

Marine Biology

Science
 NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
 Credit
 Elective Course

Description

Marine Biology is a hands on lab and experience oriented science course that can be taken either as a required class fulfilling the third required science credit or as an elective. This course attempts to cover all life in the ocean with an emphasis on the physical properties of the ocean and their effects on life in the ocean. In addition to the oceanography unit there are units on marine algae, invertebrates, vertebrates and concepts of marine ecological relationships are interwoven throughout.

Scope And Sequence

Timeframe	Unit	Instructional Topics
5 Week(s)	Oceanography - Physical Properties of the Ocean	1. Geology of the Ocean 2. Physical Properties of the Ocean Lecture/Notes 3. Physical Properties of the Ocean Directed Reading Guide 4. Waves 5. Salinity and Buoyancy Lab 6. Ocean Data Practice 7. Indian River Estuary Field Trip - pH, salinity and temp. 8. Diffusion and Osmosis Lecture 9. Potato Fish Lab 10. Work Float Field Trip 11. Change in Temperature Lab 12. Rocky Shores Field Trip - Whale Park 13. Sound in the Ocean 14. Ocean Acidification 15. Physical Properties of the Ocean Study Guide 16. Physical Properties of the Ocean Jeopardy 17. Physical Properties of the Ocean Test
2 Week(s)	Algae	1. Introduction to Algae 2. Microplankton - Diatom/Dinoflagellate Lab 3. Marine Algae Directed Reading Guide 4. Algae Project 5. Algae Study Guide 6. Algae Quiz
4 Week(s)	Invertebrates	1. Phylum Notes 2. Plankton Lab 3. Sealing Cove Field Trip 4. Sponge, Bryozoan and Cnidarian Directed Reading Guide 5. Sponge, Bryozoan and Cnidarian Lab 6. Higher Invertebrate Directed Reading Guide 7. Crab Dissection 8. Sea Star Dissection 9. Sea Star vs. Sea Urchin Interaction Lab 10. Field trip to the Touch Tanks 11. Invertebrate Project 12. Snorkeling 13. Invertebrate Study Guide 14. Invertebrate Jeopardy 15. Invertebrate Test
4 Week(s)	Chordates	1. Tunicates 2. Fish 3. Marine Birds and Reptiles 4. Marine Mammals

Materials and Resources

Microscopes

Dissection kits

Wetsuits/snorkeling gear

Text: [Introduction to Marine Biology](#) By George Karleskint Jr., Richard Turner, James W. Small Jr.

A totally equipped science lab

Marine Biology

Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

Prerequisite (What do you need to take before this)

Integrated Science I and Integrated Science II
Must be in 10th grade or higher

Postrequisite (Allows you to take these courses)

Sea Tech

Location

MEHS Science Wing Room 141

Course Details

Unit: Oceanography - Physical Properties of the Ocean

Duration: 5 Week(s)

Description

Oceanography covers the physical properties of the ocean such as temperature, salinity, pH etc. Defining these properties, how they are measured and how they effect the living things in the ocean are covered in this unit

MEHS Standard 5: Earth Science

MEHS Standard 6: Ecosystems: Cycles of Nature and Human Impacts

Essential Questions

What are the physical properties of the ocean that effect living things living there?
How do the physical properties of the ocean effect living organisms?

Assessments

Physical Properties of the Ocean card shuffle - formative assessment
Physical Properties of the Ocean Test - summative assessment

Resources

Introduction to Marine Biology by George Karleskint, Richard Turner and James Small
pH kit
Dissolved Oxygen Kit
Dissolved Carbon Dioxide Kit
Salinity/Temp. meter
under water sampler
secci disk
Color kit
Vans for field trips

Vocabulary

salinity
pH
temperature
osmosis
diffusion
turbidity
dissolved oxygen
dissolved carbon dioxide
secci disk
amplitude
wave length
wave height
hertz
parts per million
parts per thousand
forel-ule scale
water color

Topic: Geology of the Ocean

Duration: 2 Day(s)

Description

Plate tectonics web tutorial - quick overview of the plate tectonics concepts that effect life in the ocean

OR

Geology of the Ocean Directed Reading Guide - Reading guide created to accompany text Introduction to Marine Biology

The word document that goes along with this can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&usp=sharing)

[id=0B6_wvnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&usp=sharing)

Knowledge/Skills

Web tutorial

Marine Biology

Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

Assessment: complete companion worksheet
Classwork

Geology of the Ocean Directed Reading Guide
Description: Complete companion worksheet to accompany reading
Assessment: Classwork

Knowledge/Skills linked to Power Standard = +

Topic: Physical Properties of the Ocean Lecture/Notes

Duration: 2 Day(s)

Description

Overview lecture of all the physical properties of the ocean that affect marine life. You can use the note taking guide provided or you can have give each student a set of 45 index cards so they can make 5 cards per property of the ocean creating a deck of cards to play a shuffling game.

