Introduction

The **Core Earth & Space Science III Course** teaches about the universe, the solar system, the structure and history of Earth, Earth's moon, kinds of rocks, the rock cycle, plate tectonics, the role of water, weather, climate, biogeology, natural resources, natural hazards, human impacts on Earth's systems, and global climate change.

The **Core Earth & Space Science III Course** learning objectives align with Next Generation Science standards for middle school: MS-ESS1-1, MS-ESS1-2, MS-ESS1-3, MS-ESS1-4, MS-ESS-2-1, MS-ESS2-2, MS-ESS2-3, MS-ESS2-4, MS-ESS2-5, MS-ESS2-6.

The Course has 19 lessons organized in 4 Units. There are 522 audio-supported instruction pages, 59 printable activity sheet pages, 329 defined vocabulary words, and a set of 285 Quiz and Unit Unit Test Questions. Completion time is estimated at 15 to 17 hours**.**

Unit 1: The Earth's Position

Unit 1 - Lesson 1: The Universe

Next Generation Science Standards (NGSS)

- Middle School: MS-ESS1-1, MS-ESS1-2

Common Core Science Objectives

- ESS1.A The Universe and Its Stars

Learning Objectives

- to learn about the components of the universe
- to learn about the nature and role of stars

Defined Vocabulary Words

- asteroid, asteroid, astronomer, Big Bang theory, celestial body, comet, constellation, dwarf planet, elliptical, galaxy, light year, meteor, meteoroid, milky way, moon, planet, solar system, universe

Activity Type

- Match the word to its definition.
- Interactive Activity: Make Your Own Planetarium - construct your own planetarium to share with friends.

Lesson Components

Total Learning Objects – 43
Instruction Pages - 25
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 1 - Lesson 2: The Solar System

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS1-1, MS-ESS1-2, MS-ESS1-3

Common Core Science Objectives
- ESS1.B Earth and the Solar System

Learning Objectives
- to learn about the solar system and the names and characteristics of the planets

Defined Vocabulary Words
- asteroid, asteroid belt, astronomer, comet, crater, dwarf planet, Earth, Eye of Jupiter, Gas Giants, Hubble Space Telescope, inner planets, Jupiter, Mars, Mercury, meteor, meteoroid, moon, Neptune, orbit, outer planets, planet, planetary ring system, Pluto, revolve, satellite, Saturn, scooter, shepherd moons, solar system, star, sun, Terrestrial planets, universe, Uranus, Venus

Activity Type
- Draw a picture of each of the eight planets in our solar system, in the same order they appear from the sun, and write a short description.
- Interactive Activity: Locating Planets in the Sky - try to identify which objects in the sky are stars and which are planets.

Lesson Components
Total Learning Objects – 57
Instruction Pages - 38
Activity Pages - 5
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 1 - Lesson 3: The Earth and Stars

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS1-1, MS-ESS1-2, MS-ESS1-3

Common Core Science Objectives
- ESS1.B Earth and the Solar System

Learning Objectives
- to learn about the rotation and revolution of Earth
- to learn about seasons, solstices, and equinoxes

Defined Vocabulary Words
- aphelion, astronomer, autumnal equinox, axis, constellation, elliptical, equator, equinox, hemisphere, North Star, orbit, perihelion, pole, revolution, rotation, season, solar system, solstice, star, sun, vernal equinox

Activity Type
- Crossword Puzzle

- Interactive Activity: It's All in the Angle - experiment to show how the angle of light can impact the resulting temperature of an area that the light hits.

