

## Environmental Science – HS

**COURSE DESCRIPTION:** This course surveys key topic areas including the application of scientific process to environmental analysis; ecology; energy flow; ecological structures; earth systems; and atmospheric, land, and water science. Topics also include the management of natural resources and analysis of private and governmental decisions involving the environment. Students explore actual case studies and conduct five hands-on, unit-long research activities, learning that political and private decisions about the environment and the use of resources require accurate application of scientific processes, including proper data collection and responsible conclusions.

**PREREQUISITES:** Success in previous high school science course and a teacher/counselor recommendation

**COURSE LENGTH:** One Semester

**REQUIRED TEXT:** No required textbook for this course.

### **MATERIALS LIST:**

Common household materials for labs

NOTE: List subject to change

### **COURSE OUTLINE:**

#### **Module 1: In the Beginning**

##### **Unit 1: Learning the Basic**

- Lesson 1: Identifying Main Environmental Factors
- Students will consider what makes up the environment, learn the main factors that are needed to understand the environment in a logical manner, and realize the importance of the human factor on the environment.
- Lesson 2: The Scientific Method
- Students will learn one method of scientific problem solving, discover the steps of the scientific method, and experiment with the scientific method.
- Lesson 3: Environmental Specialists
- Students will learn about the many types of specific specialists and identify which scientists work in various environments.
- Lesson 4: Observation and Record Keeping - Past and Present

- Students will explore how different civilizations have recorded the environments around them through the centuries, learn how environmental scientists record their observations, and discover ways that they can record information about the environment.
- Lesson 5: Historic Environmental Accidents and Scientific Methods
- Students will discover the challenges scientists face when emergencies occur and realize the effects of accidental contamination on the environment.

### **Unit 2: Starting Off Small**

- Lesson 1: Biotic versus Abiotic
- Students will define and differentiate abiotic and biotic and learn the basic differences between biotic and abiotic objects.
- Lesson 2: Earth Divisions
- Students will study the divisions of the Earth and their locations, and see how each division contributes to the environment.
- Lesson 3: Hierarchy of Biology
- Students will discover the way life is organized from the tiniest parts of an organism to the largest forms of life and explore the importance of listing and classifying organisms

### **Unit 3: Group Behavior**

- Lesson 1: Population versus Community
- Students will gain a better understanding of the differences between population and community, and learn the names of various groups of animals.
- Lesson 2: Biodiversity
- Students will explore how life forms adapt to their surroundings, discover how diverse organisms can be, and learn about Charles Darwin and his theory of natural selection.

## **Module 2: Changes in the Earth's Processes**

### **Unit 1: Pollution and Environmental Invaders**

- Lesson 1: Domestic vs. Wild
- Students will explore the differences between domestic and wild plants and animals, discover how domestication has improved the way humans live, and consider the concept of selective breeding.
- Lesson 2: Environmental Invaders

- Students will learn about the delicate balance between organisms and their surroundings, consider the introduction of new life forms in America and how they affect the already existing populations, and explore the ways of controlling the effects of new organisms in a community.
- Lesson 3: The Water Cycles
- Students will discover the stages of the water cycle and explore how water and the various stages of the water cycle impact everyday life.
- Lesson 4: Acid Rain
- Students will learn where acid rain comes from, discover how acid rain affects the environment, and consider ways to prevent acid rain in the future.
- Lesson 5: Ground Water Pollution
- Students will examine sources of ground pollution, explore the importance of ground water and fresh water, and consider how the water we drink is affected by pollution. [Item]

## **Unit 2: The Carbon Cycle**

- Lesson 1: The Carbon Cycle
- Students will learn about the carbon cycle – how carbon is circulated through the environment, discover how carbon relates to people, plants, and animals, and explore the processes in plants and animals that use carbon.
- Lesson 2: The "Greenhouse Effect" And Global Warming
- Students will gain a better understanding of how the carbon cycle is affected by pollution, discover the role carbon plays in both good and harmful processes on Earth, and consider the concepts of global warming and the "greenhouse effect."
- Lesson 3: Air Pollution
- Students will explore how air pollution is affecting every part of the globe, discover the main air pollution issues, and consider ways to improve air quality.