The power point presentation, Marine Biology Notebook Info, and the word document, note taking grid_physical Properties, that goes with this is found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&usp=sharing)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&usp=sharing](https://drive.google.com/folderview?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&usp=sharing)

Knowledge/Skills linked to Power Standard = +

Topic: Physical Properties of the Ocean Directed Reading Guide

Duration: 1 Day(s)

Description

Reading guide created to accompany text Introduction to Marine Biology Chapter 4.

The word document, Reading assignm. Physical Properties of the OceanMarine Biology, that goes along with this is found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = +

Topic: Waves

Duration: 3 Day(s)

Description

There are 3 different activities that are used to cover the concept of ocean waves. A Lecture/note taking guide, a directed reading guide and a wave field trip.

The power point presentation that accompanies the lecture is called, Waves Background Information. The combined lecture note taking guide and directed reading guide is called, Waves and tides reading_newtext_12_13. The word document for the wave field trip is called, Ocean Wave Field Work.

These can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills

Note taking

Assessment: Check notes for completion

Experiential observations

Description: Student observations during field trips

Assessment: Field trip worksheets

Knowledge/Skills linked to Power Standard = +

Topic: Salinity and Buoyancy Lab

Duration: 4 Day(s)

Description

Hands on experience lab that tests the changes in buoyancy in relation to salinity. Students write a full scientific report after completing the lab work/data collection. This is the first scientific report for the class so before beginning the write up, make sure to review the parts of a scientific report and what goes in each section.

Marine Biology


Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

The word document for Scientific Report Format that can be used throughout the unit for this and the two other labs. The word document for the Salinity and Buoyancy Lab is called Buoyancy experiment. Both of these can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Topic: Ocean Data Practice

Duration: 1 Day(s)


Description

Activity that gives students practice using all of the kits and instruments needed to test the different physical properties of the ocean before field work is conducted. This activity is a series of stations that groups rotate through familiarizing themselves with the procedures of each kit/instrument.

The word document that goes along with this is called, Ocean Data Practice and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Topic: Indian River Estuary Field Trip - pH, salinity and temp.

Duration: 1 Day(s)


Description

Field trip to provide hands on experience with the changes in salinity, pH and temp. as you travel from the river to the estuary and out into the ocean.

The word document that goes with this is called, Estuary pH, Salinity and water temp. and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Topic: Diffusion and Osmosis Lecture

Duration: 1 Day(s)


Description

Quick lecture that reminds students of the basic concepts of diffusion and osmosis. Usually only takes part of a class period, introduce and set up for the Potato Fish Lab with the second half of the period.

The presentation that goes with the lecture is called Diffusion and Osmosis and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Topic: Potato Fish Lab

Duration: 3 Day(s)


Description

Investigates the relationship between osmosis and salinity, by using pieces of potato in water with different salinities. The potatoes are left over night in the water and the size before and after is compared. Percent change is calculated to determine effect. Students write a full scientific report after completing the lab work/data collection.

The word document that goes with this is called, Potato Fish Experiment, and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Topic: Work Float Field Trip

Duration: 1 Day(s)


Description

Field trip where students test all the physical properties of the ocean using the kits/instruments for each one. Students are broken up into groups where each group tests a particular property. Salinity, pH and temp. results are also compared to those gathered during the Indian River Estuary Field Trip since this location is considered an 'Ocean' station as opposed to being close to a river estuary.

The word document that goes with this is called, Work Float Physical Properties Rotation, and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfklHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Marine Biology

Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

Topic: Change in Temperature Lab

Duration: 3 Day(s)


Description

Students investigate how temperature effects chemical reaction time, using the time it takes for alka seltzer to dissolve in water as a measurable chemical reaction. Students write a full scientific report after completing the lab work/data collection.