Lesson Components
Total Learning Objects – 43
Instruction Pages - 24
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 1 - Lesson 4: The Moon

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS1-1, MS-ESS1-2, MS-ESS1-3

Common Core Science Objectives
- ESS1.B Earth and the Solar System

Learning Objectives
- to learn about the Earth's moon, its function, its movement, and its phases
- to learn about eclipses and the effect of the moon on tides

Defined Vocabulary Words
- axis, blue moon, crater, eclipse, elliptical, first quarter moon, full moon, gravity, high tide, low tide, lunar eclipse, lunar month, moon, moon phase, neap tide, new moon, orbit, partial eclipse, reflected light, revolution, rotate, solar eclipse, spring tide, telescope, three quarter moon, tide, tidal range, total eclipse, waning crescent, waning gibbous, waxing crescent, waxing gibbous

Activity Type
- Draw the position of the Earth, sun, and moon during each eclipse and tide. Explain briefly what you drew.
- Interactive Activity: The Man in the Moon - choose a clear night with a full moon, grab a pair of binoculars, and observe the moon. Take time to draw what you see and label what you can.

Lesson Components
Total Learning Objects – 47
Instruction Pages - 29
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 1 - Lesson 5: Earth History

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS1-4, MS-ESS2-3

Common Core Science Objectives
- ESS1.C The History of Plant Earth

Learning Objectives
- to learn about the Earth's history and geologic time scale
- to learn about changes to the Earth from activity due to earthquakes, volcanoes, glaciers, and water

Defined Vocabulary Words
- absolute age, Appalachian Mountains, Atlantic Ocean, continental drift, earthquake, eon, epoch, era, evolution, extinction, fossil, Geologic Time Scale, geological, glacier, Ice Ages, ocean basin, Pacific Ocean, Pangaea, period, plate tectonics, radioactive elements, relative date, Ring of Fire, rock strata, snow line, supercontinent, volcano, watershed

Activity Type
- Sort the words on the left into the correct boxes on the right according to the key word given. Be sure you can support how all of the words in the box are related.
- Interactive Activity: Simulating a Glacier - simulate the movement of a glacier by mixing a batch of a substance that bends and flows in a similar manner.

Lesson Components
Total Learning Objects – 48
Instruction Pages - 30
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

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Unit 2: The Planet Earth

Unit 2 - Lesson 1: The Earth's Structure

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS-2-1, MS-ESS2-2

Common Core Science Objectives
- ESS2.A Earth Materials and Systems

Learning Objectives
- about the parts of the Earth's structure and the interrelated systems of the geosphere, hydrosphere, atmosphere, and biosphere

Defined Vocabulary Words
- aquifer, asthenosphere, atmosphere, biosphere, condense, continental crust, crust, cryosphere, geosphere, GPS, groundwater, hydrosphere, inner core, lava, lithosphere, magma, mantle, oblate spheroid, oceanic crust, outer core, ozone, polar ice caps, water vapor, well

Activity Type
- Draw and describe each of the Earth's systems
- Interactive Activity: Model of the Earth's Layers - model the layers of the Earth by using a variety of food or arts and crafts materials.

Lesson Components
Total Learning Objects – 42
Instruction Pages - 24
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 2 - Lesson 2: Kinds of Rocks

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS-2-1, MS-ESS2-2

Common Core Science Objectives
- ESS2.A Earth Materials and Systems

Learning Objectives
- to learn about rocks and minerals, including igneous, sedimentary, and metamorphic rocks and how they are formed

Defined Vocabulary Words
- biochemical sedimentary, chemical sedimentary, clastic sedimentary, clasts, course grain, crystal, erosion, extrusive igneous rocks, fine grain, foliated metamorphic rocks, fossil, igneous, intrusive igneous rocks, lava, magma, metamorphic, minerals, nonfoliated metamorphic rocks, rock cycle, rocks, sedimentary, sediments, strata, weathering

Activity Type
- Write a story about your favorite kind of rock.
- Interactive Activity: Rocks, rocks everywhere - produce a photo slide show to demonstrate the many ways rocks impact life, inside and outside.

