and/or open response items.
6. Emphasis is put on organization, notation, accuracy and proficiency of student work.
7. The final exam will consist of primarily multiple choice, short answer and open response questions.
8. Extra credit opportunities will be provided.

Materials and Resources

Greene, Thomas F, Marine Science, Marine Biology and Oceanography , Amsco School Publications, New York, 1998 (primary text for this course)

Niesen, Thomas N., Marine Biology Coloring Book, Harper Perennial, Oakville, CA, 1982

Charton, Barbara, Marine Science, Checkmark Books, New York, 2002
Ripple, Jeff, Sea Turtles, Voyageur Press, Stillwater, MN, 1996
Zim, Herbert S. and Ingle, Lester, Seashores, Golden Books, New York, 2000
Bannister, Keith and Campbell, Andrew, Aquatic Life, Facts on File, New York, 1985
Clayton, JM, Seashells, Crescent Books, New York, 1974
Gosner, Kenneth L., Atlantic Seashore, Houghton Mifflin, Boston, 1978
Videos (located in the storage closet)
Class handouts

Relationship to the High School Student Expectations

The members of the Scituate High Science Department will offer to every student the opportunity to:

1. Be an effective reader
2. Be an effective writer
3. Be an effective speaker/presenter/performer
4. Be an effective problem solver
5. Be an effective information seeker/organizer
6. Contribute to the community at large

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