

**Course Title:** Oceanography  
**Board Approval Date:** 04/14/14  
**Credit / Hours:** 0.5 credit

**Course Description:**

Oceanography introduces students to the physical features and the geological and biological phenomena of the oceans and seas. Non-technical emphasis is placed on the origins of the oceans, physical and structural features of the oceans and dynamic processes such as waves, currents, undersea volcanoes and earthquakes, and coral reef building. Basic concepts of physical and geological oceanography are covered, including processes that shape ocean basins and coastlines, origin of the oceans, ocean zones, ocean sediments and deposits, and prominent features of the oceans of the world. Areas of ocean dynamics included in the course are wave motion, currents, tides, temperature moderation, storms, ice formation, and El Nino-Southern Oscillation. A short unit on marine biology examines estuaries and wetlands, food chains, and several kinds of living organisms - benthic, neritic, and plankton.

**Learning Activities / Modes of Assessment:**

Large group instruction	Tests and Quizzes
Laboratory experiment	
Small group work	
Computer simulations / Video Analysis	
Reading assignments	

**Instructional Resources:**

Text book: *Introductory Oceanography* Thurman  
Online text resources through Pearson-Prentice-Hall  
Videos: Bill Nye the Science Guy, Myth Busters, videos and video clips available through Discovery Ed Streaming, videos and video clips available through Central Columbia S.D. Educational Video Library, *Finding Nemo*  
Online tutorials and quizzes available online at Quia.com

## Course Pacing Guide

Course: Oceanography

Course Unit (Topic)	Length of Instruction (Days/Periods)
1. Structure of Earth and Oceans	12 days
2. Plate Tectonics	12 days
3. Features of the Ocean Environment	11 days
4. Properties of Water	12 days
5. Sun, Wind, Seasons, Currents	16 days
6. Waves and Tides	11 days
7. Beaches	<u>08 days</u>
DAYS TOTAL	82 Days

Topic: 01 Structure of Earth and Oceans

Days: 12

Subject(s):

Grade(s):

Know:

Understand:

Do:

**3.3.10.B1.b – Compact COMPOSITION AND STRUCTURE** - Explain what caused the sun, Earth, and most of the other planets to form between 4 and 5 billion years ago.

**3.3.10.B1.c – Compact COMPOSITION AND STRUCTURE** - Provide evidence to suggest the Big Bang Theory.

**S11.D.3.1.3 – Essential**  
Explain the current scientific theories of the origin of the solar system and universe (big bang theory, solar nebular theory, stellar evolution).

How people have studies the oceans throughout history

How the earth developed after the Big Bang

Theories that describe the origin of the waters that fill the oceans

How to use latitude and longitude on a map

Oceans make Earth Special

**SI.8-10.3 – Essential**

Identify questions and concepts that guide scientific investigations.

**S11.D.3.1.3 – Essential**

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SI.8-10.3 - Identify questions and concepts that guide scientific investigations.

S11.D.3.1.3 - Explain the current scientific theories of the origin of the solar system and universe (big bang theory, solar nebular theory, stellar evolution).

3.3.10.B1.b - COMPOSITION AND STRUCTURE - Explain what caused the sun, Earth, and most of the other planets to form between 4 and 5 billion years ago.

3.3.10.B1.c - COMPOSITION AND STRUCTURE - Provide evidence to suggest the Big Bang Theory.

Topic: 02 Plate Tectonics

Days: 12

Subject(s):

Grade(s):

Know:

Understand:

Do:

**3.3.10.A1.a – Important EARTH FEATURES AND THE PROCESSES THAT CHANGE IT -** Relate plate tectonics to both slow and rapid changes in the earth's surface.

**3.3.10.A3. – Important EARTH'S HISTORY -** Explain how the evolution of Earth has been driven by interactions between the lithosphere, hydrosphere, atmosphere, and biosphere.

**3.3.10.A4.b – Compact SCIENCES AND TRANSFER OF ENERGY -** Explain how the Earth's systems and its various cycles are driven by energy.

Major parts of the earth

How continents have moved

Evidence for plate tectonics

Description and characteristics of the mid-ocean ridge

Types of plate boundaries

asthenosphere, atmosphere, crust, core, lava, lithosphere, magma,

Earth is a Dynamic Planet

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3.3.10.A3. - EARTH'S HISTORY - Explain how the evolution of Earth has been driven by interactions between the lithosphere, hydrosphere, atmosphere, and biosphere.

3.3.10.A4.b - SCIENCES AND TRANSFER OF ENERGY - Explain how the Earth's systems and its various cycles are driven by energy.

Topic: 02 Plate Tectonics  
Subject(s):

Days: 12  
Grade(s):

Know:	Understand:	Do:
<p>mantleTypes of plate boundaries</p> <p>Gondwanaland, Laurasia, Pangaea, Panthalassa, Tethys Sea, continental drift, convection cell, convergent boundary, divergent boundary, hot spot, oceanic ridge, (global) plate tectonics, seafloor spreading, subduction boundary, transform boundary</p>		

Topic: 03 Features of the Ocean Environment

Days: 11

Subject(s):

Grade(s):

Know:

Understand:

Do:

**3.3.10.A7.a – Important UNIFYING THEMES - SCALE/MODELS**  
Interpret and create models of the Earth's physical features in various mapping representations.

