

Earth Science CR

| State Standard Number | State Standard Area/Description | Unit Name | Course Topic Description |
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| ES | Earth Science | | |
| 0 | Scientific Inquiry | | |
| ES-1 | The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions. | | |
| ES-1.1 | Apply established rules for significant digits, both in reading scientific instruments and in calculating derived quantities from measurement. | | |
| ES-1.2 | Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation. | | |
| ES-1.3 | Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument. | Introduction to Earth Science | Measurement |
| ES-1.4 | Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations. | Introduction to Earth Science | Scientific Method |
| ES-1.5 | Organize and interpret the data from a controlled scientific investigation by using mathematics (including calculations in scientific notation, formulas, and dimensional analysis), graphs, tables, models, diagrams, and/or technology. | | |

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| ES-1.6 | Evaluate the results of a controlled scientific investigation in terms of whether they refute or verify the hypothesis. | Introduction to Earth Science | Scientific Method |
| ES-1.7 | Evaluate conclusions based on qualitative and quantitative data (including the impact of parallax, instrument malfunction, or human error) on experimental results. | | |
| ES-1.8 | Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials). | | |
| ES-1.9 | Communicate and defend a scientific argument or conclusion. | | |
| ES-1.10 | Use appropriate safety procedures when conducting investigations. | | |
| 0 | Astronomy | | |
| ES-2 | Students will demonstrate an understanding of the structure and properties of the universe. | | |
| ES-2.1 | Summarize the properties of the solar system that support the theory of its formation along with the planets. | Astronomy | The Universe |
| ES-2.2 | Identify properties and features of the Moon that make it unique among other moons in the solar system. | Astronomy | The Earth, Moon and Sun |
| ES-2.3 | Summarize the evidence that supports the big bang theory and the expansion of the universe (including the red shift of light from distant galaxies and the cosmic background radiation). | Astronomy | The Universe |

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| ES-2.4 | Explain the formation of elements that results from nuclear fusion occurring within stars or supernova explosions. | Astronomy | The Life of a Superstar |
| ES-2.5 | Classify stars by using the Hertzsprung-Russell diagram. | | |
| ES-2.6 | Compare the information obtained through the use of x-ray, radio, and visual (reflecting and refracting) telescopes. | Astronomy | Looking into Space |
| ES-2.7 | Summarize the life cycles of stars. | Astronomy | The Life of a Superstar |
| ES-2.8 | Explain how gravity and motion affect the formation and shapes of galaxies (including the Milky Way). | | |
| ES-2.9 | Explain how technology and computer modeling have increased our understanding of the universe. | Astronomy | Looking into Space |
| 0 | Solid Earth | | |
| ES-3 | Students will demonstrate an understanding of the internal and external dynamics of solid Earth. | | |
| ES-3.1 | Summarize theories and evidence of the origin and formation of Earth's systems by using the concepts of gravitational force and heat production. | Atmosphere and Climate | Origin of Earth's Atmosphere |

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| ES-3.2 | Explain the differentiation of the structure of Earth's layers into a core, mantle, and crust based on the production of internal heat from the decay of isotopes and the role of gravitational energy. | | |
| ES-3.3 | Summarize theory of plate tectonics (including the role of convection currents, the action at plate boundaries, and the scientific evidence for the theory). | The Interior of the Earth | Plate Tectonics |
| ES-3.4 | Explain how forces due to plate tectonics cause crustal changes as evidenced in earthquake activity, volcanic eruptions, and mountain building. | The Interior of the Earth | Plate Tectonics |
| ES-3.5 | Analyze surface features of Earth in order to identify geologic processes (including weathering, erosion, deposition, and glaciation) that are likely to have been responsible for their formation. | The Surface of the Earth | Mechanical Weathering Chemical Weathering |
| ES-3.6 | Explain how the dynamic nature of the rock cycle accounts for the interrelationships among igneous, sedimentary, and metamorphic rocks. | Earth's Materials | Igneous Rocks Sedimentary Rocks Metamorphic Rocks |
| ES-3.7 | Classify minerals and rocks on the basis of their physical and chemical properties and the environment in which they were formed. | Earth's Materials | Characteristics of Minerals |
| ES-3.8 | Summarize the formation of ores and fossil fuels and the impact on the environment that the use of these fuels has had. | Earth's Environment | From Fossil Fuels to Renewable Energy |
| 0 | Earth's Atmosphere | | |

