

Earth & Space Science, Part 2

Course Outline & Objectives

Course Description:

In Earth and Space Science Part 2, students investigate Earth's interconnected systems and the processes that influence our planet's climate, resources, and environment. Students explore the hydrosphere, cryosphere, and atmosphere, examining topics such as the water cycle, oceans, weather patterns, climate systems, and climate change. The course also investigates renewable and nonrenewable resources, human impacts on ecosystems, pollution, biodiversity loss, and sustainability. Finally, students examine natural hazards including hurricanes, floods, earthquakes, volcanoes, and wildfires, while evaluating strategies used to reduce risk and protect communities. Through scientific inquiry, data analysis, and real-world applications, students develop a deeper understanding of the complex interactions between Earth's systems and human activity.

Credits - One Semester (0.5 Carnegie unit / CA: 5 credits)

Course Outline

Unit 1: The Hydrosphere and Cryosphere

- 1.1 Properties of Water
- 1.2 The Water Cycle
- 1.3 Earth's Oceans
- 1.4 Freshwater Resources
- 1.5 Glaciers and Permafrost

Next Generation Science Standards (NGSS)

In Unit 1 students will:

Investigate the unique properties of water and how they support life on Earth.
Explore the water cycle and the processes that move water between Earth's systems.
Examine the structure and importance of Earth's oceans and their influence on climate and ecosystems.
Learn about freshwater resources, their distribution, and the challenges involved in managing them sustainably.
Understand the formation and significance of glaciers and permafrost, and how they are affected by environmental change.

[HS-ESS2-2, HS-ESS2-5]

Unit 2: Atmosphere & Weather

- 2.1 Earth's Early Atmosphere
- 2.2 Earth's Current Atmosphere
- 2.3 Weather Patterns
- 2.4 El Niño Southern Oscillation
- 2.5 Weather vs. Climate

In Unit 2 students will:

Explore how Earth's atmosphere formed and changed over time.
Examine the composition and structure of the modern atmosphere and the role of its different layers.
Investigate the processes that create weather patterns and influence local and global weather conditions.
Learn how the El Niño-Southern Oscillation affects weather and climate around the world.
Distinguish between weather and climate and explain how scientists study each.

[HS-ESS2-2, HS-ESS2-4, HS-ESS2-7]

Course Outline

Unit 3: Climate Systems and Climate Change

- 3.1 The Greenhouse Effect
- 3.2 Natural Climate Change
- 3.3 Anthropogenic Climate Change
- 3.4 Impacts of Climate Change
- 3.5 Climate Change Mitigation
- 3.6 The Carbon Cycle

Unit 4: Earth Resources & Human Impact

- 4.1 Nonrenewable Resources
- 4.2 Renewable Resources
- 4.3 Habitat Destruction
- 4.4 Mass Extinctions
- 4.5 Pollution

Unit 5: Natural Hazards & Earth System Interactions

- 5.1 Atmospheric Hazards
- 5.2 Hydrosphere-Related Hazards
- 5.3 Geological Hazards
- 5.4 Wildfires
- 5.5 Environmental Legislation

Next Generation Science Standards (NGSS)

In Unit 3 students will:

Understand how the greenhouse effect helps regulate Earth's temperature.
Examine natural factors that have caused climate change throughout Earth's history.
Investigate the evidence for anthropogenic climate change and the role of greenhouse gas emissions.
Analyze the environmental, economic, and societal impacts of climate change.
Explore strategies for mitigating climate change and reducing human impacts on the climate system.
Trace the movement of carbon through Earth's systems and explain the importance of the carbon cycle.

[HS-ESS2-4, HS-ESS2-6, HS-ESS3-4]

In Unit 4 students will:

Compare nonrenewable resources and evaluate the benefits and challenges associated with their use.
Explore renewable resources and how they can contribute to a more sustainable future.
Investigate how habitat destruction affects ecosystems, biodiversity, and the survival of species.
Examine the causes and consequences of species extinction and mass extinction events.
Analyze different forms of pollution and their impacts on environmental and human health.

[HS-ESS3-1, HS-ESS3-4, HS-ESS3-6]

In Unit 5 students will:

Explore atmospheric hazards such as hurricanes, tornadoes, and heat waves, and their impacts on people and the environment.
Investigate hydrosphere-related hazards including tsunamis and floods, and the conditions that cause them.
Examine geological hazards such as earthquakes, volcanic eruptions, and landslides.
Understand how wildfires develop, the factors that influence their spread, and their effects on ecosystems and communities.
Analyze how environmental legislation and public policy can help address environmental challenges and reduce risks to people and ecosystems.

[HS-ESS2-1, HS-ESS3-1, HS-ESS3-4, HS-ESS3-6]