Lesson Components
Total Learning Objects – 44
Instruction Pages – 26
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 2 - Lesson 3: The Rock Cycle

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS-2-1, MS-ESS2-2

Common Core Science Objectives
- ESS2.A Earth Materials and Systems

Learning Objectives
- to learn about stages of the rock cycle and the roles of weathering, erosion, heat, and pressure in transforming rocks

Defined Vocabulary Words
- atmosphere, biosphere, clasts, cementing, cooling and crystallizing, convection currents, crust, crystal, crystallize, delta, earthquake, erosion, extrusive igneous rocks, geosphere, heat and pressure, hydrosphere, igneous, intrusive igneous rocks, lagoon, lava, magma, mantle, melting, metamorphic, minerals, rock cycle, rock precursor, rocks, sedimentary, sedimentary beds, sedimentary depositional environments, sediments, weathering

Activity Type
- List and describe the 5 mechanisms that turn rocks into different kinds of rocks.
- Interactive Activity: The Power of Ice – witness exactly how strong the force of expansion can be.

Lesson Components
Total Learning Objects – 43
Instruction Pages – 25
Activity Pages - 4
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 2 - Lesson 4: Plate Tectonics

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS2-3

Common Core Science Objectives
- ESS2.B Plate Tectonics and Large-Scale System Interactions

Learning Objectives
- to learn about plate tectonics, convection currents in the mantle, divergent plate movement, convergent plate movement, and transform plate movement

Defined Vocabulary Words
- atmosphere, biosphere, clasts, cementing, cooling and crystallizing, convection currents, crust, crystal, crystallize, delta, earthquake, erosion, extrusive igneous rocks, geosphere, heat and pressure, hydrosphere, igneous, intrusive igneous rocks, lagoon, lava, magma, mantle, melting, metamorphic, minerals, rock cycle, rock precursor, rocks, sedimentary, sedimentary beds, sedimentary depositional environments, sediments, weathering, continental crust, continental drift, convection currents, convergent plate movement, crust, divergent plate movement, earthquake, fault, folded mountains, magma, mantle, mountain range, oceanic crust, oceanic ridge, Pangaea, plate boundary, plate tectonics, plateau, rift, sea-floor spreading, subduct, subduction zone, tectonic plates, transform plate movement, trench, volcanic island

Activity Type
- Write a story about your favorite kind of rock.
- Interactive Activity: Rocks, rocks everywhere - produce a photo slide show to demonstrate the many ways rocks impact life, inside and outside.

Lesson Components
Total Learning Objects – 47
Instruction Pages – 26
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 2 - Lesson 5: Volcanoes

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS2-3

Common Core Science Objectives
- ESS2.B Plate Tectonics and Large-Scale System Interactions

Learning Objectives
- to learn about the formation and classification of volcanoes

Defined Vocabulary Words
- active volcano, ash, central pipe, cinder, cinder cone volcano, composite volcano, crater, dormant volcano, extinct volcano, intermittent volcano, hot spot, lateral blast, lava, magma, magma chamber, ring of fire, shield volcano, tephra, volcano, volcanic bombs, volcanic island, volcanic vent

Activity Type
- List and describe the 5 mechanisms that turn rocks into different kinds of rocks.
- Interactive Activity: The Power of Ice – witness exactly how strong the force of expansion can be.

Lesson Components
Total Learning Objects – 41
Instruction Pages – 25
Activity Pages - 4
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

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Unit 3: Water and Climate

Unit 3 - Lesson 1: The Earth's Water

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS2-2, MS-ESS2-4, MS-ESS2-5, MS-ESS2-6

Common Core Science Objectives
- ESS2.C the Roles of Water in Earth's Surface Processes

Learning Objectives
- to learn about the water cycle
- to learn about the types of water such as freshwater, groundwater, and salt water
- to learn about the locations and movement of water
- to learn about the storage of freshwater in glaciers

Defined Vocabulary Words
- aquifer, aquitard, collection, condensation, convection rainfall, erosion, evaporation, evapotranspiration, freshwater, glacier, groundwater, humidity, hydrologic cycle, photosynthesis, polar ice caps, potable water, precipitation, run-off, seawater, spring, stomata, sublimation, transpiration, updraft, water cycle, water table, water vapor, weathering, xylem

Activity Type
- Draw and explain the water cycle
- Interactive Activity: Plant Transpiration – observe how water evaporates from the leaves of plants in a process called transpiration.