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| ES-4 | The student will demonstrate an understanding of the dynamics of Earth's atmosphere. | | |
| ES-4.1 | Summarize the thermal structures, the gaseous composition, and the location of the layers of Earth's atmosphere. | Atmosphere and Climate | Levels of our Atmosphere |
| ES-4.2 | Summarize the changes in Earth's atmosphere over geologic time (including the importance of photosynthesizing organisms to the atmosphere). | Atmosphere and Climate | Structure of Atmosphere |
| ES-4.3 | Summarize the cause and effects of convection within Earth's atmosphere. | The World of Weather | Wind |
| ES-4.4 | Attribute global climate patterns to geographic influences (including latitude, topography, elevation, and proximity to water). | | |
| ES-4.5 | Explain the relationship between the rotation of Earth and the pattern of wind belts. | The World of Weather | Wind |
| ES-4.6 | Summarize possible causes of and evidence for past and present global climate changes. | Geologic Time, Relative Age Dating, and Absolute Age Dating | Relative Time, Fossils, Rocks, and Faunal Succession |
| ES-4.7 | Summarize the evidence for the likely impact of human activities on the atmosphere (including ozone holes, greenhouse gases, acid rain, and photochemical smog). | | |
| ES-4.8 | Predict weather conditions and storms (including thunderstorms, hurricanes, and tornados) on the basis of the relationship among the movement of air masses, high and low pressure systems, and frontal boundaries. | The World of Weather | Weather and Forecasting |
| 0 | Earth's Hydrosphere | | |

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| ES-5 | The student will demonstrate an understanding of Earth's freshwater and ocean systems. | | |
| ES-5.1 | Summarize the location, movement, and energy transfers involved in the movement of water on Earth's surface (including lakes, surface-water drainage basins [watersheds], freshwater wetlands, and groundwater zones). | The World's Water | The World's Water |
| ES-5.2 | Illustrate the characteristics of the succession of river systems. | The World's Water | Stream and River Development |
| ES-5.3 | Explain how karst topography develops as a result of groundwater processes. | | |
| ES-5.4 | Compare the physical and chemical properties of seawater and freshwater. | | |
| ES-5.5 | Explain the results of the interaction of the shore with waves and currents. | | |
| ES-5.6 | Summarize the advantages and disadvantages of devices used to control and prevent coastal erosion and flooding. | | |
| ES-5.7 | Explain the effects of the transfer of solar energy and geothermal energy on the oceans of Earth (including the circulation of ocean currents and chemosynthesis). | The World's Water | Currents |
| ES-5.8 | Analyze environments to determine possible sources of water pollution (including industrial waste, agriculture, domestic waste, and transportation devices). | The World's Water | Threats to Oceans |

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| 0 | The Paleobiosphere | | |
| ES-6 | Students will demonstrate an understanding of the dynamic relationship between Earth's conditions over geologic time and the diversity of its organisms. | | |
| ES-6.1 | Summarize the conditions of Earth that enable the planet to support life. | Introduction to Earth Science | A Unique Earth |
| ES-6.2 | Recall the divisions of the geologic time scale and illustrate the changes (in complexity and/or diversity) of organisms that have existed across these time units. | Geologic Time, Relative Age Dating, and Absolute Age Dating | Relative Time, Fossils, Rocks, and Faunal Succession |
| ES-6.3 | Summarize how fossil evidence reflects the changes in environmental conditions on Earth over time. | Geologic Time, Relative Age Dating, and Absolute Age Dating | Relative Time, Fossils, Rocks, and Faunal Succession |
| ES-6.4 | Match dating methods (including index fossils, ordering of rock layers, and radiometric dating) with the most appropriate application for estimating geologic time. | Geologic Time, Relative Age Dating, and Absolute Age Dating | Relative Time, Fossils, Rocks, and Faunal Succession |
| ES-6.5 | Infer explanations concerning the age of the universe and the age of Earth on the basis of scientific evidence. | Covered throughout the course | |