

## AP Environmental Science (APES)

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### **Goals of the Course**

The AP Environmental Science course is a full-year course designed to be the equivalent of a one-semester, introductory college course in environmental science. The goal of the AP Environmental Science course is to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them.

Environmental science is interdisciplinary; it embraces a wide variety of topics from different areas of study. Yet there are several major unifying constructs, or themes, that cut across the many topics included in the study of environmental science. The following themes provide a foundation for the structure of the AP Environmental Science course.

1. Science is a process.
  - Science is a method of learning more about the world.
  - Science constantly changes the way we understand the world.
2. Energy conversions underlie all ecological processes.
  - Energy cannot be created; it must come from somewhere.
  - As energy flows through systems, at each step more of it becomes unusable.
3. The Earth itself is one interconnected system.
  - Natural systems change over time and space.
  - Biogeochemical systems vary in ability to recover from disturbances.
4. Humans alter natural systems.
  - Humans have had an impact on the environment for millions of years.
  - Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment.
5. Environmental problems have a cultural and social context.
  - Understanding the role of cultural, social and economic factors is vital to the development of solutions.
6. Human survival depends on developing practices that will achieve sustainable systems.
  - A suitable combination of conservation and development is required.
  - Management of common resources is essential.

### **Course Mechanics**

The APES course consists of lectures and discussions of the required reading from the textbook. Assignments include chapter tests multiple choice questions, free-response questions, measuring your impact problems, short class presentations, laboratory write-ups, movie notes, and midterm examinations. The College Board requires APES course to include assignments such as field studies, data collection, conservation projects etc. therefore **field trips**, as determined by bus availability and administrative permission, will be **required as well as 8 hours of fieldwork/stewardship outside of regular class time**. Some are already listed and as more after school/weekend field study opportunities arise they'll be presented. APES students are required to keep a three-ring binder with all of their work neatly organized.

### Required Textbook\*

Friedland and Relyea: **Environmental Science for AP**, 2012 \*Textbook should be brought to class daily unless notified otherwise.

### APES Dropbox

Much of the APES content and resources are uploaded to Dropbox for all students and parents to access for additional help or access during times of absence and is reached through <http://tinyurl.com/pirateapes>

### AP Environmental Science Exam

Student who enroll in an AP course are expected to take their AP Environmental Science exam on Monday, May 6<sup>th</sup>, 2019. Those needing financial aid for the exam may apply for it. Students taking the exam will want to purchase and study from an APES test prep book. There are several test prep books to choose from. Go on-line, read reviews and choose one you will actually utilize.

\*The **Environmental Science for AP** textbook focuses mostly on national and international environmental issues. We will also consistently go "beyond the textbook" to focus on important state and local issues throughout the course.

| <i>AP Topic Outline</i>                                    | <i>Friedland and Relyea: <b>Environmental Science</b></i>              |
|--|--|
| <b>for AP</b>  |  |
| <b>I. Earth Systems and Resources (10 - 15% = 4 weeks)</b> |  |
| A. Earth Science Concepts<br>Earth                         | Chapter 1 Studying the State of our<br>Chapter 2 Environmental Systems |
| B. The Atmosphere  | Chapter 3 Ecosystem Ecology<br>Chapter 4 Global Climates and Biomes    |
| C. Global Water Resources and Use                          | Chapter 9 Water Resources  |
| D. Soil and Soil Dynamics                                  | Chapter 8 Earth Systems  |
| <b>II. The Living World (10 - 15% = 4 weeks)</b>           |  |
| A. Ecosystem Structure                                     | Chapter 3 Ecosystem Ecology<br>Chapter 5 Evolution of Biodiversity     |
| B. Energy Flow   | Chapter 3 Ecosystem Ecology  |

|   |  |
|---|--|
| C. Ecosystem Diversity  | Chapter 6 Population and Community Ecology   |
| D. Natural Ecosystem Change                                     | Chapter 3 Ecosystem Ecology<br>Chapter 5 Evolution of Biodiversity   |
| E. Natural Biogeochemical Cycles                                | Chapter 3 Ecosystem Ecology<br>Chapter 4 Global Climates and Biomes  |
| <b>III. Population (10 - 15% = 4 weeks)</b>                     |  |
| A. Population Biology Concepts                                  | Chapter 6 Population and Community Ecology   |
| B. Human Population   | Chapter 7 The Human Population   |
| <b>IV. Land and Water Use (10 - 15% = 4 weeks)</b>              |  |
| A. Agriculture  | Chapter 10 Land, Public and Private<br>Chapter 11 Feeding the World  |
| B. Forestry   | Chapter 10 Land, Public and Private  |
| C. Rangelands   | Chapter 10 Land, Public and Private  |
| D. Other Land Use   | Chapter 10 Land, Public and Private  |
| E. Mining   | Chapter 8 Earth Systems  |
| F. Fishing  | Chapter 11 Feeding the World   |
| G. Global Economics<br>Equity                                   | Chapter 20 Sustainability, Economics, and<br>Equity  |
| <b>V. Energy Resources and Consumption (10 - 15% = 4 weeks)</b> |  |
| A. Energy Concepts  | Chapter 12 Nonrenewable Energy Sources   |
| B. Energy Consumption   | Chapter 12 Nonrenewable Energy Sources   |
| C. Fossil Fuel Resources and Use<br>Sources                     | Chapter 12 Nonrenewable Energy   |
| D. Nuclear Energy<br>Sources                                    | Chapter 12 Nonrenewable Energy   |
| E. Hydroelectric Power  | Chapter 12 Nonrenewable Energy Sources   |
| F. Energy Conservation  | Chapter 13 Achieving Energy Sustainability   |
| G. Renewable Energy   | Chapter 13 Achieving Energy Sustainability   |
| <b>VI. Pollution (25 - 30% = 8 weeks)</b>                       |  |
| A. Pollution Types  | Chapter 14 Water Pollution<br>Chapter 15 Air Pollution and Stratospheric Ozone<br>Depletion<br>Chapter 16 Waste Generation and Waste<br>Disposal |
| B. Impacts on the Environment and Human Health                  | Chapter 14 Water Pollution<br>Chapter 15 Air Pollution and Stratospheric Ozone<br>Depletion<br>Chapter 16 Waste Generation and Waste<br>Disposal |

