

AP ENVIRONMENTAL SCIENCE

What to Expect

Big Ideas

The big ideas serve as the foundation of the course and allow for creation of meaningful connections among concepts. They are often overarching concepts or themes that become threads that run throughout the course. Revisiting the big ideas and applying them in a variety of contexts allows for development of deeper conceptual understanding.

BIG IDEA 1: ENERGY TRANSFER (ENG)

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.

BIG IDEA 2: INTERACTIONS BETWEEN EARTH SYSTEMS (ERT)

The Earth is one interconnected system. Natural systems change over time and space. Biogeochemical systems vary in ability to recover from disturbances.

BIG IDEA 3: INTERACTIONS BETWEEN DIFFERENT SPECIES AND THE ENVIRONMENT (EIN)

Humans alter natural systems and 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.

BIG IDEA 4: SUSTAINABILITY (STB)

Human survival depends on developing practices that will achieve sustainable systems. A suitable combination of conservation and development is required. The management of resources is essential. Understanding the role of cultural, social, and economic factors is vital to the development of solutions.

Units

The course content is organized into 9 units (+ *this Week 1 introduction to the course*). The units have been arranged in a (*mostly*) logical sequence frequently found in ~~many~~ *some* college courses and *newer* textbooks. Weights reflect the multiple choice section of the exam.

Units	Exam Weighting
Unit 1: The Living World: Ecosystems	6–8%
Unit 2: The Living World: Biodiversity	6–8%
Unit 3: Populations	10–15%
Unit 4: Earth Systems and Resources	10–15%
Unit 5: Land and Water Use	10–15%
Unit 6: Energy Resources and Consumption	10–15%
Unit 7: Atmospheric Pollution	7–10%
Unit 8: Aquatic and Terrestrial Pollution	7–10%
Unit 9: Global Change	15–20%

Semester 2 (roughly)

- Mostly specific environmental issues we are facing on the planet.
- Understanding semester 1 topics is necessary to make sense of the causes and effects of these environmental issues and evaluate possible solutions to them.

UNIT 6 Energy Resources and Consumption		UNIT 7 Atmospheric Pollution		UNIT 8 Aquatic and Terrestrial Pollution		UNIT 9 Global Change	
~16-17	Class Periods	10-15%	AP Exam Weighting	~11-12	Class Periods	7-10%	AP Exam Weighting
ENG 1	6.1 Renewable and Nonrenewable Resources	STB 4	7.1 Introduction to Air Pollution	STB 1	8.1 Sources of Pollution	STB 1	9.1 Stratospheric Ozone Depletion
ENG 6	6.2 Global Energy Consumption	STB 5	7.2 Photochemical Smog	STB 6	8.2 Human Impacts on Ecosystems	STB 6	9.2 Reducing Ozone Depletion
ENG 1	6.3 Fuel Types and Uses	STB 2	7.3 Thermal Inversion	STB 1	8.3 Endocrine Disruptors	STB 7	9.3 The Greenhouse Effect
ENG 2	6.4 Distribution of Natural Energy Resources	STB 4	7.4 Atmospheric CO ₂ and Particulates	STB 7	8.4 Human Impacts on Wetlands and Mangroves	STB 1	9.4 Increases in the Greenhouse Gases
ENG 7	6.5 Fossil Fuels	STB 5	7.5 Indoor Air Pollutants	STB 2	8.5 Eutrophication	STB 2	9.5 Global Climate Change
ENG 2	6.6 Nuclear Power	STB 7	7.6 Reduction of Air Pollutants	STB 1	8.6 Thermal Pollution	STB 5	9.6 Ocean Warming
ENG 7	6.7 Energy from Biomass	STB 4	7.7 Acid Rain	STB 1	8.7 Persistent Organic Pollutants (POPs)	STB 7	9.7 Ocean Acidification
ENG 5	6.8 Solar Energy	STB 3	7.8 Noise Pollution	STB 4	8.8 Bioaccumulation and Biomagnification	STB 1	9.8 Invasive Species
ENG 7	6.9 Hydroelectric Power			STB 7	8.9 Solid Waste Disposal	EIN 7	9.9 Endangered Species
ENG 1	6.10 Geothermal Energy			STB 6	8.10 Waste Reduction Methods	EIN 7	9.10 Human Impacts on Biodiversity
ENG 1	6.11 Hydrogen Fuel Cell			STB 2	8.11 Sewage Treatment		
ENG 7	6.12 Wind Energy			EIN 6	8.12 Lethal Dose 50% (LD ₅₀)		
ENG 6	6.13 Energy Conservation			EIN 5	8.13 Dose Response Curve		
				EIN 4	8.14 Pollution and Human Health		
				EIN 2	8.15 Pathogens and Infectious Diseases		

