
Oceanography

Course Description

Oceanography gives students the opportunity to explore the oceans from the perspective of a visitor from another solar system. In this introductory laboratory course, students gain an applied knowledge of the characteristics of aquatic systems. They study ocean structure and marine ecology through exploration of coastal waters, open ocean waters, deep ocean waters, coral reefs, kelp forests, deep ocean vents, and tide pools. Students observe the inter-relationship of living and nonliving factors, and they discover how different organisms have adapted specifically to specific environments.

Skills in scientific inquiry, reading, and writing are incorporated throughout the course as students complete labs and writing assignments, with a field study of a local aquatic structure as the final project. Students are engaged by Fun Facts about oceanography and videos of ocean environments.

Overview

Unit 1 – Systems

- Lesson 1: Exploring Earth's Systems
- Lesson 2: The Graphic Organizer
- Lesson 3: The Experimental Plan

Unit 2 – Ocean Structure

- Lesson 1: Currents
- Lesson 2: Waves
- Lesson 3: Light
- Lesson 4: Temperature
- Lesson 5: Salinity
- Lesson 6: Pressure
- Lesson 7: Oxygen

Unit 3 – Marine Ecology

- Lesson 1: Coastal Waters
- Lesson 2: Coral Reefs
- Lesson 3: Open Ocean
- Lesson 4: Deep Ocean

Unit 4 – Ecosystems

- Lesson 1: Tide Pools
- Lesson 2: Antarctic Seas
- Lesson 3: Research Center

Unit 5 – Field Study

- Lesson 1: Aquatic Resource Library
- Lesson 2: Scientific Method
- Lesson 3: Designing Your Research
- Lesson 4: Conducting, Analyzing, and Reporting Your Research

Objectives

Students completing this course will be able to demonstrate the following skills:

- Understand and investigate ocean systems.
- Explore the abiotic (nonliving) factors that influence aquatic systems.
- Explore the biotic (living) factors of specific ocean ecosystems and how they interact.
- Describe how the Coriolis Effect, combined with Earth's rotation, causes ocean currents.
- Identify the characteristics of a wave, including crest, trough, amplitude, wavelength, and frequency.
- Examine the electromagnetic spectrum to understand the energy content of different colors of light, based on their wavelengths.
- Learn how to analyze the characteristics of seawater, including temperature, pressure, oxygen level, salinity, and concentration of other constituents.
- Consider abiotic and biotic factors to predict what organisms may be found in the ecosystems of coastal waters, coral reefs, open ocean, and deep ocean.
- Appreciate the importance of ozone in protecting plants and animals from ultraviolet radiation, and consider the destructive impact of chlorofluorocarbons on ozone.
- Recognize the role of humanity in global warming.
- Develop scientific thinking and processes through conducting a field study, formulating and revising scientific explanations, and communicating and defending a scientific argument.
- Gain an awareness of the physical, biological, chemical, and temporal components that interact in various aquatic systems.

Activities and Assessments

- **12 Writing Assignments** – In Unit 1, students complete two notebook assignments about their observations of an ocean environment. In Unit 3, they complete four notebook assignments on the organisms that live in coastal waters, coral reefs, open ocean, and deep ocean ecosystems. In Unit 4, students complete six notebook assignments on tidepool and Antarctic seas ecosystems and the adaptations necessary for organisms to survive in them. The teacher grades these assignments and provides feedback.
- **8 Lab Activities** – In Unit 2, students complete eight hands-on lab activities where they gather data, solve problems, and form conclusions based upon what they have learned. The teacher grades these lab activities and provides feedback.
- **4 Quizzes and 1 Examination** – In Unit 2, students take an essay test on their knowledge of ocean structure. The teacher grades this exam and provides feedback. There is also a computer-graded quiz over each of the four ecosystems studied in Unit 3: Coastal Waters, Coral Reefs, the Open Ocean, and the Deep Ocean.
- **1 Final Project** – For their final project, students choose a freshwater or saltwater field study, using the scientific method to conduct research and experiments, and report their observations, predictions, methods, results, and conclusions.