## **Unit 3: The Food Chain**

- Lesson 1: The Food Chain
- Students will learn about the food chain, discover how nature dictates food choices, and understand the importance of the food chain.
- Lesson 2: Food Chain Pollution
- Students will discover how the food chain is affected by pollution, examine the difficulties of repairing damage to the food chain, and realize how invader species can affect the food chain.

## **Module 3: Become an Activist!**

### **Unit 1: The Government**

- Lesson 1: Policies and Agencies
- Students will learn about the departments and agencies that the United States has established to monitor specific issues in the environment, and discover how the different agencies overlap focus on issues and work together to find solutions to problems in the environment.
- Lesson 2: Recent Policy Changes and Energy Issues
- Students will explore the government's new energy legislation and what it means for individuals and companies, consider the supply and demand of energy, and discover the advantages and disadvantages of the new laws.
- Lesson 3: Local Environmental Agencies
- Students will learn about the Environmental Protection Agency and how it works to make the environment clean and safe, explore the laws that the EPA has developed to prevent further harm to the environment, and discover how local government works with the EPA to regulate pollution in cities and towns.
- Lesson 4: International Environmental Concerns
- Students will discover environmental problems that affect the planet and its species, explore how deforestation creates even greater problems with global warming, and consider the efforts some make to clean up the environment and the lack of effort by others.

### **Unit 2: Them and Us**

- Lesson 1: Environmental Groups and Regulatory Violations
- Students will discover various environmental groups that work to improve the environment and explore how environmental groups take different approaches to pollution and its control.
- Lesson 2: Planning Conservation
- Students will discover the ways people are saving energy in their homes and consider how older homes can be more energy efficient.

### **Unit 3: Waste Not, Want Not**

- Lesson 1: Waste Management
- Students will learn about the entire process of waste management and explore the different classes of waste processing.
- Lesson 2: Composting
- Students will learn about the process of composting biodegradable materials and discover the benefits of composting and how it can help reduce waste in landfills.

- Lesson 3: Space Waste
- Students will discover the growing problems faced by waste in space, realize the damage space waste can cause, and explore methods of cleaning up space waste.

#### **Unit 4: Beep! Beep!**

- Lesson 1: Transportation Challenges
- Students will discover the importance of the trucking industry, consider ways to make trucking transportation safer, and learn about the laws that govern the trucking industry.

### **Module 4: This Land Is Your Land**

#### **Unit 1: Zap!]**

- Lesson 1: Standard Electric Energy Production Methods
- Students will discover the basic theory of generating electricity, explore different ways to generate electricity, and consider ways power plants can harm the environment.
- Lesson 2: New Energy Production Methods
- Students will explore new designs for safely producing power and discover how energy sources are harnessed to produce power.
- Lesson 3: Fuel Production and Transport Problems
- Students will discover the basic steps of oil production and explore the ways the environment may be affected by oil drilling.

#### **Unit 2: Old McDonald Had a Farm...E-I-E-I-O!**

- Lesson 1: United States Agriculture
- Students will explore the world's need for farmers, discover the many diverse crops grown in the United States, understand why farmland is being sold and developed into new homes and businesses, and consider the need to preserve our nation's farmlands.
- Lesson 2: Modern Agriculture and New Technology
- Students will learn about new technology in agriculture, discover how these technologies are helping and hurting today's farmers, and explore what can be done to help American farmers keep their land.
- Lesson 3: Less Pesticides and More IPM
- Students will discover integrated pest management techniques and explore how using IPM can help save crops in an environmentally-friendly way.

#### **Unit 3: Not Just a Sheep That Resembles David Letterman**

- Lesson 1: Genetically Modified Organisms (GMOs)
- Students will compare and consider the pros and cons of genetically altering foods, discover how GMOs are helping to improve the products we buy, and explore ways GMOs are helping doctors cure diseases.
- Lesson 2: Grazing and Public Land Management
- Students will learn about how the Bureau of Land Management regulates land under its control, explore the reintroduction of wild species into national parks and the impact it has on the existing species, and discover the Acts of Congress that protect federal land and the animals living there.

#### **Unit 4: A Corny Way of Fueling Your Monster Truck**

- Lesson 1: New Environmental Uses of Corn
- Students will discover why corn is the most important crop in the United States and across the globe, explore the many uses of corn from food to blankets, and learn about a more efficient fuel made from corn.
- Lesson 2: It's All Up to You!
- Students will review the keywords from this course, recap the main ideas of this course, and consider their role in protecting and preserving the Earth.