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Features of the ocean floor

Characteristics of the continental margin

Types of marine sediments

Theory of coral reef development

abyssal hills, abyssal plain, active margin, black smoker, continental margin, continental rise, continental shelf, continental slope, guyot, passive margin, seamount, shelf break, white smoker, trench

biogenous, cosmogenous, hydrogenous, lithogenous, manganese nodule, neritic, oceanic, ooze, stromatolite, Wentworth scale,

The Ocean Environment has a Variety of Physical Features

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Topic: 03 Features of the Ocean Environment  
Subject(s):

Days: 11  
Grade(s):

Know:	Understand:	Do:
<div>silicious, calcareous, turbidite, clay</div> <div>atoll, barrier reef, fringing reef, lagoon</div>		

Topic: 04 Properties of Water

Days: 12

Subject(s):

Grade(s):

Know:

**3.3.10.A4.b – Compact**  
SCIENCES AND  
TRANSFER OF  
ENERGY - Explain how  
the Earth's systems and  
its various cycles are  
driven by energy.

**3.2.12.A1.b – Compact**  
PROPERTIES OF  
MATTER - Compare  
and contrast the unique  
properties of water to  
other liquids.

**3.3.12.A1.c – Compact**  
EARTH FEATURES  
AND THE PROCESSES  
THAT CHANGE IT -  
Classify Earth's internal  
and external sources of  
energy such as  
radioactive decay,  
gravity, and solar  
energy.

Structure and formula  
of water

Physical properties of  
water

Phase changes and the  
heat involved

Hydrological Cycle

Process of dissolving

Most abundant ions in  
sea water

Difference in how light  
and sound travel through  
water versus through air

Understand:

Water – One Weird  
Molecule!

Do:

**3.3.10.A5.b – Essential**  
WATER - Explain the processes of the hydrologic  
cycle.

3.3.10.A5.b - WATER - Explain the processes of the  
hydrologic cycle.

3.3.10.A4.b - SCIENCES AND TRANSFER OF  
ENERGY - Explain how the Earth's systems and its  
various cycles are driven by energy.

3.2.12.A1.b - PROPERTIES OF MATTER -  
Compare and contrast the unique properties of water  
to other liquids.

3.3.12.A1.c - EARTH FEATURES AND THE  
PROCESSES THAT CHANGE IT - Classify Earth's  
internal and external sources of energy such as  
radioactive decay, gravity, and solar energy.

Topic: 04 Properties of Water  
Subject(s):

Days: 12  
Grade(s):

Know:	Understand:	Do:
<p>capillarity, dipolar, hydrogen bond, latent heat, sublimation, endothermic, exothermic, SOFAR channel, surface tension</p> <p>hydrological cycle, condensation, evaporation, transpiration, sublimation</p> <p>salinity, dissolve, solute, solvent</p>		

Topic: 05 Sun, Wind, Seasons, Currents

Days: 16

Subject(s):

Grade(s):

Know:

Understand:

Do:

**3.3.10.A6.b – Compact WEATHER AND CLIMATE** - Explain the phenomena that cause global atmospheric processes such as storms, currents, and wind patterns.

**3.3.10.A7.a – Important UNIFYING THEMES - SCALE/MODELS** Interpret and create models of the Earth's physical features in various mapping representations.

**3.3.10.A7.d – Compact UNIFYING THEMES - CONSTANCY/CHANGE** Describe factors that contribute to global climate change.

**3.3.10.A1.d – Important EARTH FEATURES AND THE PROCESSES THAT CHANGE IT** - Explain how the Earth is composed of a number of dynamic, interacting systems exchanging energy or matter.

Properties of seawater affect ocean circulation.

conservative property, halocline, nonconservative property, pycnocline, thermocline

Solar energy affects the earth.

The ocean and the atmosphere interact.

**3.3.10.A7.a – Important UNIFYING THEMES - SCALE/MODELS** Interpret and create models of the Earth's physical features in various mapping representations.

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3.3.10.A6.b - WEATHER AND CLIMATE - Explain the phenomena that cause global atmospheric processes such as storms, currents, and wind patterns.

3.3.10.A7.a - UNIFYING THEMES - SCALE/MODELS Interpret and create models of the Earth's physical features in various mapping representations.

3.3.10.A7.d - UNIFYING THEMES - CONSTANCY/CHANGE Describe factors that contribute to global climate change.

3.3.10.A1.d - EARTH FEATURES AND THE PROCESSES THAT CHANGE IT - Explain how the Earth is composed of a number of dynamic, interacting systems exchanging energy or matter.