The word document that goes with this is called, Alka-Seltzer vs. Temp Exp., and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Topic: Rocky Shores Field Trip - Whale Park

Duration: 1 Day(s)


Description

Field trip for gathering data on the physical properties of the ocean on an exposed coast with a lot of wave action. The results are compared to those from the Indian River Estuary and Work Float.

The word document that goes with this is called, Waves on Rocky Coastline Data Collection, and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Topic: Sound in the Ocean

Duration: 2 Day(s)

Description


Introduction to sound in the ocean:

- Humpback whale song story
 - Class discussion - What kinds of things contribute to sounds in the ocean?
- Voices in the Sea Activity - Web based

The word document that goes with this is called, Voices In The Sea, and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 


Topic: Ocean Acidification

Duration: 1 Day(s)

Description

Demonstration and lecture/class discussion.

Get a beaker of ocean water, add pH crestol red indicator until the water is red. Measure the pH. Give each student a straw and pass the beaker around the room having each student blow one full breath into the beaker of water. By the time each student has blown their breath in the beaker, the water should be orange/yellow. Measure the pH. Have a class discussion on how decreasing pH can effect living organisms in the ocean. Leave the Beaker out for a few days to see if it turns back to the original red color. Discuss why this happens and whether this would happen in a natural system. This should not take an entire class period, you will need to combine it at the end or beginning of another lesson or during a shortened class period.

Knowledge/Skills linked to Power Standard = 

Topic: Physical Properties of the Ocean Study Guide

Duration: 1 Day(s)


Description

Study guide to prepare students for the test

The word document that goes with this is called, Physical Properties of the Ocean SG2, and can be found at:

[https://drive.google.com/open?](https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

[id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0](https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0)

Knowledge/Skills linked to Power Standard = 

Topic: Physical Properties of the Ocean Jeopardy

Duration: 1 Day(s)

Description

Class Jeopardy game for studying for the test.

The power point document that goes with this is called, Physical Properties Jeopardy Review09, and can be found at:

Marine Biology

Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0

Knowledge/Skills linked to Power Standard = +

Topic: Physical Properties of the Ocean Test

Duration: 1 Day(s)

Description

The word document that goes with this is called, Physical Prop. Exam, and can be found at:

https://drive.google.com/open?id=0B6_vwnghrjeRfkIHd01RMUVxN056NIJhTTNZVkfIMU5yMVM3Q29TcXk2c20xZGJodWRsX2s&authuser=0

Knowledge/Skills linked to Power Standard = +

Unit: Algae

Duration: 2 Week(s)

Description

This is a small unit that introduces students to the diversity of Algae in the ocean. This unit also covers the important role that algae play in the marine ecosystem.

MEHS Standard 6: Ecosystems:Cycles of Nature and Human Impacts
MHES Standard 7: Life Structures and Processes

Essential Questions

- What is Algae?
- What is the importance of Algae in the Marine Ecosystem?
- How can Algae be used to solve human problems?

Assessments

- Algae Project
- Algae Quiz

Resources

- North Pacific Seaweeds by Rita M. O'Clair and Sandra C. Lindstrom
- The Amazing World of Algae - Film

Vocabulary

- hold fast
- photosynthesis
- primary producer
- thallus
- blade
- stipe
- cortex
- medulla
- epidermis
- gametophyte
- zygote
- receptacles
- haploid
- diploid
- sporophyte

Topic: Introduction to Algae

Duration: 1 Day(s)

Description

A 30 minute film that acts as an introduction to the role algae play in the marine ecosystem. It also covers all the amazing uses of algae for humans. To be used as an introduction to Algae before the Diatom/Dinoflagellate lab.

The note taking guide that accompanies this film is called, The Amazing World of Algae, and can be found at the following link:

https://drive.google.com/folderview?id=0B6_vwnghrjeRfnBJazc0UDRfVEtkQ2dGQzRmZ3YyRm5ycU1NN19HMjVoaDJDLWxrb052WEk&usp=sharing

Knowledge/Skills linked to Power Standard = +

Topic: Microplankton - Diatom/Dinoflagellate Lab

Duration: 1 Day(s)

Description

Students read through the text and complete the Directed Reading Guide as they read. Students use prepared slides to identify different species of diatoms and dinoflagellates


The word document that goes along with this is called, Diatoms and Dioflagellates_new text, can be found at:

Marine Biology

Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

https://drive.google.com/folderview?id=0B6_vwnghrjeRfnBJazc0UDRfVEtkQ2dGQzRmZ3YyRm5ycU1NN19HMjVoaDJDLWxrb052WEk&usp=sharing

Knowledge/Skills linked to Power Standard = 

Topic: Marine Algae Directed Reading Guide


Duration: 2 Day(s)

Description

Directed reading guide created to accompany the Introduction to Algae section in the North Pacific Seaweeds book by Rita O'Clair and Sandra Lindstrom. Students also are required to use the same text to find three different species of algae (a red, green and brown algae) to do some directed research on.