Lesson Components
Total Learning Objects – 57
Instruction Pages - 39
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 3 - Lesson 2: Oceanography

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS2-2, MS-ESS2-4, MS-ESS2-5, MS-ESS2-6

Common Core Science Objectives
- ESS2.C the Roles of Water in Earth's Surface Processes

Learning Objectives
- to learn about the major oceans of the world
- to learn about the parts and features of the ocean bottom
- to learn about the formation of deep ocean currents
- to learn about the formation of surface ocean currents and the Coriolis Effect
- to learn about the impact of the ocean on weather and climate

Defined Vocabulary Words
- abyssal plain, California current, coral reef, continental, continental rise, continental shelf, continental slope, convergent tectonic plates, Coriolis effect, current, deep ocean current, divergent tectonic plates, evaporation, groundwater, gulf stream, guyot, mid-ocean ridge, ocean basin, salinity, seamounts, sea-floor spreading, surface currents, tide, trade winds, westerlies

Activity Type
- Answer the questions.
- Interactive Activity: Deep Ocean Currents - explore how changes in the salinity and temperature of water can create ocean currents.

Lesson Components
Total Learning Objects – 42
Instruction Pages - 24
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 3 - Lesson 3: Weather

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS2-5, MS-ESS2-6

Common Core Science Objectives
- ESS2.D Weather and Climate

Learning Objectives
- to learn about temperature, atmospheric pressure, wind, and humidity
- to learn about cloud formation and precipitation
- to learn about the measurement and forecasting of weather conditions
- to learn about the role of latitude, altitude, and geography on weather conditions

Defined Vocabulary Words
- air pressure, anemometer, atmospheric pressure, barometer, barometric pressure, cloud, Coriolis effect, degrees Celsius, degrees Fahrenheit, depression, evaporate, front, gulf stream, high pressure system, humidity, hygrometer, low pressure system, precipitation, prevailing wind, rain gauge, temperature, thermometer, weather, weather vane, wind

Activity Type
- Answer the questions.
- Interactive Activity: Homemade Hygrometer - use hair to build a home-made hygrometer.

Lesson Components
Total Learning Objects – 50
Instruction Pages – 32
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 3 - Lesson 4: Climate

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS2-5, MS-ESS2-6

Common Core Science Objectives
- ESS2.D Weather and Climate

Learning Objectives
- to learn about the features of climate
- to learn about major climate types such as tropical, dry, temperate, cold, and polar climates
- to learn about the ocean's role in climate
- to learn about greenhouse gases, global warming, and climate change

Defined Vocabulary Words
- carbon dioxide, climate, cold climate, dry climate, elevation, geography, greenhouse effect, greenhouse gases, Gulf Stream, insulation, latitude, phytoplankton, polar climate, temperate climate, tropical climate, water vapor, weather

Activity Type
- Draw a picture to show the ocean's role in determining stabilizing global climates and write a brief explanation.
- Interactive Activity: Warming the Earth - model absorption of light by placing soil and water in a jar, placing the jars under a light, and measuring the temperatures over time.

Lesson Components
Total Learning Objects – 43
Instruction Pages – 25
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 3 - Lesson 5: Biogeology

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS2-5, MS-ESS2-6

Common Core Science Objectives
- ESS2.E Biogeology

Learning Objectives
- to learn learn about the interaction of living things with the hydrosphere, atmosphere, and geosphere
- to learn about the causes of species extinction
- to learn about the role of weathering
- to learn about the role of microorganisms
- to learn about the carbon cycle
- to learn about the impact of animals and people on the environment

Defined Vocabulary Words
- atmosphere, biosphere, carbon cycle, carbon dioxide, coal, decompose, extinct, fossil fuels, geography, geosphere, hydrosphere, limestone, metabolism, oxygen, petroleum oil, photosynthesis, phytoplankton, respiration, sedimentary, weathering, wetland

Activity Type
- Pick one living thing that has an impact on how the Earth looks or what happens on Earth. Draw a picture of how it does so and write a paragraph to explain the drawing.
- Interactive Activity: My Very Own Compost Pile - make a compost pile to show the decomposition or decay of plants.

