

# AP Environmental Science Course Syllabus

**Text:** *Environmental Science: A Study of Interrelationships*, Eldon D. Enger and Bradley F. Smith; 9th Ed. McGraw-Hill.

## Course Overview:

This course meets for 45 minutes each day, five days a week for 180 days. AP Environmental Science is open to juniors and seniors that have maintained at least a B average in chemistry and biology and have a recommendation from their current science teacher. Course enrollment is between 10 and 20 students in class.

AP Environmental Science is a college-level, introductory environmental science course which follows the course description and the objectives set forth by the College Board. This course will provide students with an understanding of how the natural world works, the interrelationships living things have with each other and with their environment, and how to identify environmental problems, natural and human-made. This course will also discuss legislation, both national and international, which is designed to protect the environment.

The school campus sits on a 400-acre site with 200 acres for the school itself and 200 acres set aside as a nature preserve and educational area named Eden. Eden is a mixed hardwood forest with three ponds, a 36-acre pond, and 11-acre pond with tupelo gum and cypress trees and an 18-acre pond that is the center of our educational area. The 18-acre pond has outdoor amphitheater seating, a dock and observation deck overlooking the pond. We also have trails around the two larger ponds with interpretive signs that the AP Environmental Science class updates and replaces regularly.

The lab component of this course includes student designed activities as well as laboratory activities drawn from the following sources: Enger and Smith, *Field and Laboratory Exercises in Environmental Science*; Prentice-Hall, *Biology Laboratory Manual*; Addison-Wesley, *Biology Laboratory Manual*; *Project Wild Activity Guide*; and *Project Learning Tree Activity Guide*. All laboratory activities require a completed lab report at the conclusion of each activity. The class also participates in at least one ongoing field activity involving weekly pond level measurements and rain gauge readings. Findings and Conclusions are submitted in four quarterly reports.

## Evaluation:

The course is evaluated in three weighted categories. Tests, which are given for each chapter, make up 50% of the student's grade. Laboratory and field activities account for 35% of the student's grade, and homework is 15% of the grade.

## AP Exam:

All students enrolled in AP Environmental Science are expected to take the AP Exam in May.

## **Course Content:**

### **Unit I - Interrelatedness**

#### **Chapter 1 - Environmental Relationships (1 week)**

In this chapter students will define environmental science and learn the ecosystem approach to environmental organization. The major regions of North America will be discussed along with the concept of sustainable development.

#### **Chapter 2 - Environmental Ethics (1 week)**

The students will learn the difference between ethics and morals with emphasis on the different environmental ethics. Several significant naturalists/philosophers will be discussed. Environmental justice and the concept of profitability and how they direct the decision-making process will also be discussed.

#### **Chapter 3 - Risk & Cost: Elements of Decision Making (2 weeks)**

Risk assessment and management will be learned with emphasis on costs versus benefits. Students will be able to identify external costs.

### **Unit II - Ecological Principles & Their Applications**

#### **Chapter 4 - Interrelated Scientific Principles: Matter, Energy & Environment (1 week)**

Students will review the scientific problem-solving method, basic chemistry, concepts of molecular structure, pH and the difference between organic and inorganic compounds. Students will discuss photosynthesis, cellular respiration, matter and energy.

#### **Chapter 5 - Interactions: Environments and Organisms (2 weeks)**

Students will learn to distinguish between population and species, habitat and niche, community and ecosystem. They will be able to discuss limiting factors and natural selection. Symbiotic relationships among and between species will be discussed (predation, competition, parasitism, commensalism and mutualism). Students will learn about energy flow and will learn several nutrient cycles.

#### **Chapter 6 - Kinds of Ecosystems and Communities (2 weeks)**

In Chapter 6 students will learn about aquatic and terrestrial succession. They will learn the difference between primary and secondary succession, and they will learn the major biomes of the world.

#### **Chapter 7 - Population Principles (1.5 weeks)**

Population growth curves, age distribution and carrying capacity will be discussed in the chapter. Natality and mortality as well as calculating doubling times will also be covered. Students will be able to distinguish between K-strategists and r-strategists.

### **Chapter 8 - Human Population Issues (2 weeks)**

Students will discuss how density affects humans' standard of living and factors affecting human fertility worldwide. Students will also anticipate changes that may occur in the population of the United States.

