

Honors Earth Science

COURSE DESCRIPTION: This challenging course provides students with an honors-level earth science curriculum, focusing on geology, oceanography, astronomy, weather, and climate. The program consists of online lessons, an associated reference book, collaborative activities, and hands-on laboratories students can conduct at home. The course prepares students for advanced studies in geology, meteorology, oceanography, and astronomy courses, and gives them more sophisticated experience in implementing scientific methods. Additional honors assignments include debates, research papers, extended collaborative laboratories, and virtual laboratories.

PREREQUISITES: Middle school Life Science (or equivalent), success in previous science course, and teacher/school counselor recommendation

COURSE LENGTH: Two Semesters

REQUIRED TEXT: Earth Science: A Reference Guide

MATERIALS LIST: No required materials for this course

COURSE OUTLINE:

Semester 1

Unit 1: Earth Science and Systems

- Lesson 1: Earth Science Semester 1 Introduction
- Lesson 2: Why Study Earth Science?
- Lesson 3: Historical Contributions in Earth Science 1
- Lesson 4: Historical Contributions in Earth Science 2
- Lesson 5: Spheres as Earth Systems
- Lesson 6: Laboratory: Topographical Maps
- Lesson 7: Earth Systems and Interactions
- Lesson 8: Laboratory: Modeling Earth Science Processes 1
- Lesson 9: Laboratory: Modeling Earth Science Processes 2
- Lesson 10: Your Choice
- Lesson 11: Unit Test

Unit 2: Dynamic Earth

- Lesson 1: Introduction to Plate Tectonics
- Lesson 2: Pangaea and Continental Drift
- Lesson 3: Moving Plates
- Lesson 4: Plate Boundaries 1
- Lesson 5: Plate Boundaries 2
- Lesson 6: Plate Tectonics: Historical Perspective
- Lesson 7: Where Earthquakes and Volcanoes Occur
- Lesson 8: Structure of Earth's Interior
- Lesson 9: Laboratory: Island Chain Formation
- Lesson 10: How Earthquakes Happen
- Lesson 11: Your Choice
- Lesson 12: Mid-Unit Test
- Lesson 13: Locating Earthquakes
- Lesson 14: Earthquakes and Waves
- Lesson 15: Laboratory: Earthquake Epicenter
- Lesson 16: How Volcanoes Form
- Lesson 17: Volcanic Zones
- Lesson 18: Mountain Building
- Lesson 19: Impact of Geologic Events
- Lesson 20: Unit Test

Unit 3: Composition of the Earth

- Lesson 1: Minerals on Earth
- Lesson 2: Mineral Properties
- Lesson 3: Valuable Minerals
- Lesson 4: Crystal Structures
- Lesson 5: Rocks and Their Mineral Composition
- Lesson 6: Three Kinds of Rocks
- Lesson 7: Laboratory: Rocks and Minerals 1
- Lesson 8: Laboratory: Rocks and Minerals 2
- Lesson 9: Mid-Unit Test
- Lesson 10: Rock Origins 1

- Lesson 11: Rock Origins 2
- Lesson 12: The Rock Cycle
- Lesson 13: Earth Materials Change
- Lesson 14: Weathering and Erosion
- Lesson 15: Land Use and Its Effects
- Lesson 16: Your Choice
- Lesson 17: Unit Test

Unit 4: Geologic History

- Lesson 1: Earth's History
- Lesson 2: Earth's History and Change
- Lesson 3: The Fossil Record
- Lesson 4: Age of Geologic Features
- Lesson 5: Earth's History Written in Rocks
- Lesson 6: Laboratory: Interpreting Geologic History, Day 1
- Lesson 7: Laboratory: Interpreting Geologic History, Day 2
- Lesson 8: Your Choice
- Lesson 9: Unit Test

Unit 5: Earth's Atmosphere

- Lesson 1: Layers in the Atmosphere
- Lesson 2: Composition of the Atmosphere
- Lesson 3: History of Earth's Atmosphere
- Lesson 4: Atmosphere and Life on Earth
- Lesson 5: Laboratory: Barometer 1
- Lesson 6: Laboratory: Barometer 2
- Lesson 7: Mid-Unit Test
- Lesson 8: The Sun and Energy
- Lesson 9: Solar Radiation
- Lesson 10: Temperature and Air Pressure
- Lesson 11: Air Circulation Patterns 1
- Lesson 12: Air Circulation Patterns 2
- Lesson 13: Air Movement and Weather
- Lesson 14: Wind and Human Activity

- Lesson 15: Laboratory: Energy Absorption/Reflection 1
- Lesson 16: Laboratory: Energy Absorption/Reflection 2
- Lesson 17: Your Choice
- Lesson 18: Unit Test

Unit 6: Weather 1

- Lesson 1: What Makes the Weather?
- Lesson 2: Gathering Weather Data
- Lesson 3: Weather Maps
- Lesson 4: Laboratory: Weather Map Interpretation 1
- Lesson 5: Laboratory: Weather Map Interpretation 2
- Lesson 6: Cloud Formation
- Lesson 7: How Storms Develop
- Lesson 8: Determining Level of Risk
- Lesson 9: Preparing for Severe Weather
- Lesson 10: Your Choice
- Lesson 11: Unit Test

