

## SC Earth System Science Research

The student will demonstrate the ability to use specific skills and processes (Core Learning Goal 1) and major earth science concepts (Core Learning Goal 2) to explain the physical behavior of the environment, Earth, and the universe.

### SC.ESSR.10 Students will use the language and instruments of science to apply the skills of scientific inquiry to understand the nature of science.

- SC.ESSR.10.01 Demonstrate safety when conducting an investigation (CS1.12.5)
  - SC.ESSR.10.01a Recognize safe laboratory procedures (CLG 1.3.2\*)
  - SC.ESSR.10.01b Demonstrate safe handling of the chemicals and materials of science (CLG 1.3.3)
- SC.ESSR.10.02 Demonstrate proficiency in using the metric system
  - SC.ESSR.10.02.a Appropriately apply the basic units of meter, liter, and gram
  - SC.ESSR.10.02.b Appropriately apply the metric system to measure mass, volume, length, and temperature
- SC.ESSR.10.03 Apply the steps of the scientific method when given problem solving situations
  - SC.ESSR.10.03.a Access and process information from readings, investigations, and oral communications (CS1.12.1\*, CLG1.5.6\*, CLG1.3.4, CLG1.2.7\*)
  - SC.ESSR.10.03.b Formulate questions that lead to a testable hypothesis (CS1.12.2\*, CS1.12.3\*, CLG1.2.3\*, CLG1.2.1\*, CLG1.2.2, CLG1.2.4)
  - SC.ESSR.10.03.c Design logically sequenced, experimental approaches which appropriately control dependent and independent variables and answer scientific questions (CS1.12.4\*, CS1.12.7\*, CLG1.2.5\*, CLG1.2.6\*)
  - SC.ESSR.10.03.d Conduct scientific investigations to test a hypothesis (CS1.12.4, CLG1.3.1)
- SC.ESSR.10.04 Demonstrate proficiency in the use of the appropriate language and instruments of science to appropriately collect, organize, and display data (CS1.12.7\*, CLG1.4.1\*)
  - SC.ESSR.10.04.a Collect data for mass, volume, length and temperature
  - SC.ESSR.10.04.b Create and interpret graphics (scale drawings, photographs, digital images, etc) analyze data and evaluate hypotheses (CS1.12.6\*)
  - SC.ESSR.10.04.c Design, construct, and use models to make predictions about and to visualize actual events (1.12.22, CLG1.4.8)
  - SC.ESSR.10.04.d Use mathematical process when conducting investigations, analyzing information, and displaying information (CS1.12.6\*, CLG1.6.1\*, CLG1.6.2, CLG1.6.3\*, CLG1.6.4, CLG1.6.5\*, CLG1.7.4)

### SC.ESSR.20 Students will apply critical thinking skills to understand the nature of science.

- SC.ESSR.20.01 Demonstrate proficiency in evaluating scientific data in terms of bias, reliability and validity (CS1.12.8\*, CLG1.4.3\*, CLG1.4.5\*)
  - SC.ESSR.20.01.a Analyze appropriate data to classify, identify trends, and identify similarities and differences to form conclusions and apply what has been learned to evaluate the hypothesis (CS1.12.8\*, CS1.12.10\*, CS1.12.11\*, CLG1.4.2\*, CLG1.4.4\*, CLG1.4.6\*, CLG1.4.9\*, CLG1.5.7\*, CLG1.5.8\*)
- SC.ESSR.20.02 Demonstrate proficiency in formulating conclusions (CS1.12.9\*, CLG1.5.1\*, CLG1.5.2\*, CLG1.5.9\*)
  - SC.ESSR.20.02.a Analyze the adequacy of supporting evidence used to form conclusions (CS1.12.13\*, CLG1.4.7\*)
  - SC.ESSR.20.02.b Provide supporting evidence when forming conclusions (CS1.12.14\*, CLG1.2.8\*)
- SC.ESSR.20.03 Modify ideas based on new information (CS1.12.16\*, CLG1.1.2\*)
  - SC.ESSR.20.03.a Defend a position on a scientific issue (CS1.12.20\*)
  - SC.ESSR.20.03.b Recognize that real problems have more than one solution (CS1.12.21\*, CLG1.1.1\*)
- SC.ESSR.20.04 Apply scientific principles and concepts to understand a new situation (CS1.12.18\*, CS1.12.19\*, CLG1.7.1\*)
- SC.ESSR.20.05 Critique scientific information in order to detect bias and analyze the source of the bias (CS1.12.12\*, CLG1.1.3\*, CLG1.1.4\*, CLG1.1.5\*)

### SC.ESSR.30 Students will connect the various aspects of technology to the nature of science.

- SC.ESSR.30.01 Use computational tools and technologies in data collection, analysis and modeling (CS 1.12.9\*, CS 1.12.17\*, CLG 1.5.3\*)

- SC.ESSR.30.02 Demonstrate and explain how using existing tools extend knowledge and identify the limitations, which drive the need for new technologies (CS1.12.23\*, CLG1.7.6)
- SC.ESSR.30.03 Interpret and communicate findings using developmentally appropriate technology and telecommunications (CS1.12.9\*, CLG1.5.5\*)

**SC.ESSR.40 The student will be able to understand the Earth System and the interrelationships between the five spheres.**

- SC.ESSR.40.01 Describe the Earth as a dynamic and complex system.
- SC.ESSR.40.01.a Describe a system.
  - SC.ESSR.40.01.b Explain how a system changes over time.
  - SC.ESSR.40.01.c Describe the causes of the change over time.
- SC.ESSR.40.02 Describe the components of the Earth system.
- SC.ESSR.40.02.a Describe the biosphere.
  - SC.ESSR.40.02.b Describe the cryosphere.
  - SC.ESSR.40.02.c Describe the atmosphere.
  - SC.ESSR.40.02.d Describe the hydrosphere.
  - SC.ESSR.40.02.e Describe the geosphere
- SC.ESSR.40.03 Describe how the system responds to natural and human induced changes.
- SC.ESSR.40.03.a Describe the interactions that cause change
  - SC.ESSR.40.03.b Describe the response to human induced change
  - SC.ESSR.40.03.c Explain the Sun – Earth connection as it impacts the processes on Earth

**SC.ESSR.50 Students will conduct a research project that will demonstrate an understanding of the Earth System by developing a scientific question that will explore the interrelationships between at least two of the Earth spheres.**

- SC.ESSR.50.05 Formulate a question that will lead to a testable hypothesis that includes the analysis of the interrelationships within two spheres of the Earth system.
- SC.ESSR.50.02 Gather appropriate background information pertaining to the selected research question.
- SC.ESSR.50.03 Collect, organize and display data in multiple ways that fit the context using appropriate instruments to effectively convey the information.
- SC.ESSR.50.04 Analyze appropriate data to identify trends to form conclusions and apply what has been learned to evaluate the hypothesis.
- SC.ESSR.50.05 Interpret and communicate findings through speaking, writing, and drawing in a form suited to the purpose and audience using developmentally appropriate methods including technology tools and telecommunications via a scientific poster or a multimedia presentation. (CS1.12., CS1.12.17, CLG 1.5.3)