The word document to go along with this activity is called, Marine Algae DRG, and can be found at:

https://drive.google.com/open?id=0B6_vwnghrjeRfnBJazc0UDRfVEtkQ2dGQzRmZ3YyRm5ycU1NN19HMjVoaDJDLWxrb052WEk&authuser=0

Knowledge/Skills linked to Power Standard = 

Topic: Algae Project


Duration: 5 Day(s)

Description

In depth investigation of one species of algae (*Fucus gardneri*). Students are required to create a display that shows the life cycle, a cross section of the tissue structures, and pressed and labeled sample of *Fucus gardneri*.

The word document that goes with this is called Kelp Project_spring15 and can be found at:

https://drive.google.com/open?id=0B6_vwnghrjeRfnBJazc0UDRfVEtkQ2dGQzRmZ3YyRm5ycU1NN19HMjVoaDJDLWxrb052WEk&authuser=0

Knowledge/Skills linked to Power Standard = 

Topic: Algae Study Guide


Duration: 1 Day(s)

Description

Study guide provided to help study for the test.

The word document that goes with this is called, Algae Study Guide, and can be found at:

https://drive.google.com/open?id=0B6_vwnghrjeRfnBJazc0UDRfVEtkQ2dGQzRmZ3YyRm5ycU1NN19HMjVoaDJDLWxrb052WEk&authuser=0

Knowledge/Skills linked to Power Standard = 

Topic: Algae Quiz


Duration: 1 Day(s)

Description

Algae quiz only takes half of a class period max. Introduction of invertebrate phylums should finish out the class period.

The word document that goes with this is called, Marine Algae Quiz, and can be found at:

https://drive.google.com/open?id=0B6_vwnghrjeRfnBJazc0UDRfVEtkQ2dGQzRmZ3YyRm5ycU1NN19HMjVoaDJDLWxrb052WEk&authuser=0

Knowledge/Skills linked to Power Standard = 

Unit: Invertebrates

Duration: 4 Week(s)

Description

This unit covers the main invertebrate phylum. There is a lab, activity or dissection for each phylum in addition to an overview of all the phylum characteristics in the beginning.

MEHS Standard 6: Ecosystems: Cycles of Nature and Human Impacts

MEHS Standard 7: Life Structures and Processes

Essential Questions

What are the characteristics of the 6 main invertebrate phyla?

What are the physiological differences between organisms in the different invertebrate phyla?

What types of ecological interactions happen between and among invertebrate phyla?

Assessments

Invertebrate Project

Invertebrate Test

Resources

Marine Biology

Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

Introduction to Marine Biology by George Karleskint Jr., Richard Turner, and James W. Small Jr.
+ 40 guide books from the Library on all the different invertebrate phylum.

Sea star - preserved animals for dissection
Variety of critters collected at Sealing Cove for different labs (critters are returned to the ocean after the labs).
Dissection trays/tools
Gloves
Stereo and Compound Microscopes

Vocabulary

radial symmetry
asymmetric
bilateral symmetry
nematocysts
pedicellaria
skin gills
tube feet
sessile
motile/mobile
budding
hermaphrodite
polyp
medusa
epidermis
benthic
spicule
pore cells
collar cell
osculum
flagellum
chitin
molting
exoskeleton
exoskeleton
cheliped
madreporite
water vascular system
cnidaria
porifera
mollusca
arthropoda
echinodermata
polycheate

Topic: Phylum Notes

Duration: 1 Day(s)


Description

The Algae Quiz from the previous Unit shouldn't take the entire class period, so you should be able to at least start this overview of the 6 main invertebrate phylum.

Students should take these notes down on index cards. One card per phylum. With the phylum name on one side and the characteristics on the back. After the notes are done there are a variety of games that can be played to help students solidify the characteristics with each phylum. There is a sorting game, where students sort a variety of different critters into the correct phylum. There is also a game where you tape a critter on each student's back and they have to have conversations with each other using the characteristic vocabulary to help direct each other into the correct phylum column.

