Missouri Science

Earth and Space Sciences: Grades 9-12

Adopted 2016

Earth and Space Sciences

1 **Earth's Place in the Universe** ESS1

A The Universe and its Stars ESS1.A

1 Develop a model based on 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-1

2 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-2

3 Communicate scientific ideas about the way stars, over their life cycle, produce elements. 9-12.ESS1.A-3

B Earth and the Solar System ESS1.B

4 Use Kepler's Law to predict the motion of orbiting objects in the solar system. 9-12.ESS1.B-4

C The History of Planet Earth ESS1.C

5 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 to explain why continental rocks are generally much older than rocks of the ocean floor. 9-12.ESS1.C-5

6 Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. 9-12.ESS1.C-6

2 Earth's Systems ESS2

A Earth Materials and Systems ESS2.A

1. 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-1
2. 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-2
3. Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection. 9-12.ESS2.A-3
4. 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.A-4

C The Role of Water in Earth's Surface Processes ESS2.C

5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. 9-12.ESS2.C-5

D Weather and Climate ESS2.D

6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. 9-12.ESS2.D-6

E Biogeology ESS2.E

1. Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. 9-12.ESS2.E-1

3 Earth and Human Activity ESS3

A Natural Resources ESS3.A

1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. 9-12.ESS3.A-1
2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on economic, social, and environmental cost-benefit ratios. 9-12.ESS3.A-2

C Human Impacts on Earth's Systems ESS3.C

1. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. 9-12.ESS3.C-1
4. Evaluate or refine a technological solution that reduces 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.C-4

D Global Climate Change ESS3.D

5. 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 and associated future impacts to Earth systems. 9-12.ESS3.D-5
2. Predict how human activity affects the relationships between Earth systems in both positive and negative ways. 9-12.ESS3.D-2