

**New Hampshire Science Grades 9-12
Curriculum Standards**

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Earth Space Science	Boardworks High School Earth Science Presentations
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.	
1. ATMOSPHERE, CLIMATE, AND WEATHER	
Grades 9-11	
S:ESS1:11:1.1 Explain how winds and ocean currents are created on the Earth’s surface.	Heat Transfer and Global Interactions
S:ESS1:11:1.2 Explain how heat and energy transfer in and out of the atmosphere; and provide examples of how it is related to weather and climate.	Heat Transfer and Global Interactions Weather and Climate
S:ESS1:11:1.3 Describe how Earth’s atmospheric composition has changed from the formation of the Earth through current time.	The Atmosphere
S:ESS1:11:1.4 Explain how Earth’s features can affect wind and weather patterns by causing air to rise and increasing precipitation.	Precipitation Weather and Climate
Grade 11-12 (advanced)	
S:ESS1:12:1.1 Identify and describe the layers of the atmosphere.	The Atmosphere
<i>S:ESS1:12:1.2 Understand the effects of solar influences, such as flares and sunspots, on atmospheric</i>	–
2. COMPOSITION AND FEATURES	
Grades 9-11	
S:ESS1:11:2.1 Recognize that elements exist in fixed amounts and describe how they move through the solid Earth, oceans, atmosphere, and living things as part of geochemical cycles, such as the water, carbon and nitrogen cycles.	The Carbon Cycle The Nitrogen Cycle The Water Cycle
S:ESS1:11:2.2 Describe the conditions that enable the Earth to support life, such as the availability of water, the gravitational force, the electromagnetic field and the intensity of radiation from the Sun.	Planets of the Solar System
S:ESS1:11:2.3 Explain the theory of plate tectonics.	Plate Tectonics
S:ESS1:11:2.4 Describe the movement of crustal plates and explain how the effects have altered the Earth’s features.	Plate Tectonics Earthquake Causes
3. FOSSILS AND GEOLOGIC TIME	
Grades 9-11	
S:ESS1:11:3.1 Identify and describe the methods used to measure geologic time, such as fossil identification, radioactive dating, and rock sequences.	Fossil Record Radioactive Dating
S:ESS1:11:3.2 Relate how geologic time is determined using various dating methods (e.g., radioactive decay, rock sequences, fossil records).	Fossil Record Radioactive Dating
4. OBSERVATION OF THE EARTH FROM SPACE	

Grades 9-11	
S:ESS1:11:4.1 <i>Provided with geologic data (including movement of plates) on a given locale, predict the likelihood for an earth event (e.g. volcanoes mountain ranges, islands, earthquakes, tides, tsunamis).</i>	Earthquake Causes Plate Tectonics
5. PROCESSES AND RATES OF CHANGE	
Grades 9-11	
S:ESS1:11:5.1 Explain that the Earth is composed of interactive layers, which have distinct compositions, physical properties and processes.	Earth's Structure Plate Tectonics
S:ESS1:11:5.2 Relate plate movement to earthquakes and volcanic activity, and explain how it results in tectonic uplift and mountain building.	Earthquake Causes Earthquake Effects Plate Tectonics Volcanoes
S:ESS1:11:5.3 Identify and describe the major external and internal sources of energy on Earth.	Heat Transfer and Global Interactions Solar Energy
S:ESS1:11:5.4 Provide supporting geologic/geographic evidence that supports the validity of the theory of plate tectonics.	Plate Tectonics
S:ESS1:11:5.5 Trace the development of the theory of plate tectonics.	Plate Tectonics
S:ESS1:11:5.6 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading).	Plate Tectonics The Rock Cycle
6. ROCK CYCLE	
Grades 9-11	
S:ESS1:11:6.1 <i>Explain that throughout the rock cycle, the total amount of the material remains the same.</i>	–
Grades 11-12 (Advanced)	
S:ESS1:12:6.1 Describe the processes that transform one type of rock into another, such as lithification, metamorphosis, and weathering on a chemical level.	Erosion, Transportation and Deposition The Rock Cycle Weathering
S:ESS1:12:6.2 Describe the various types of igneous, sedimentary, and metamorphic rocks found on Earth.	The Rock Cycle Volcanoes
7. WATER	
Grades 9-11	
S:ESS1:11:7.1 Explain that water quality can be affected positively or negatively by outside sources	Water Pollution
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.	
1. EARTH, SUN, AND MOON	
Grade 9-11	
S:ESS2:11:1.1 Explain how the Earth, Moon and Sun were formed.	Planets of the Solar System The Life Cycle of Stars
Grades 11-12 (Advanced)	