The word document that goes with this is called, Phylum Notes and the Power point presentation that goes with this is called, Phylum Notes and both can be found at:

https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing

Knowledge/Skills linked to Power Standard = 

Topic: Plankton Lab

Duration: 2 Day(s)

Description

This activity includes a vocabulary activity, a lab and a paragraph conclusion writing activity

The student lab and teacher key word documents that goes with this are called, Plankton Lab and Plankton Lab_teacher_notes and can be

Marine Biology


Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)


Knowledge/Skills linked to Power Standard = 

Topic: Sealing Cove Field Trip

Duration: 1 Day(s)

Description

Collect critters from the dock for the Sponge/Bryozoan Lab and any other cool invertebrates we can find. Critters are collected in buckets and brought back to the classroom

Knowledge/Skills linked to Power Standard = 

Topic: Sponge, Bryozoan and Cnidarian Directed Reading Guide

Duration: 1 Day(s)


Description

This is a Directed Reading Guide for the 'Lower Invertebrate' Chapter in the text.

The word document that goes with this is called, Sponges, Bryozoans and Cnidarian drg_new text, and can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = 

Topic: Sponge, Bryozoan and CnidarianLab

Duration: 2 Day(s)


Description

Students investigate sponges, bryozoans and cnidarians using slides and live critters with dissecting microscopes.

The word document that goes with this is called, Sponges and Cnidarians Lab, and can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = 

Topic: Higher Invertebrate Directed Reading Guide

Duration: 2 Day(s)


Description

Directed Reading Guide of the Higher Invertebrate chapter in the text.

The word document that goes with this is called, Higher_invertebrates_drg_newtext, and can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = 

Topic: Crab Dissection

Duration: 1 Day(s)


Description

Crab dissection using slides and live crabs for the external features.

The word document that goes with this is called, Crustaceandissection, and the power point presentation is called, Arthropod Anatomy and both can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = 

Topic: Sea Star Dissection

Duration: 1 Day(s)

Description

Sea Star Dissection using preserved sea stars.

The word document that goes with this is called, Starfish Dissection, and the power point presentation is called, Sea Star Dissection and notes and both can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Marine Biology

Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course
Knowledge/Skills linked to Power Standard = +

Topic: Sea Star vs. Sea Urchin Interaction Lab **Duration:** 1 Day(s)

Description

Sunflower star vs green sea urchin, students observe how the green sea urchin defends itself from a predator. Need to collect enough sea stars and sea urchins for students to pair up under dissecting microscopes.

The word document that goes with this is called, Sun Starfish vs urchin Lab, and can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = +

Topic: Field trip to the Touch Tanks **Duration:** 1 Day(s)

Description

Field trip to the Sitka Sound Science Center Touch Tanks. Students identify, draw and touch the invertebrates found around Sitka Sound.

The word document that goes with this is called, Touch Tanks Field Trip, and can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = +

Topic: Invertebrate Project **Duration:** 10 Day(s)

Description

Students pick an invertebrate of their choice and do background research to create a presentation for the class.

The word document that goes with this is called, Invert Powerpoint description_rubric, and can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = +

Topic: Snorkeling **Duration:** 3 Day(s)

Description

Students snorkel around Sitka to experience the ocean and its critters hands on. Three days includes one day of prepping, trying on suits and gear and two days of snorkeling.

Knowledge/Skills linked to Power Standard = +

Topic: Invertebrate Study Guide **Duration:** 1 Day(s)

Description

Study guide in preparation for the test.

The word document that goes with this is called Marine Bio Invert Practice Exam, and can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = +

Topic: Invertebrate Jeopardy **Duration:** 1 Day(s)

Description

After going over the study guide we play jeopardy as a preparation for the test.

The power point document that goes with this is called, Jeopardy Marine Invertebrates, and can be found at:

[https://drive.google.com/folderview?](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

[id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing](https://drive.google.com/folderview?id=0B6_wvnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing)

Knowledge/Skills linked to Power Standard = +

Topic: Invertebrate Test **Duration:** 1 Day(s)

Description

Marine Biology


Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course

Comprehensive test for the unit.