Individual Lessons

- Each lesson is planned with three things in mind
 - **Enduring Understanding:** Long-term take-away related to the big idea of the course.
 - **Learning Objectives:** What I hope you will be able to do with the information.
 - **Essential Knowledge:** The background knowledge that you will need to perform the learning objective.

ENDURING UNDERSTANDING

ERT-1

Ecosystems are the result of biotic and abiotic interactions.

LEARNING OBJECTIVE

ERT-1.A

Explain how the availability of resources influences species interactions.

ESSENTIAL KNOWLEDGE

ERT-1.A.1

In a predator-prey relationship, the predator is an organism that eats another organism (the prey).

ERT-1.A.2

Symbiosis is a close and long-term interaction between two species in an ecosystem. Types of symbiosis include mutualism, commensalism, and parasitism.

ERT-1.A.3

Competition can occur within or between species in an ecosystem where there are limited resources. Resource partitioning—using the resources in different ways, places, or at different times—can reduce the negative impact of competition on survival.

Science Practices

- The Science Practices describe what a student should be able to do while exploring course concepts. The table that follows presents these practices, which hopefully already exist from previous science classes and will develop further this year.

Practice 1	Practice 2	Practice 3	Practice 4
<p>Concept Explanation 1</p> <p>Explain environmental concepts, processes, and models presented in written format.</p>	<p>Visual Representations 2</p> <p>Analyze visual representations of environmental concepts and processes.</p>	<p>Text Analysis 3</p> <p>Analyze sources of information about environmental issues</p>	<p>Scientific Experiments 4</p> <p>Analyze research studies that test environmental principles</p>
SKILLS			
<p>1.A Describe environmental concepts and processes.</p> <p>1.B Explain environmental concepts and processes.</p> <p>1.C Explain environmental concepts, processes, or models in applied contexts.</p>	<p>2.A Describe characteristics of an environmental concept, process, or model represented visually.</p> <p>2.B Explain relationships between different characteristics of environmental concepts, processes, or models represented visually:</p> <ul style="list-style-type: none">• In theoretical contexts• In applied contexts <p>2.C Explain how environmental concepts and processes represented visually relate to broader environmental issues.</p>	<p>3.A Identify the author's claim.</p> <p>3.B Describe the author's perspective and assumptions.</p> <p>3.C Describe the author's reasoning (use of evidence to support a claim).</p> <p>3.D Evaluate the credibility of a source (<i>not assessed</i>):</p> <ul style="list-style-type: none">• Recognize bias• Scientific accuracy <p>3.E Evaluate the validity of conclusions of a source or research study (<i>not assessed</i>).</p>	<p>4.A Identify a testable hypothesis or scientific question for an investigation.</p> <p>4.B Identify a research method, design, and/or measure used.</p> <p>4.C Describe an aspect of a research method, design, and/or measure used.</p> <p>4.D Make observations or collect data from laboratory setups (<i>not assessed</i>).</p> <p>4.E Explain modifications to an experimental procedure that will alter results.</p>

MORE Science Practices

Practice 5

Data Analysis 5

Analyze and interpret quantitative data represented in tables, charts, and graphs

- 5.A** Describe patterns or trends in data.
- 5.B** Describe relationships among variables in data represented.
- 5.C** Explain patterns and trends in data to draw conclusions.
- 5.D** Interpret experimental data and results in relation to a given hypothesis.
- 5.E** Explain what the data implies or illustrates about environmental issues.