C. Economic Impacts

Chapter 17 Human Health and Environmental Risks

Chapter 14 Water Pollution

Chapter 15 Air Pollution and Stratospheric Ozone Depletion

Chapter 16 Waste Generation and Waste Disposal

**VII. Global Change (10 - 15% = 4 weeks)**

A. Stratospheric Ozone Depletion

Chapter 15 Air Pollution and Stratospheric Ozone

B. Global Warming

Chapter 19 Global Change

C. Loss of Biodiversity

Chapter 18 Conservation of Biodiversity

**Chapter 1: Studying the State of our Earth**

(15) Checkpoint Qs Video: *National Geographic's 7 Billion*

"Do the Math" p. 11: *Rates of Forest Clearing*

Free-Response Qs 1 and 2 p. 24

"Measuring Your Impact" p. 25: *Exploring Your Footprint* ([www.footprintnetwork.org](http://www.footprintnetwork.org))

**Lab Investigation:** *Seed Germination Lab*

**Chapter 2: Environmental Systems**

(16) Checkpoint Qs

"Do the Math" p. 38: *Calculating Energy Use and Converting Units*, and p. 44: *The Mystery of the Missing Salt*

Free-Response Qs 1 and 2 p. 51

"Measuring Your Impact" p. 51: *Bottled Water versus Tap Water*

**Lab Investigation:** *Taste Test: Bottled Water versus Tap Water*

**Chapter 3: Ecosystem Ecology**

(15) Checkpoint Qs

"Do the Math" p. 78: *Raising Mangoes*

Free-Response Qs 1 and 2 p. 84

"Measuring Your Impact" p. 84: *Atmospheric Carbon Dioxide*

**Lab Investigation:** *Mark and Recapture Lab, Primary Productivity and Energy Flow Kit, Biogeochemical Cycles Lab*

**Chapter 4: Global Climates and Biomes**

(9) Checkpoint Qs

Free-Response Qs 1 and 2 p. 116 **Stewardship: California Coastal Cleanup Sept. 15**

"Measuring Your Impact" p. 116: *How Much Paper Do You Use?*

**Lab Investigation:** *Hotspots Lab* <http://www.cepf.net/resources/hotspots/Pages/default.aspx>  
*Turbidity Tube*

**Chapter 5: Evolution of Biodiversity**

(12) Checkpoint Qs

"Do the Math" p. 124: *Measuring Species Diversity*

Free-Response Qs 1 and 2 p. 142

"Measuring Your Impact" p. 143: *The True Cost of a Green Lawn*

**Lab Investigation:** *Quadrat Analysis*

## Chapter 6: Population and Community Ecology

(18) Checkpoint Qs

"Do the Math" p. 156: *Calculating Exponential Growth*

Free-Response Qs 1 and 2 p. 176

"Measuring Your Impact" p. 177: *The Living Planet Index*

**Lab Investigation:** *Determining Population Size, Population Growth Kit*

## Chapter 7: The Human Population

(15) Checkpoint Qs Videos: *Paul Ehrlich and the Population Bomb; Race to Save the Planet; How Mr. Condom made Thailand a better place (TED Talk)*

"Do the Math" p. 187: *Calculating Population Growth*

Free-Response Qs 1 and 2 p. 200

"Measuring Your Impact" p. 201: *National Footprints*

**Lab Investigation:** *Food for Thought* [https://www.populationeducation.org/sites/default/files/food\\_for\\_thought.pdf](https://www.populationeducation.org/sites/default/files/food_for_thought.pdf)

## Chapter 8: Earth Systems

(15) Checkpoint Qs Video: *Dirt! The Movie, Plate Tectonics, Rock Cycle, Soil.*

"Do the Math" p. 216: *Plate Movement*

Free-Response Qs 1 and 2 p. 232

"Measuring Your Impact" p. 233: *What is the impact of your diet on soil dynamics?*