The word document that goes with this is called, marine invertebrates exam or marine invertebrates exam make up, and both can be found at:

https://drive.google.com/folderview?id=0B6_vwnghrjeRfINIOHBnNIhkUVBubEhzU2o3ZlpxakVncGp5X2kxMXpPM0t1Q214Q3pGZ0U&usp=sharing

Knowledge/Skills linked to Power Standard = 

Unit: Chordates

Duration: 4 Week(s)

Description

This unit goes from the most simplest of chordates, tunicates, to fish, marine birds and mammals.

MEHS Standard 6: Ecosystems: Cycles of Nature and Human Impacts

MEHS Standard 7: Life Structures and Processes

Essential Questions

- What is a chordate?
- What are the characteristics of marine fish?
- What are the feeding, reproductive, protective strategies of different species of fish?
- How do managers manage our fish stocks?
- What are the characteristics of marine birds?
- What roles do marine birds play in the marine ecosystem?
- What adaptations allow marine mammals to live in the marine environment?
- What are the different types of marine mammals?

Assessments

- Fish Mural Project/Presentation
- Marine Mammal Fact Sheet/Presentation

Resources

Text: Introduction to Marine Biology By George Karleskint Jr., Richard Turner, James W. Small Jr.

Variety of field guides to marine fish, birds and mammals

Vocabulary

- notochord
- operculum
- swim bladder
- caudal fin
- counter shading
- pyloric cecea
- olfactory lobe
- follicles
- barbule
- crop
- gizzard
- pinniped
- otoriid
- phocid
- cetacean
- odontocete
- mysticete

Topic: Tunicates


Duration: 1 Day(s)

Description

Tunicate dissection lab. This lab introduces the concept of a chordate looking at the most primitive chordate, a tunicate. The tunicates need to be collected from the harbor ahead of time.

The word document that goes with this is called, Tunicate Lab, and the power point presentation is called, Phylum Chordata tunicates, and both can be found at:

https://drive.google.com/folderview?id=0B6_vwnghrjeRfimtZrkhoYjVHT1hjZINTOVZXclRIV0wxV21KSI9qaUFLeWftTGhkaDMtaFU&usp=sharing

Knowledge/Skills linked to Power Standard = 

Topic: Fish

Duration: 2 Week(s)

Description

This series of lessons includes an introduction to fish characteristics, a salmon or herring dissection, and a fish mural project and presentation

Marine Biology

Science
NCAA Approved

Grade(s) 10th - 12th, Duration 1 Semester, 1
Credit
Elective Course


(Gallery Walk) as an assessment.

The word documents and power point presentations that are used in this section are as follows:

Marine Fishes Directed Reading Guide.doc
The Fishes.ppt
The Pacific Herring.ppt
Herring Dissection.doc
HerringRoe%Study.doc
Indian River Note Taking Guide.doc
fish_mural_proj.doc

The link to these documents can be found at:

https://drive.google.com/open?id=0B6_wvnghrjeRfmtzRkhoYjVHT1hjZINTOVZXclRIV0wxV21KSI9qaUFLeWFtTGhkaDMtaFU&authuser=0

Knowledge/Skills linked to Power Standard = 

Topic: Marine Birds and Reptiles

Duration: 3 Day(s)

Description


This is a brief introduction to marine birds, which includes a lecture with note taking guide and a reading with directed reading guide. Next there is an internet research activity and a birding field trip.

The word documents and power point presentations that are used in this section are as follows:

Marine Birds.ppt
Marine Birds note taking guide.doc
Marine Reptiles and Birds DRG_newtext.doc
Project bird/reptile research - collaborative google slides

The link to these documents can be found at:

https://drive.google.com/folderview?id=0B6_wvnghrjeRfIVha2w0ZVZLUUZ6TjhaNUduMm5qZFB3aW9NTTVRNHpiVW5hZVlVMjJOUzQ&usp=sharing

Knowledge/Skills linked to Power Standard = 

Topic: Marine Mammals

Duration: 5 Day(s)

Description

This is a brief introduction to marine mammals, including a lecture with note taking guide, directed reading guide and a Fact Sheet project.

The word documents and power point presentations that are used in this section are as follows:

Marine Mammal.ppt
Marine mammal notetaking guide.doc
Marine mammal DRG_newtext.doc
Marine Mammal fact sheet.doc

The link to these documents can be found at:

https://drive.google.com/open?id=0B6_wvnghrjeRfmtzRkhoYjVHT1hjZINTOVZXclRIV0wxV21KSI9qaUFLeWFtTGhkaDMtaFU&authuser=0

Knowledge/Skills linked to Power Standard = 