Lesson Components
Total Learning Objects – 43
Instruction Pages – 25
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 50 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

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Unit 4: Earth and Human Activity

Unit 4 - Lesson 1: Natural Resources

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS3-1

Common Core Science Objectives
- ESS3.A Natural Resources

Learning Objectives
- to learn about the types and uses of natural resources
- to learn about renewav]ble versus non-renewable natural resources
- to learn about inexhaustible natural resources

Defined Vocabulary Words
- air, atmosphere, cellulose, climate, current, erosion, fossil fuels, gems, humus, hydrosphere, inexhaustible resources, metals, mine, minerals, natural resource, non-renewable resources, renewable resources, soil, weathering, wind

Activity Type
- Sort the resources listed into their correct category.
- Interactive Activity: Homemade Ice Cream – use salt's ability to melt ice in order to make ice cream.

Lesson Components
Total Learning Objects – 48
Instruction Pages – 30
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 40 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 4 - Lesson 2: Natural Hazards

Next Generation Science Standards (NGSS)

- Middle School: MS-ESS3-2

Common Core Science Objectives

- ESS3.B Natural Hazards

Learning Objectives

- to learn about natural hazards, including earthquakes, volcanic eruptions, hurricanes, tornadoes, and coastal erosion

Defined Vocabulary Words

- aftershocks, carbon dioxide, coastal erosion, earthquake, fault, flood, food chain, foreshocks, hurricane, lava, magma, magma chamber, natural hazard, sulfur dioxide, tectonic plates, tornado, tsunami, volcanic ash, volcano

Activity Type

- Answer the questions.
- Interactive Activity: Shoebox Seismograph - build your own seismograph out of a shoebox.

Lesson Components

Total Learning Objects – 39
Instruction Pages – 21
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 40 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 4 - Lesson 3: Human Impacts on Earth Systems

Next Generation Science Standards (NGSS)

- Middle School: MS-ESS3-3, MS-ESS3-4

Common Core Science Objectives

- ESS3.C Human Impacts on Earth Systems

Learning Objectives

- to learn about human impact on the environment
- to learn about water resources
- to learn about pollution
- to learn about conservation

Defined Vocabulary Words

- acid rain, agriculture, biosphere, conservation, ecosystem, emissions, endangered, erosion, extinct, industry, mining, natural resource, overfish, pollution, recycle, reduce, reuse, run-off, sewage, sewage treatment plants, 3 r's

Activity Type

- Match the phrase with the definition.

- Interactive Activity: Affect of Acid Rain on Plants - observe the negative impact acid rain can have on plants.

Lesson Components
Total Learning Objects – 49
Instruction Pages – 31
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 40 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test

Unit 4 - Lesson 4: Global Climate Change

Next Generation Science Standards (NGSS)
- Middle School: MS-ESS3-3, MS-ESS3-4, MS-ESS3-5

Common Core Science Objectives
- ESS3.D Global Climate Change

Learning Objectives
- to learn about global warming and climate change
- to learn about the sources and role of greenhouse gases
- to learn about carbon footprints and how to reduce them

Defined Vocabulary Words
- ash, carbon dioxide, carbon footprint, caulking, climate, conservation, environmental stewardship, fossil fuels, global warming, greenhouse gases, insulating, recycle, reuse

Activity Type
- List 5 things that happen in every day life and describe how they contribute to global warming.
- Interactive Activity: Finding Your Carbon Footprint - will find a carbon footprint calculator on the internet and answer questions to determine your carbon footprint.

Lesson Components
Total Learning Objects – 41
Instruction Pages – 23
Activity Pages - 3
Lesson Quiz Questions – 10 total questions; 5 randomly selected to populate the Lesson Quiz
Unit Test Questions – 40 total questions; 10 total per Lesson of which 3 are randomly selected to populate the Unit Test