

# EARTH SCIENCE

Students should be able to use science and engineering practices and understand the following content:

## Science and Engineering Practices

- Development of habits of mind that are necessary for scientific thinking and that allow students to engage in science in ways similar to those used by scientists and engineers
- Asking and answering questions about the natural world
- Developing and using models to (1) build understanding of phenomena, processes and relationships, (2) test devices or solutions, or (3) communicate ideas to others
- Conducting structured investigations to answer scientific questions, test predictions, and develop explanations
- Collecting and analyzing data from investigations to construct explanations and communicate results
- Using mathematical and computational thinking in collecting and communicating data
- Using technology to collect data and in communication of results

## Earth Science (Astronomy)

- Demonstrate an understanding of the structure, properties, and history of the observable universe
- Construct explanations for how gravity and motion affect the formation and shapes of galaxies
- Use the Hertzsprung-Russell diagram to classify stars and explain the life cycle of stars
- Explain the formation of stars
- Describe ideas related to the formation of the universe
- Describe the technological tools used to collect evidence about the origin of the universe
- Analyze and interpret data to compare properties of Earth and other planets
- Explain the unique properties of the Earth's moon
- Using mathematical and computational thinking to explain the motion of an orbiting object in the solar system
- Construct explanations of how the solar system was formed

## Earth Science (Earth's Geosphere)

- Demonstrate an understanding of the internal and external dynamics of the Earth's geosphere
- Analyze and interpret data that explains the Earth's internal structure
- Analyze and interpret data to explain the theory of plate tectonics
- Construct explanations based on evidence from tectonic environments and how they account for earthquakes, volcanic eruptions, and mountain building
- Use mathematical and computational thinking to analyze data from seismic activity
- Analyze and interpret data to describe the physical and chemical properties of rocks and minerals
- Develop and use models to explain how various rock formations result from geologic processes
- Plan and conduct investigations that determine factors that affect the rate of weathering

- Analyze and interpret data about soil types from various locations
- Explain the formation, availability, and uses of ores and fossil fuels and their environmental impacts
- Discuss the needs to have responsible management of natural resources
- Explain how natural hazards and geologic events have impacted human history
- Discuss how human activities can relate to the consequences of natural disasters

## Earth Science (Earth's Paleobiosphere)

- Demonstrate an understanding of the dynamic relationship between Earth's conditions over geologic time and diversity of organisms
- Support claims that Earth's physical conditions support carbon-based life
- Explain how various life forms have altered conditions over geologic time
- Evaluate evidence from rocks, fossil records, and ice core samples to support the claim that Earth's conditions have changed over time
- Describe the various methods to estimate geologic time
- Use mathematical and computational thinking to calculate the age of Earth's material
- Develop and use models to predict the effects of an environmental change on global carbon cycling

## Earth Science (Earth's Atmosphere- Weather and Climate)

- Demonstrate an understanding of the dynamics of Earth's atmosphere
- Develop and use models to describe thermal structures, the gaseous composition, and locations of the layers of the atmosphere
- Develop and use models to predict and explain how the angle of solar incidence and the Earth's axial tilt impact daylight, atmospheric filtration, sunlight distribution, and seasonal changes
- Analyze and interpret various kinds of weather data used in describing and predicting weather
- Develop and use models to describe climate and global circulation patterns
- Analyze climate data to examine changes that occurred over time
- Describe ways that human activities may relate to climate change

## Earth Science (Earth's Hydrosphere)

- Demonstrate an understanding of Earth's freshwater and ocean systems
- Describe and compare the physical and chemical properties of freshwater and saltwater
- Explain how location, movement, and energy transfers are involved in making water available
- Plan and conduct investigations into how stream flow is related to erosion and deposition
- Describe how human activities can contribute to water pollution
- Develop and use models to explain how groundwater processes affect limestone formation (caves, karst topography)
- Describe conditions that produce ocean currents

- Develop and use models to describe how waves and currents impact the shore
- Describe, discuss, and evaluate ways that erosion and flooding can be controlled

### Activities:

- Go online and search for sites with tutorials and simulations related to the various content in the standards.
- Note the various ways that your area prepares for flood control.
- Find out what is done in your area and in your state to protect wildlife.
- Examine the geology of South Carolina.
- Try a free astronomy app and become acquainted with the constellations in the night sky.

### Web Sites

- AAAS Science Netlinks - [www.sciencenetlinks.com](http://www.sciencenetlinks.com)
- American Chemical Society - <http://www.acs.org/content/acs/en.html>
- Bill Nye the Science Guy - [www.billnye.com](http://www.billnye.com)
- Discovering Fossils in the UK - [http://www.discoveringfossils.co.uk/fossil\\_hunting\\_guide.htm](http://www.discoveringfossils.co.uk/fossil_hunting_guide.htm)
- Franklin Institute - <https://www.fi.edu>
- NASA's Earth Science Web Site - <http://kids.earth.nasa.gov>
- National Weather Service - <http://www.weather.gov>
- Paleozoology - <http://www.paleozoic.org/home.htm>
- Periodic Table <http://www.rsc.org/periodic-table>
- South Carolina Department of Natural Resources – [www.dnr.state.sc.us](http://www.dnr.state.sc.us)
- U.S. Geological Survey - <http://www.usgs.gov>