

Earth Systems

Instructors:

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2 semesters, 1 credit

Governments around the world are increasingly aware of the relationship between Earth's natural cycles, its resources, and the well-being of human life. Under the unifying theme of global climate change, students will use scientific inquiry to explore the interconnections of Earth's systems. Topics of study will include: geologic time, plate tectonics, natural resources and energy consumption, oceans and the atmosphere, astronomy, and ecology.

Graduation Standards (the number of the standard is referenced in the performance indicators listed in each unit):

5- Life Sciences: Matter and Energy in Organisms and Ecosystems Understand and analyze the characteristics, functions, and behavioral interactions within an ecosystem. (LS 2)

7- Earth And Space Sciences: Earth Systems, the Earth, Space, and the Universe Understand and analyze the origins, interactions and relationships between and among Earth, its systems, and the universe. (ESS1, ESS2, + ESS3)

8- Engineering, Technology, and Application of Science Demonstrate engineering concepts across multiple disciplines and novel situations. (HS-ETS1)

- 8 A. Ask questions/ define problems.
- 8 B. Develop and use models.
- 8 C. Plan and carry out investigations.
- 8 D. Analyze and interpret data.
- 8 E. Use mathematical and computational reasoning.
- 8 F. Construct explanations/ design solutions.
- 8 G. Engage in Argument from evidence.
- 8 H. Obtain, evaluate, and communicate information

Unit 1	Astronomy
Summary	Students will use evidence to describe the formation and behavior of the universe and our solar system, life cycles of stars, and how solar activity impacts life on Earth.
Performance Indicators Assessed in Unit	7A. Describe the history of the universe and our solar system, the functioning of its stars and other components, and how they impact life on Earth. 8- (A-H) Engineering, Technology, and Application of Science Practices
Unit 2	Earth's History
Summary	Students will understand how Earth's axial tilt and orbital shape dictate Earth's climate, and interpret proxy evidence (ice cores, sediment data, tree rings, forams, evidence for changes in glacial ice, and the fossil record) to suggest how Earth's climate and biosphere have changed over time.
Performance Indicators Assessed in Unit	7B. Understand the components that dictate Earth's climate, how these have changed over time, and the implications for life on Earth. 8 (A-H). Engineering, Technology, and Application of Science Practices

Unit 3	Plate Tectonics
Summary	Students will model and explain the relationship between convection in the Earth's mantle, the movement of lithospheric plates, and geologic events on Earth.
Performance Indicators Assessed in Unit	7C. Describe the processes that drive tectonic plate movement and the resulting effects on Earth's atmosphere and climate. 8 (A-H). Engineering, Technology, and Application of Science Practices
Unit 4	Earth's Oceans and Atmosphere
Summary	Students will explore the properties and behaviors of Earth's atmosphere and oceans and understand the effect of each on weather and climate.
Performance Indicators Assessed in Unit	7D. Connect global wind patterns and ocean circulation to changes in weather and climate. 8 (A-H). Engineering, Technology, and Application of Science Practices
Unit 5	Natural Resources
Summary	Students will compare renewable with nonrenewable resources and the impacts of each on natural cycles both locally and globally. We will explore the past and potential future impacts on human civilization as our dependence on nonrenewable fossil fuel resources are causing our climate to change at an unprecedented rate.
Performance Indicators Assessed in Unit	7E. Recognize how human use of natural resources and energy consumption impacts Earth on a local and global level. 8 (A-H) Engineering, Technology, and Application of Science Practices
Unit 6	Population Ecology
Summary	In this unit, students will focus on the abiotic and biotic factors that make up an ecosystem and investigate how changes in either impact the health, growth, and succession of populations therein.
Performance Indicators Assessed in Unit	5B. Apply population dynamics (species interactions and community behavior) to the functioning and resiliency of a species population, its community, and the surrounding ecosystem. 8 (A-H) Engineering, Technology, and Application of Science Practices