## **Unit III - Energy**

### **Chapter 9 - Energy and Civilization: Patterns of Consumption (1.5 weeks)**

Students will learn the history of energy consumption by humans, particularly fossil fuels. Energy use, economics and energy trends will be discussed. Students will learn about gasoline supply and demand. During this chapter, students will calculate energy consumption given basic information.

### **Chapter 10 - Energy Sources (2 weeks)**

Students will study a variety of renewable energy sources including hydroelectric, geothermal, wind, solar, biomass conversion, fuel wood and solid waste. Students will revisit fossil fuels and discuss the benefits of conservation.

### **Chapter 11 - Nuclear Energy: Benefits and Risks (2 weeks)**

Students will learn about the different types of nuclear reactors and the nuclear fuel cycle. Nuclear waste and its effects on human health will be discussed. Thermal pollution and nuclear safety will also be covered.

\*\*\*\*\*End of First Semester\*\*\*\*\*

## **Unit IV - Human Influences on Ecosystems**

### **Chapter 12 - Human Impact on Resources and Ecosystems (2 weeks)**

Natural resources, renewable and non-renewable, mineral and forest resources will be covered. Pollution and extinction will be discussed as well as aquaculture, harvesting forest products and rangeland use.

### **Chapter 13 - Land Use Planning (2 weeks)**

In this chapter students will learn about urbanization, urban and suburban sprawl and problems associated with urban growth. Wetlands and flood zones will be discussed as well as the role of the government in land use planning.

### **Chapter 14 - Soil and Its Uses (2 weeks)**

Students will learn about the geologic processes that form soil, weathering and soil properties. Students will be able to describe a soil profile and methods of soil conservation.

### **Chapter 15 - Agricultural Methods and Pest Management (2 weeks)**

The green revolution and different agricultural techniques will be discussed, as well as different types of fertilizers. Pesticides and related topics of persistence, resistance,

bioaccumulation, biomagnification, target and non-target organisms and alternatives to pesticides will be covered along with human health issues associated with pesticides.

**Chapter 16 - Water Management (2 weeks)**

In chapter 16 students will learn the hydrologic cycle and different types of water use (domestic, agricultural, industrial and in-stream), water pollution, thermal pollution, salination, BOD and wastewater treatment.

**Unit V: Pollution and Policy**

**Chapter 17 - Air Quality Issues (2 weeks)**

Students will learn about the Clean Air Act, air pollutants, global warming, ozone depletion and climate change. Students will also learn about indoor air pollution.

**Chapter 18 - Solid Waste Management and Disposal (1.5 weeks)**

Solid waste will be defined and methods of waste disposal will be discussed. Municipal solid waste issues, landfills, and incineration will be covered as well as composting and other methods of recycling.

**Chapter 19 - Regulating Hazardous Materials (1.5 weeks)**

Students will learn the different categories of toxic materials, synergism and regulations regarding them. Environmental and human health risks will be discussed along with waste disposal, waste management, accident prevention and international trade.

**Chapter 20 - Environmental Policy and Decision Making**

Students will discuss current and future environmental policies and regulation--both domestic and international--as well as green politics and environmental terrorism.

## Lab Activities

No.	Name of Lab	# of Periods
1	Pond Level Measurement (Yearlong lab - initial research and weekly measurements with 2 quarterly reports)	3
2	Science and the Scientific Method	1
3	Data Gathering and Graphic Labs	2
4	Seine in pond - Importance of TED's (turtle excluder device)	1
5	Determining pH of Pond Water	1
6	Habitat and Niche	1
7	Organisms in Lake/Pond Ecosystem	2
8	Species Distribution - Hardwood Trees	2
9	Is Your Campus Friendly to Wildlife?	2
10	Human Population Dynamics (Growth Rates/Doubling Time)	1
11	Personal Energy Consumption	1
12	Effectiveness of Insulation	2
13	Temperature and Fish Respiration	1
	*****2nd Semester*****	
14	Pond Level Measurement (Continue yearlong lab - weekly measurement with quarterly reports 3rd & 4th quarters)	3
15	Seed Germination - over 2 weeks - daily observation in classroom	2
16	pH (Acid Rain) and Plant Germination (concurrent with above)	1
17	Eco-Enrichment - Earthworms and Composting - (daily observations over 2-3 weeks)	2
18	Air Pollution - Pollen levels	2
19	Land Use Planning - Designing a Shopping Center	2
20	Non-Pesticide Control of Fire Ants - research and implementation	2
21	Pond Water Lab - BOD	2
22	Soil Compaction Lab	1
23	How Oil Spills Affect Birds	1