Practice 6

Mathematical Routines 6

Apply quantitative methods to address environmental concepts

- 6.A** Determine an approach or method aligned with the problem to be solved.
- 6.B** Apply appropriate mathematical relationships to solve a problem, with work shown (e.g., dimensional analysis).
- 6.C** Calculate an accurate numeric answer with appropriate units.

Practice 7

Environmental Solutions 7

Propose and justify solutions to environmental problems

- 7.A** Describe environmental problems.
- 7.B** Describe potential responses or approaches to environmental problems.
- 7.C** Describe disadvantages, advantages, or unintended consequences for potential solutions.
- 7.D** Use data and evidence to support a potential solution.
- 7.E** Make a claim that proposes a solution to an environmental problem in an applied context.
- 7.F** Justify a proposed solution, by explaining potential advantages.

Exam Overview

The AP Environmental Science Exam assesses student understanding of the science practices and learning objectives outlined in the course framework. The exam is 2 hours and 40 minutes long and includes 80 multiple-choice questions and 3 free-response questions. A four-function, scientific, or graphing calculator is allowed on both sections of the exam.

Section	Question Type	Number of Questions	Exam Weighting	Timing
I	Multiple-choice questions	80	60%	90 minutes
II	Free-response questions	3	40%	70 minutes
	Question 1: Design an investigation (10 points)			
	Question 2: Analyze an environmental problem and propose a solution (10 points)			
	Question 3: Analyze an environmental problem and propose a solution doing calculations (10 points)			

Section I: Multiple Choice

- The multiple-choice section includes both individual and set-based questions. All set-based questions include stimulus material:
 - Three to four sets include quantitative data, such as data tables, charts, or graphs.
 - Three to four sets include qualitative data or information, such as models, representations, or maps.
 - Two sets include text-based sources.

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Unit 9: Global Change	15–20%

Section II: Free-Response

- The second section of the AP Environmental Science Exam includes three free-response questions.
- **FREE-RESPONSE QUESTION 1: Design an Experiment**
 - Presents students with an authentic environmental scenario accompanied by either a model/visual representation or quantitative data, and may assess student ability to:
 - Describe and/or explain environmental concepts, processes, and models presented in written format.
 - Analyze visual representations or data.
 - Analyze research studies that test environmental principles.
 - Describe environmental problems and/or potential responses.
- **FREE-RESPONSE QUESTION 2 Analyze an Environmental Problem and Propose a Solution**
 - Presents students with an authentic environmental scenario accompanied by either a model/visual representation or quantitative data, and may assess student ability to:
 - Describe and/or explain environmental concepts, processes, and models presented in written format
 - Analyze visual representations or data.
 - Propose and justify solutions to environmental problems .

Section II: Free-Response

- **FREE-RESPONSE QUESTION 3**
Analyze an Environmental Problem and Propose a Solution Doing Calculations
 - presents students with an authentic environmental scenario and may assess student ability to:
 - Describe or explain environmental concepts, processes, and models presented in written format
 - Apply quantitative methods to address environmental concepts.
 - Propose and justify solutions to environmental problems.

The following task verbs are commonly used in the free-response questions:

Calculate: Perform mathematical steps to arrive at a final answer, including algebraic expressions, properly substituted numbers, and correct labeling of units. Showing work is required.

Describe: Provide the relevant characteristics of a specified topic.

Explain: Provide information about how or why a relationship, process, pattern, position, situation, or outcome occurs, using evidence and/or reasoning to support or qualify a claim. Explain "how" typically requires analyzing the relationship, process, pattern, position, situation, or outcome; whereas, explain "why" typically requires analysis of motivations or reasons for the relationship, process, pattern, position, situation, or outcome. Also phrased as "give one reason."

Identify: Indicate or provide information about a specified topic, without elaboration or explanation.

Justify: Provide evidence to support, qualify, or defend a claim and/or provide reasoning to explain how that evidence supports or qualifies the claim.

Make a claim: Make an assertion that is based on evidence or knowledge.

Propose a solution: Provide a proposed solution to a problem based on evidence or knowledge.

AP Environmental Science

- And now lets hear about it again from my co-teacher for the year, Mr. Paul Andersen:

AP Environmental Science

https://www.youtube.com/watch?time_continue=2&v=LEgKTGgPFho&feature=emb_logo