**Lab Investigation:** *Mineral Identification, Vermiculture (ongoing)*

## Chapter 9: Water Resources

(11) Checkpoint Qs Video: *State of Thirst: California's Water Future; Last Call at the Oasis*

"Do the Math" p. 251: *Selecting the Best Washing Machine*

Free-Response Qs 1 and 2 p. 255

"Measuring Your Impact" p. 255: *Saving Water*

**Lab Investigation:** **Stewardship:** *Giving Natives A Chance: Flood Plain Remediation*

## Chapter 10: Land, Public and Private

(10) Checkpoint Qs

Free-Response Qs 1 and 2 p. 281

"Measuring Your Impact" p. 281: *The Costs of Commuting*

**Lab Investigation:** *Tragedy of the Commons Lab*

## Chapter 11: Feeding the World

(15) Checkpoint Qs Videos: *Foods, Inc.; Forks over Knives; GMO, OMG; Our Daily Bread; The Cove*

"Do the Math" p. 288: *Land Needed for Food*

Free-Response Qs 1 and 2 p. 308

"Measuring Your Impact" p. 309: *The Ecological Footprint of Food Production*

**Lab Investigation:** *Hunger Lab, Agriculture and Feeding a Growing Human Population, Cricket Cuisine &*

*Farming, Farmers market survey* **Stewardship:** *Community Garden Project (ongoing school-grown/served)*

Farm

**Chapter 12: Nonrenewable Energy Resources**

(15) Checkpoint Qs Video: *Crude; Fuel*

“Do the Math” p. 321: *Efficiency of Travel* and p. 324: *Calculating Electricity Supply*

Free-Response Qs 1 and 2 p. 340

“Measuring Your Impact” p. 341: *Choosing a Car: Conventional or Hybrid?*

**Lab Investigation:** *Coal Investigations Lab*

**Chapter 13: Achieving Energy Sustainability**

(27) Checkpoint Qs Video: *Switch*

“Do the Math” p. 348: *Energy Star*

Free-Response Qs 1 and 2 p. 375

“Measuring Your Impact” p. 375: *Choosing a Light Bulb*

**Lab Investigation:** *Solar Energy Lab*

**Chapter 14: Water Pollution**

(22) Checkpoint Qs

“Do the Math” p. *Building a Manure Lagoon*

Free-Response Qs 1 and 2 p. 406

“Measuring Your Impact” p. 407: *Gaining Access to Safe Water and Proper Sanitation*

**Lab Investigation:** *Waste Water Treatment Kit,*

*Quality of Waters: Physical & Chemical Factors Kit + Biological Factors Kit*

**Chapter 15: Air Pollution and Stratospheric Ozone Depletion**

(21) Checkpoint Qs

Free-Response Qs 1 and 2 p. 433

“Measuring Your Impact” p. 434: *Mercury Release from Coal*

**Lab Investigation:** *Ozone Sampling Lab, Air Pollution & Vehicle Emissions Kit*

**Chapter 16: Waste Generation and Waste Disposal**

(15) Checkpoint Qs Videos: *Bag It!; Modern Marvels: Trash; Waste Land; Trashed; Plastic Pollution*

“Do the Math” p. 450: *How Much Leachate Might be Collected?*

Free-Response Qs 1 and 2 p. 460 **Field trip:** *Keller Canyon Landfill, Mt. Diablo MRF*

and/or

**Sewage Treatment plant**

“Measuring Your Impact” p. 461: *Understanding Household Solid Waste*

**Lab Investigation:** *What's In Our Waste Lab, Acid Deposition Kit*

**Chapter 17: Human Health and Environmental Risks**

(15) Checkpoint Qs

“Do the Math” p. 475: *Estimating LD50 Values and Safe Exposures*

Free-Response Qs 1 and 2 p. 488

“Measuring Your Impact” p. 488: *How Does Risk Affect Your Life Expectancy?*

**Lab Investigation:** *Brine Shrimp LD50 Lab*

## Chapter 18: Conservation of Biodiversity

(12) Checkpoint Qs Video: *Cane Toads; Evolution: Extinction!; Blackfish; America's Endangered Species*

Free-Response Qs 1 and 2 p. 515 **Stewardship: Antioch Dunes Wildlife Refuge**

"Measuring Your Impact" p. 515: *How Large Is Your Home?*

**Lab Investigation:** *Invasive Species "Wanted" Poster*

## Chapter 19: Global Change

(21) Checkpoint Qs Video: *Chasing Ice*

"Do the Math" p. 526: *Projecting Future Increases in CO<sub>2</sub>*

Free-Response Qs 1 and 2 p. 546

"Measuring Your Impact" p. 546-547: *Carbon Produce by Different Modes of Travel*

**Lab Investigation:** *Climate Change Lab, Ocean Acidification Kit*

## Chapter 20: Sustainability, Economics, and Equity

(17) Checkpoint Qs Video: *The Lorax; Affluenza; The Story of Stuff: No Impact Man*

Free-Response Qs 1 and 2 p. 570

"Measuring Your Impact" p. 570: *GDP and Footprints*

**Lab Investigation:** *Scarcity Lab*