S:ESS2:12:1.1 Understand how the Nebular Hypothesis, fusion, and the process of differentiation contributes to the structure and organization of the universe.	Planets of the Solar System
2. ENERGY	
Grade 9-11	
S:ESS2:11:2.1 Identify the Earth's major external source of energy as solar energy.	Heat Transfer and Global Interactions Recycling Nutrients Solar Energy
S:ESS2:11:2.2 Explain how the inclination of incoming solar radiation can impact the amount of energy Earth receives on any given surface area.	The Rotation of the Earth Weather and Climate
S:ESS2:11:2.3 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading).	Plate Tectonics
3. SOLAR SYSTEM	
S:ESS2:11:3.1 Explain how gravitational force influenced the formations of the planets and their moons; and describe how these objects move in patterns under its continued influence.	Gravity and Orbits Planets of the Solar System
S:ESS2:11:3.2 Explain how the Solar System formed from a giant cloud of gas and debris about 5 billion years	Planets of the Solar System
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.	
1. SIZE AND SCALE	
Grade 9-11	
S:ESS3:11:1.1 Recognize electromagnetic waves can be used to locate objects in the universe, and track their movement.	Observing the Universe Telescopes
S:ESS3:11:1.2 Define a light year.	Astronomical Distances
2. STARS AND GALAXIES	
Grade 9-11	
S:ESS3:11:2.1 Identify and describe the characteristics common to most stars in the universe.	The Life Cycle of Stars Properties of Stars
S:ESS3:11:2.2 Describe the ongoing processes involved in star formation, their life cycles and their destruction.	The Life Cycle of Stars Properties of Stars
S:ESS3:11:2.3 Explain the relationships between or among the energy produced from nuclear reactions, the origin of elements, and the life cycles of stars.	The Life Cycle of Stars Properties of Stars
3. UNIVERSE	
Grade 9-11	
S:ESS3:11:3.1 Explain that current scientific evidence supports the Big Bang Theory as a probable explanation of the origin of the universe, and describe the theory.	Doppler Effect Observing the Universe
S:ESS3:11:3.2 Explain the evidence that suggests the universe is expanding.	Observing the Universe
S:ESS3:11:3.3 Provide scientific evidence that supports or refutes the "Big Bang" theory of how the universe	–

S:ESS3:11:3.4 Based on the nature of electromagnetic waves, explain the movement and location of objects in the universe or their composition (e.g., red shift, blue shift, line spectra).	Doppler Effect Observing the Universe
S:ESS3:11:3.5 Explain how scientific theories about the structure of the universe have been advanced through the	Telescopes
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	
1. DESIGN TECHNOLOGY	
Grade 9-11	
S:ESS4:11:1.1 Describe ways in which technology has increased our understanding of the universe.	Observing the Universe Telescopes
S:ESS4:11:1.2 <i>Understand that technology is designed with a particular function in mind; and principles of Earth Space science are useful in creating technology for the Earth space sciences.</i>	–
Grade 11-12 (advanced)	
S:ESS4:12:1.1 <i>Recognize the importance of technology as it relates to science, for purposes such as: access to space and other remote locations, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.</i>	–
2. TOOLS	
Grade 9-11	
S:ESS4:11:2.1 Describe the use and benefits of land-based light telescopes, radio telescopes, spectrophotometers, satellites, manned exploration, probes, and robots to the study of Earth Space Science.	Satellites Telescopes
S:ESS4:11:2.2 <i>Explain how scientists study the Earth using computer-generated models and observations from both landbased sites and satellites; and describe the value of using these tools in unison.</i>	–
3. LOCAL AND GLOBAL ENVIRONMENTAL ISSUES	
Grade 9-11	
S:ESS4:11:3.1 Differentiate between and provide examples of renewable and nonrenewable sources of energy; and explain the advantages and limitations of each.	Air Pollution Fossil Fuels Formation of Fossil Fuels Nuclear Fission Solar Energy
S:ESS4:11:3.2 <i>Describe the means for transforming a natural material, such as iron ore, into useful products during different historical periods, such as the Stone Age, Iron Age, Renaissance, the Industrial Period and the current Age of Information</i>	–
S:ESS4:11.3.3 Explain how the use of technologies at a local level, such as burning of fossil fuels for transportation or power generation, may contribute to global environmental problems.	Air Pollution Climate Change Greenhouse Gases

Grade 11-12 (advanced)	
S:ESS4:12:3.1 Explain the environmental effects of using both renewable and nonrenewable resources; and provide examples of how man is addressing these effects on the environment.	Air Pollution Fossil Fuels Formation of Fossil Fuels Nuclear Fission Solar Energy The Carbon Cycle
<i>S:ESS4:12:3.2 Provide examples of how man's use of Earth materials has changed over time; and use those examples to explain how the relationship between science and technology has gradually grown closer in the</i>	–
<i>S:ESS4:12:3.3 Research and evaluate a current environmental issue within the State of New Hampshire, such as a dispute regarding the conversion of a natural environment to human use; and construct a defense that supports environmental protection.</i>	–
4. CAREER TECHNICAL EDUCATION CONNECTIONS	
Grade 9-11	
<i>S:ESS4:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to Earth or space sciences.</i>	–
Grade 11-12 (advanced)	
<i>S:ESS4:12:4.1 Understand the various scientific fields that use scientific content and skills; and distinguish between professional and skilled science jobs/careers in Earth or space sciences.</i>	–