

Comprehensive Earth Science

COURSE DESCRIPTION: This course provides students with a comprehensive earth science curriculum, focusing on geology, oceanography, astronomy, weather, and climate. The program consists of in-depth online lessons, an associated reference book, collaborative activities, virtual laboratories, and hands-on laboratories students can conduct at home. The course prepares students for further studies in geology, meteorology, oceanography, and astronomy courses, and gives them practical experience in implementing scientific methods.

PREREQUISITES: Middle school Life Science, or equivalent

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

- Semester Introduction
- Why Study Earth Science?
- Historical Contributions in Earth Science 1
- Historical Contributions in Earth Science 2
- Spheres as Earth Systems
- Laboratory: Topographical Maps
- Earth Systems and Interactions
- Laboratory: Modeling Earth Science Processes 1
- Laboratory: Modeling Earth Science Processes 2

Unit 2: Dynamic Earth

- Introduction to Plate Tectonics
- Pangaea and Continental Drift
- Moving Plates

- Plate Boundaries 1
- Plate Boundaries 2
- Plate Tectonics: Historical Perspective
- Where Earthquakes and Volcanoes Occur
- Structure of Earth's Interior
- Laboratory: Island Chain Formation
- How Earthquakes Happen
- Locating Earthquakes
- Earthquakes and Waves
- Laboratory: Earthquake Epicenter
- How Volcanoes Form
- Volcanic Zones
- Mountain Building
- Impact of Geologic Events

Unit 3: Composition of the Earth

- Minerals on Earth
- Mineral Properties
- Valuable Minerals
- Crystal Structures
- Rocks and Their Mineral Composition
- Three Kinds of Rocks
- Laboratory: Rocks and Minerals 1
- Laboratory: Rocks and Minerals 2
- Rock Origins 1
- Rock Origins 2
- The Rock Cycle
- Earth Materials Change
- Weathering and Erosion
- Land Use and Its Effects

Unit 4: Geological History

- Earth's History
- Earth's History and Change

- The Fossil Record
- Age of Geologic Features
- Earth's History Written in Rocks
- Laboratory: Interpreting Geologic History, Day 1
- Laboratory: Interpreting Geologic History, Day 2

Unit 5: Earth's Atmosphere

- Layers in the Atmosphere
- Composition of the Atmosphere
- History of the Earth's Atmosphere
- Laboratory: Barometer 1
- Laboratory: Barometer 2
- The Sun and Energy
- Solar Radiation
- Temperature and Air Pressure
- Air Circulation Patterns 1
- Air Circulation Patterns 2
- Air Movement and Weather
- Wind and Human Activity
- Laboratory: Energy Absorption/Reflection 1
- Laboratory: Energy Absorption/Reflection 2

Unit 6: Weather 1

- Gathering Weather Data
- Weather Maps
- Laboratory: Weather Map Interpretation 1
- Laboratory: Weather Map Interpretation 2
- Cloud Formation
- How Storms Develop
- Determining Level of Risk
- Preparing for Severe Weather

Unit 7: Semester Review and Test

- Semester Review

- Semester Test

Semester 2

Unit 1: Weather 2

- Semester Introduction
- Climate vs. Weather
- What Influences the Weather?
- Comparing the Weather
- Laboratory: Cloud Formation
- Laboratory: Relative Humidity
- Biomes on Earth
- The Greenhouse Effect
- Greenhouse Effect Analyses
- Climate Change
- Patterns of Climate Change
- Laboratory: Temperature of Water and Soil 1
- Laboratory: Temperature of Water and Soil 2

Unit 2: Oceans

- Oceans of the World
- Chemistry of the Oceans
- Physical Properties of Seawater
- Ocean Dynamics
- Laboratory: Ocean Water Density 1
- Laboratory: Ocean Water Density 2
- Ocean Currents
- Ocean Floor
- Ocean Conditions and Life
- Marine Life Zones
- Laboratory: Ocean Floor Sediments 1
- Laboratory: Ocean Floor Sediments 2
- Marine Organisms
- Marine Resources

Unit 3: Cycles on Earth

- Biogeochemical Cycles
- Nitrogen Cycle
- Carbon Cycle
- Life and the Carbon Cycle
- Laboratory: Dissolved Oxygen 1
- Laboratory: Dissolved Oxygen 2
- Water Cycle
- How Humans Alter Cycles

Unit 4: Astronomy

- The Sun
- Solar Phenomena
- The Earth–Moon–Sun System
- Laboratory: Solar Energy
- Solar and Lunar Eclipses
- The Moon's Influence
- Earth Movement and Seasons
- Laboratory: Earth, Moon, Sun Motion
- Laboratory: Sunrise and Sunset
- Origin of the Solar System
- Gravitational Forces in the Solar System
- Features of the Solar System
- The Planets
- Planetary Impact
- Electromagnetic Spectrum
- Light: A Tool for Astronomy
- Distances in Space
- Life Cycle of a Star
- Color and Brightness of Stars
- Data about Stars
- What's a Galaxy?
- Searching for Objects in Space
- The Big Bang Theory

Unit 5: Earth's Resources

- Earth's Natural Resources
- Renewable vs. Nonrenewable Resources
- Mineral Resources
- Locating Resources
- Managing Resources
- Using Resources Wisely
- Environmental Issues
- Laboratory: Air Pollution Watch
- Water Resources
- Humans and the Environment
- Conservation
- Population Growth
- Population Changes

Unit 6: Semester Review and Test

- Semester Review
- Semester Test