



Science Department Curriculum Guide

Marine Science

Course Description

This course is designed for students in grades 11 and 12 with an interest in marine biology and oceanography. This course provides an excellent background for students who are interested in further study of the oceans and the organisms that inhabit it. Major concepts include the study of interrelationships of marine and terrestrial environments, the geology and geography of the oceans, marine organisms, and the ecology of coral reefs. Laboratory activities, including the examination of marine specimens, are used throughout this course to build upon student knowledge. Labs, modeling, - 24 - research, and projects will be used to explore these topics. There will be 2 trips to the coast to see first hand organisms in their environment as well as real-life interactions with what we are learning in class. Major topics integrated throughout the course include: marine biology, marine geology, physical oceanography, chemical oceanography, research techniques, and environmental impacts. This course is offered as Dual Enrollment through Quincy college.

Content Standards

The Marine Science curriculum is aligned to the [Ocean Literacy Frameworks](#) which is comprised of two consensus documents: The Essential Principles of Ocean Sciences K-12 and the Ocean Literacy Scope and Sequence for Grades K-12 published by the [Ocean Literacy Network](#). The guiding principles can be accessed below.

- [Ocean Literacy Principle #1](#): The Earth has one big ocean with many features.
- [Ocean Literacy Principle #2](#): The ocean and life in the ocean shape the features of Earth.
- [Ocean Literacy Principle #3](#): The ocean is a major influence on weather and climate.
- [Ocean Literacy Principle #4](#): The ocean made the Earth habitable.
- [Ocean Literacy Principle #5](#): The ocean supports a great diversity of life and ecosystems.
- [Ocean Literacy Principle #6](#): The ocean and humans are inextricably interconnected.
- [Ocean Literacy Principle #7](#): The ocean is largely unexplored.



Subject: Marine Science

Units	Topics	Activities May Include
Exploration of Our Oceans 2-3 weeks	<ul style="list-style-type: none"> History of exploration History of technology Modern exploration techniques Cultures and explorers Modern tools 	<ul style="list-style-type: none"> Timeline on exploration Kon Tiki Curasub Lab Knot tying GPS coordinate lab Geocaching
Physical Oceanography 4-5 weeks	<ul style="list-style-type: none"> Ocean geology Formation of oceans Tides Currents Waves Tsunamis, hurricanes Climate change effects Ocean layers and ecosystems 	<ul style="list-style-type: none"> Create Ocean maps Bathymetry lab Ocean phenomenon lab Hurricane lab Wave tank simulation Thermohaline lab Nike Shoe Lab Tectonic plate activity
Chemical oceanography 4 weeks	<ul style="list-style-type: none"> Properties of water Salinity and where salt comes from Density and temperature effects Buoyancy Osmoregulation 	<ul style="list-style-type: none"> Water lab Conductivity Salinity and Density lab Stratification lab Buoyancy lab
Plankton (zoo and phyto), Classification and Marine Plants 4-6 weeks	<ul style="list-style-type: none"> Phytoplankton and zooplankton Classification of life Marine Plants vs Algae Anatomy of plants Anatomy of Algae Anatomy of plankton Ocean drifters 	<ul style="list-style-type: none"> Plankton race Taxonomy and classification of sharks Diatom Art Algae pressing and ID Chromatography with chlorophyll pigments
Marine Invertebrates (Porifera, cnidarian, annelids) 3-4 weeks	<ul style="list-style-type: none"> Sponge anatomy and ecology Cnidarian anatomy and ecology Polychaetes and annelids and ecology 	<ul style="list-style-type: none"> Sponge absorption lab Spicule ID Cnidarian News article Annelid dissection / observation
Marine Invertebrates (Arthropods, cephalopods, gastropods, bivalves, crustacean) 3-4 weeks	<ul style="list-style-type: none"> Arthropod anatomy and ecology Gastropod anatomy and ecology Bivalve anatomy and ecology Crustacean anatomy and ecology 	<ul style="list-style-type: none"> Bivalve dissection Paper dissection Lobster/Horseshoe crab biopharmaceutical project



Units	Topics	Activities May Include
Marine Vertebrates (Ichthyology) 6 weeks	<ul style="list-style-type: none"> ▪ Chondrichthyes anatomy and ecology ▪ Osteichthyes anatomy and ecology ▪ Agnatha anatomy and ecology 	<ul style="list-style-type: none"> ▪ Fish Dissection ▪ Shark attack lab ▪ Shark tooth ID lab
Marine Mammals, Birds and Reptiles 4 weeks	<ul style="list-style-type: none"> ▪ Whales and dolphin anatomy and ecology ▪ Pinniped ecology and anatomy ▪ Bird ecology and anatomy ▪ Sea Otter and Polar bear anatomy 	<ul style="list-style-type: none"> ▪ Size comparison with Chalk ▪ Albatross Bolus dissection
Biological Illustration 1 week	<ul style="list-style-type: none"> ▪ How to draw ▪ Focus on details and labeling 	<ul style="list-style-type: none"> ▪ Learn drawing and labeling of anatomy

Textbooks
<ul style="list-style-type: none"> ▪ <i>Introduction to Marine Biology</i>, by Karleskint, Turner, and Small; published by Cengage Learning, 2012 ▪ <i>Oceanography: An Invitation to Marine Science</i>, by Tom S. Garrison; published by Cengage Learning, 2009