*Unit 1 Ocean Composition

Content Area: **Science**
Course(s): **Marine Environmental Science**
Time Period: **September**
Length: **22 blocks**
Status: **Published**

Performance Expectations (Transfer Skills)

ESS1-5	Evaluate evidence of the past and current movements of continental and oceanic crust and the theory c
ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary history.
ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks tha
ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal co
ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in
ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surf

Enduring Understandings

-Matter cycles and energy flows between living systems and the abiotic marine environment.

-Stability and change in feedback between the biosphere and other Earth systems cause a continual co-evolution of Earth's surface and the life that exists on it.

Essential Questions

-How would marine life be different without the sun?

-If energy is neither created nor destroyed, where does it go as it moves through an ecosystem?

-How can marine life survive in its unique conditions?

Disciplinary Core Ideas (Content)

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4)

ESS2.D: Weather and Climate

- Gradual atmospheric changes were due to plants and other organisms that captured carbon dioxide and released oxygen. (HS-ESS2-7)

ESS2.E: Biogeology

- The many dynamic and delicate feedbacks between the biosphere and other Earth systems cause a continual co-evolution of Earth's surface and the life that exists on it. (HS-ESS2-7)

ESS1.B: Earth and the Solar System

- Cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the earth. These phenomena cause a cycle of ice ages and other gradual climate changes. (secondary)

ESS2.A: Earth Materials and Systems

- The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun's energy output or Earth's orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles.

Science & Engineering Practices (Skills)

The eight science and engineering practices should be integrated into learning opportunities where appropriate.

1. Asking questions (for science) and defining problems (for engineering)

2. Developing and using models

3. Planning and carrying out investigations

4. Analyzing and interpreting data

5. Using mathematics and computational thinking

6. Constructing explanations (for science) and designing solutions (for engineering)

7. Engaging in argument from evidence

8. Obtaining, evaluating, and communicating information

Crosscutting Concepts (Themes that transcend all Science)

Energy and Matter

- Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems. (HS-LS2-4)

Stability and Change

- Much of science deals with constructing explanations of how things change and how they remain stable. (HS-ESS2-7)

Resources

Lesson 6: Explore the Seafloor (ESS2-1)

Lesson seven: The formation of the ocean (ESS2-2, ESS2-3, ESS1-5, ESS1-6)

Lesson two: Water on earth (ESS2-3, ESS2-4)

Lesson three: More about water (ESS2-5)

Standards

CCC.7.1	students understand much of science deals with constructing explanations of how things change and how they remain stable. They quantify and model changes in systems over very short or very long periods of time. They see some changes are irreversible, and negative feedback can stabilize a system, while positive feedback can destabilize it. They recognize systems can be designed for greater or lesser stability.
SEP.5.b	Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.
SEP.7.d	Construct, use, and/or present an oral and written argument or counter-arguments based on data and evidence.
SCI.9-12.5.3	Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.