Unit 7: Semester 1 Review and Test

- Lesson 1: Semester Review
- Lesson 2: Your Choice
- Lesson 3: Your Choice
- Lesson 4: Semester Test

Semester 2

Unit 1: Weather 2

- Lesson 1: Earth Science Semester 2 Introduction
- Lesson 2: Climate vs. Weather
- Lesson 3: What Influences the Weather?
- Lesson 4: Comparing the Weather
- Lesson 5: Climatic Zones
- Lesson 6: Laboratory: Cloud Formation
- Lesson 7: Laboratory: Relative Humidity
- Lesson 8: Biomes on Earth

- Lesson 9: The Greenhouse Effect
- Lesson 10: Greenhouse Effect Analyses
- Lesson 11: Climate Change
- Lesson 12: Patterns of Climate Change
- Lesson 13: Laboratory: Temperature of Water and Soil 1
- Lesson 14: Laboratory: Temperature of Water and Soil 2
- Lesson 15: Your Choice
- Lesson 16: Unit Test

Unit 2: Oceans

- Lesson 1: Oceans of the World
- Lesson 2: Chemistry of the Oceans
- Lesson 3: Physical Properties of Seawater
- Lesson 4: Ocean Dynamics
- Lesson 5: Laboratory: Ocean Water Density 1
- Lesson 6: Laboratory: Ocean Water Density 2
- Lesson 7: Ocean Currents
- Lesson 8: Mid-Unit Test
- Lesson 9: Ocean Floor
- Lesson 10: Ocean Conditions and Life
- Lesson 11: Marine Life Zones
- Lesson 12: Laboratory: Ocean Floor Sediments 1
- Lesson 13: Laboratory: Ocean Floor Sediments 2
- Lesson 14: Marine Organisms
- Lesson 15: Marine Resources
- Lesson 16: Your Choice
- Lesson 17: Unit Test

Unit 3: Cycles on Earth

- Lesson 1: Biogeochemical Cycles
- Lesson 2: Nitrogen Cycle
- Lesson 3: Carbon Cycle
- Lesson 4: Life and the Carbon Cycle
- Lesson 5: Laboratory: Dissolved Oxygen 1

- Lesson 6: Laboratory: Dissolved Oxygen 2
- Lesson 7: Water Cycle
- Lesson 8: How Humans Alter Cycles
- Lesson 9: Your Choice
- Lesson 10: Unit Test

Unit 4: Astronomy

- Lesson 1: The Sun
- Lesson 2: Solar Phenomena
- Lesson 3: The Earth-Moon-Sun System
- Lesson 4: Laboratory: Solar Energy
- Lesson 5: Solar and Lunar Eclipses
- Lesson 6: The Moon's Influence
- Lesson 7: Earth Movement and Seasons
- Lesson 8: Laboratory: Earth, Moon, Sun Motion
- Lesson 9: Laboratory: Sunrise and Sunset
- Lesson 10: Your Choice
- Lesson 11: Mid-Unit Test
- Lesson 12: Origin of the Solar System
- Lesson 13: Gravitational Forces in the Solar System
- Lesson 14: Features of the Solar System
- Lesson 15: The Planets
- Lesson 16: Planetary Impact
- Lesson 17: Electromagnetic Spectrum
- Lesson 18: Light: A Tool for Astronomy
- Lesson 19: Distances in Space
- Lesson 20: Life Cycle of a Star
- Lesson 21: Color and Brightness of Stars
- Lesson 22: Data about Stars
- Lesson 23: What's a Galaxy?
- Lesson 24: Searching for Objects in Space
- Lesson 25: The Big Bang Theory
- Lesson 26: Your Choice
- Lesson 27: Unit Test

Unit 5: Earth's Resources

- Lesson 1: Earth's Natural Resources
- Lesson 2: Renewable vs. Nonrenewable Resources
- Lesson 3: Mineral Resources
- Lesson 4: Locating Resources
- Lesson 5: Managing Resources
- Lesson 6: Using Resources Wisely
- Lesson 7: Mid-Unit Test
- Lesson 8: Environmental Issues
- Lesson 9: Laboratory: Air Pollution Watch
- Lesson 10: Water Resources
- Lesson 11: Humans and the Environment
- Lesson 12: Conservation
- Lesson 13: Population Growth
- Lesson 14: Population Changes
- Lesson 15: Your Choice
- Lesson 16: Unit Test

Unit 6: Semester 2 Assessment

- Lesson 1: Semester Review
- Lesson 2: Your Choice
- Lesson 3: Your Choice
- Lesson 4: Semester Test

Unit 7: Honors Project 1: Weather Website

- Lesson 1: Weather Website

Unit 8: Honors Project 2: Issues in Science: Online Debate

- Lesson 1: Semester Review
- Lesson 2: Your Choice
- Lesson 3: Your Choice
- Lesson 4: Semester Test
- Lesson 5: Debates: A Different Way to Argue

- Lesson 6: Gathering Evidence
- Lesson 7: Building a Case
- Lesson 8: Reasoning and Refutation
- Lesson 9: Effective Debating Strategies
- Lesson 10: Debate: Constructive Argument
- Lesson 11: Debate: First Rebuttal
- Lesson 12: Debate: Second Rebuttal
- Lesson 13: Debate: Summary Argument
- Lesson 14: Discuss: Issues in Science Online Debate