Earth Science Curriculum

Board Approved: 02/19/2026

Course Information

High School
Full Year

Course Description:
Earth science is a year-long course that explores various topics involving Earth's systems and its place in the universe. The focus of this course is not only on the individual processes, but also on how they relate to and affect one another.

Transfer Goals:

- Approach science as a reliable and tentative way of knowing and explaining the natural world.
- Weigh evidence and use scientific approaches to ask questions, investigate, and make informed decisions.
- Use critical thinking, science, and engineering practices to analyze ideas and phenomena to solve problems.
- Recognize that science is an ongoing human endeavor that helps us understand our universe.

Curriculum Standards: Science Missouri Learning Standards

Curriculum Resource(s): TBD

Unit 1: Earth's Place in the Universe

Timeframe: 8 weeks

Unit Description:
In this unit, students will explore the fundamental processes governing the universe, from the life cycle of stars to the expansion of the cosmos. Students will develop a deep understanding of energy generation in stars, the motion of celestial bodies, and the origins of the universe.

Enduring Understandings:

- The Sun's energy output and lifespan are determined by nuclear fusion in its core, releasing energy as radiation.
- The Big Bang Theory provides a comprehensive, evidence-based explanation for the origin and ongoing expansion of the universe.
- Stars are the universe's element factories, creating diverse elements through nuclear fusion over their life cycles, with the specific elements produced varying based on the star's mass and stage of development.
- Kepler's Laws, combined with Newton's gravitational principles, provide the fundamental framework for accurately predicting the motion of all orbiting objects within our solar system.

Essential Questions:

- How does nuclear fusion empower stars, like our Sun, to generate vast amounts of energy and sustain their long lifespans?
- What astronomical evidence explains the Big Bang Theory and the ongoing expansion of the universe?
- How do stars create elements throughout their lives?
- How do Kepler's Laws and Newtonian principles predict the motion of orbiting objects?

Unit 1 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
9-12.ESS1.A.1	• I can develop a model to illustrate the life span of the Sun and the role of nuclear fusion in the Sun's core to release energy in the form of radiation. • I can use evidence to illustrate the life span of the Sun and the role of nuclear fusion in the Sun's core to release energy in the form of radiation.
9-12.ESS1.A.2	• I can construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
9-12.ESS1.A.3	• **I can communicate scientific ideas about the way stars, over their life cycle, produce elements.**
9-12.ESS1.B.1	• I can use Kepler's Law to predict the motion of orbiting objects in the solar system.

priority standards indicated in **bold*

Unit 2: Earth's Systems

Timeframe: 17 weeks

Unit Description:
In this unit, students will explore the fundamental processes, both internal and external, that continuously shape Earth's diverse features and interconnected systems. Students will investigate the dynamic forces that build up the planet's surface and those that wear it down, understanding the intricate relationships and feedback loops that govern Earth's evolution over vast timescales.

Enduring Understandings:

- Earth's surface is constantly reshaped by dynamic plate tectonic processes.
- Earth's diverse features, ranging from continental landforms to ocean floors, are continuously shaped by a dynamic interplay of powerful internal processes that build up the surface and surface processes that wear it down.
- Water's unique physical and chemical properties profoundly influence Earth's materials, surface processes, and global energy transfer, shaping patterns of temperature, air movement, and water availability across the planet.
- Life and Earth's systems have profoundly and simultaneously coevolved, with changes in one critically influencing and creating feedback loops with the other.

Essential Questions:

- How do Earth's internal processes drive the movement of the crust and the formation of major surface features on both continents and ocean floors?
- How do Earth's systems (geosphere, hydrosphere, atmosphere, and biosphere) interact, and how do these interactions, including feedback mechanisms, influence Earth's climate and environment?
- How do the unique properties of water and the biogeochemical cycling of elements, like carbon, regulate Earth's processes, and what role has the coevolution of life played in shaping these cycles and Earth's atmospheric composition over geological time?
- What types of scientific evidence allow us to reconstruct Earth's formation, understand its history, and interpret the long-term patterns observed?

Unit 2 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
9-12.ESS1.C.1	• I can evaluate evidence of the past and current movements of continental and oceanic crust, the theory of plate tectonics, and relative densities of oceanic and continental rocks. • I can explain why continental rocks are generally much older than rocks of the ocean floor.
9-12.ESS1.C.2	• I can apply scientific reasoning from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.

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9-12.ESS2.A.1	• **I can develop a model to illustrate how Earth's interior and surface processes (constructive and destructive) operate at different spatial and temporal scales to form continental and ocean-floor features.**
9-12.ESS2.A.2	• I can analyze geoscientific data to make the claim that one change to Earth's surface can create changes to other Earth systems.
9-12.ESS2.A.3	• I can develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
9-12.ESS2.A.4	• I can use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
9-12.ESS2.C.1	• I can plan an investigation of the properties of water and its effects on Earth materials and surface processes. • I can investigate the properties of water and its effects on Earth materials and surface processes.
9-12.ESS2.D.1	• I can develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
9-12.ESS2.E.1	• **I can construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.**

Unit 3: Earth and Human Activity

Timeframe: 10 weeks

Unit Description:
In this unit, titled "Human Interaction with Earth Systems and Climate Change," students will be provided a comprehensive exploration of the intricate relationship between human activities and Earth's natural systems.

Enduring Understandings:

- Human societies are intricately linked with and profoundly impact Earth's natural systems, including climate, resources, and biodiversity.
- There is a critical need to evaluate and refine technological solutions for sustainable interaction and environmental restoration.

Essential Questions:

- How do Earth's natural systems—including resource availability, natural hazards, and climate shifts—profoundly influence human societies and populations, and in what ways has technology reshaped this dynamic relationship?
- What criteria and evidence are essential for effectively evaluating, choosing, and refining technological solutions that address societal resource needs, manage human impacts, and restore the stability and biodiversity of natural systems?
- How do geoscientific data and global climate models enable us to forecast current and future climate change impacts on Earth systems, and what are the positive and negative, reversible or irreversible, consequences of human activity on these interconnected systems?

Unit 3 Standards	
STANDARD CODE	**STUDENTS WILL KNOW, BE ABLE TO, AND UNDERSTAND:**
9-12.ESS3.A.1	• **I can construct an explanation based on evidence for how the availability of natural resources, the occurrence of natural hazards, and changes in climate have influenced human activity.**
9-12.ESS3.A.2	• I can use logical arguments based on their evaluation of the design solutions, costs, and benefits, empirical evidence, and scientific ideas to support one design over the other(s) in their evaluation. • I can describe that a decision on the best solution may change over time as engineers and scientists work to increase the benefits of design solutions while decreasing costs and risks.

9-12.ESS3.C.1	• I can create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
9-12.ESS3.C.2	• I can evaluate a technological solution that reduces the impacts of human activities on natural systems in order to restore stability and or biodiversity of the ecosystem, as well as prevent their reoccurrences. • I can refine a technological solution that reduces the impacts of human activities on natural systems in order to restore stability and or biodiversity of the ecosystem, as well as prevent their reoccurrences.
9-12.ESS3.D.1	• **I can analyze geoscientific data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change.** • **I can analyze geoscientific data and the results from global climate models to make an evidence-based claim of the associated future impacts on Earth systems.**
9-12.ESS3.D.2	• I can predict how human activity affects the relationships between Earth systems in positive ways. • I can predict how human activity affects the relationships between Earth systems in negative ways.