Topic: 05 Sun, Wind, Seasons, Currents

Days: 16

Subject(s):

Grade(s):

Know:	Understand:	Do:
<p>greenhouse effect, heat budget, Tropic of Cancer, Tropic of Capricorn, aphelion, perihelion</p> <p>There are patterns in the global winds.</p> <p>Coiolis Effect, doldrums, horse latitudes, polar easterlies, westerlies, polar front</p> <p>Many types of ice are found in the ocean.</p> <p>sea ice, iceberg, ice floe, pack ice, pancake ice, fast ice</p> <p>The major ocean surface currents flow in patterns.</p> <p>El Nino-Southern Oscillaion, Benguela Current, Brazil Current, Canary Current, California Current, Equatorial Currents, Equatorial Countercurrent, East Australia Current, Kuroshio Current, Gulf Stream, North Pacific Drift, Peru Current, West Wind Drift, Eddy, Eckman spiral and transport, upwelling, downwelling</p>		

Topic: 06 Waves and Tides  
 Subject(s):

Days: 11  
 Grade(s):

Know:	Understand:	Do:
<p><b>3.3.10.A6.b – Compact</b>            WEATHER AND CLIMATE - Explain the phenomena that cause global atmospheric processes such as storms, currents, and wind patterns.</p> <p><b>3.3.10.A7.a – Important</b>            UNIFYING THEMES - SCALE/MODELS Interpret and create models of the Earth's physical features in various mapping representations.</p> <p><b>3.3.10.A7.d – Compact</b>            UNIFYING THEMES - CONSTANCY/CHANGE Describe factors that contribute to global climate change.</p> <p>Parts of a wave</p> <p>How waves change as they travel from deep into shallow water</p> <p>Types of coastlines</p> <p>Patterns of waves in coastal areas</p> <p>Generating forces of waves</p> <p>Types of ocean waves</p> <p>Developmental cycle of a hurricane</p> <p>How the juxtaposition of the earth, sun and moon affect the tides</p>	<p>Waves and Tides Occur in the Ocean</p>	<p><b>3.3.10.A5.c – Essential</b>            WATER - Explain the dynamics of oceanic currents and their relationship to global circulation within the marine environment.</p> <p><b>3.3.10.A7.a – Important</b>            UNIFYING THEMES - SCALE/MODELS Interpret and create models of the Earth's physical features in various mapping representations.</p> <p>3.3.10.A5.c - WATER - Explain the dynamics of oceanic currents and their relationship to global circulation within the marine environment.</p> <p>3.3.10.A7.a - UNIFYING THEMES - SCALE/MODELS Interpret and create models of the Earth's physical features in various mapping representations.</p> <p>3.3.10.A6.b - WEATHER AND CLIMATE - Explain the phenomena that cause global atmospheric processes such as storms, currents, and wind patterns.</p> <p>3.3.10.A7.d - UNIFYING THEMES - CONSTANCY/CHANGE Describe factors that contribute to global climate change.</p>

Topic: 07 Beaches

Days: 8

Subject(s):

Grade(s):

Know:

**4.2.10.B.a – Compact**

Examine how human interactions impact wetlands and their surrounding environments.

**S11.D.1.1.3 – Essential**

Analyze features created by the interaction of processes that change Earth's surface (e.g., wind and moving water help break down rock into soil; plate movement, earthquakes, and volcanic activity help cause mountains and valleys to form; flowing water and deposition of material help form deltas).

The parts of a sandy beach

How a beach will change over time under the influence of the longshore current

How humans impact the shape of the beach

Types of estuaries and wetlands

Understand:

Beaches change over time.

Do:

**S11.D.1.1.3 – Essential**

Analyze features created by the interaction of processes that change Earth's surface (e.g., wind and moving water help break down rock into soil; plate movement, earthquakes, and volcanic activity help cause mountains and valleys to form; flowing water and deposition of material help form deltas).

4.2.10.B.a - Examine how human interactions impact wetlands and their surrounding environments.

Topic: 08 Life in the Marine Environment  
Subject(s):

Days: 5  
Grade(s):

Know:	Understand:	Do:
<div>3.1.B.A1.a – Essential COMMON CHARACTERISTICS OF LIFE - Describe the common characteristics of life.</div> <p>Organisms that live in the ocean have made different adaptations than those organisms that live on the land or in the air.</p> <p>Classifications of marine organisms as plankton, benthos, or nekton.</p>	<p>Organisms are Specialized for their Lives in a Marine Environment.</p>	<div>3.1.B.A8.c – Essential UNIFYING THEMES - SYSTEMS Describe how the unique properties of water support life.</div> <div>3.1.B.A1.a – Essential COMMON CHARACTERISTICS OF LIFE - Describe the common characteristics of life.</div> <p>3.1.B.A8.c - UNIFYING THEMES - SYSTEMS Describe how the unique properties of water support life. 3.1.B.A1.a - COMMON CHARACTERISTICS OF LIFE - Describe the common characteristics of life.</p>