

Boston Collegiate Charter School

AP Environmental Science

Jim White

Phone Number: (617) 265-1172, x247

Best Time to Call: before 8:00 AM, after 4:00 PM

Email: jwhite@bostoncollegiate.org

Textbook:

Wright, Richard T., and Boorse, Dorothy, Environmental Science: Towards a Sustainable Future. 11th ed. New Jersey: Prentice Hall, 2010.

Tutoring Hours:

By appointment after school

Late/Missed Work: Standard 12th grade policy (2 days to make up assessments missed from absence, 3 days to make up assignments missed from absence); see handbook for details

Schedule:

APES meets six times per week. There are 4 regular periods, and, on Thursday, a double period which runs from 1:55 to 4:00. You will be dismissed from APES on Thursday. This double period is for labs and the occasional test. Frequently, you will be off campus on a field study. This additional period is mandatory for the course. Missing this period may result in no credit for a lab, though makeup will be offered for excused absence.

In addition, you are required to attend three Saturday sessions with other schools teaching APES. These sessions are scheduled for 10/29/11, 02/11/12, and 03/31/12. A student that must miss one of these sessions needs an excused absence, and will be assigned additional work

Student Expectations:

Lectures: Students are expected to come to lecture having read the appropriate material ahead of time, with appropriate pre-lecture notes. Students must take notes during lecture, and are responsible for all material presented during that time. During lecture, students should be noting questions and comments to bring up during discussion section.

Labs/Field Study: Students will perform lab exercises and field studies on a weekly basis. Each will involve performing the activity and writing up the results, often with a short research component. Additionally, field studies will often take place after school or even on a Saturday. Advanced notice will be given for these sessions, and attendance is required.

Tests: Tests in this course are similar to the AP exam itself. They consist of a multiple choice portion and open response questions. Students will take the AP Environmental Science Exam in May.

Papers and Projects: Rather than nightly reading questions, students will answer questions from the text on a weekly basis. Students will also complete short research papers regularly, and have one major project each quarter that involves a presentation.

Quizzes: Weekly quizzes are in multiple-choice format, checking for knowledge and understanding of terms and concepts. These quizzes use actual AP questions, or questions written in the same style (5 choices).

Supplies:

- binder or notebook for this course

- folder for organizing handouts
- pens/pencils
- internet mail account
- recommended: USB drive (“thumb drive”, “flash drive”, or “jump drive”), internet access outside of school, laptop/netbook/portable computer

Grading Breakdown:

- Tests 35% (2 tests per quarter)
- Papers and Projects 25% (research papers, homework assignments, presentations)
- Labs and Field Studies 20%
- Quizzes 20% (1 per week)

In addition, the midterm is worth 7% of the overall grade in this course, and the final is worth 13% (standard for 12th grade).

Course Overview:

The AP Environmental Science (APES) course is designed to be the equivalent of a one semester, introductory college course in environmental science. The goal of the APES 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 or preventing them. Environmental science is interdisciplinary; it embraces a wide variety of topics from different areas of study. The following themes provide a foundation for the structure of the APES 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.

APES Units

I. Earth Systems and Resources

- A. Earth Science Concepts
- B. The Atmosphere
- C. Global Water Resources and Use
- D. Soil and Soil Dynamics

II. The Living World

- A. Ecosystem Structure
- B. Energy Flow
- C. Ecosystem Diversity
- D. Natural Ecosystem Change
- E. Natural Biogeochemical Cycles

III. Population

- A. Population Biology Concepts
- B. Human Population
 - 1. Human population dynamics
 - 2. Population size
 - 3. Impacts of population growth

IV. Land and Water Use

- A. Agriculture
 - 1. Feeding a growing population
 - 2. Controlling pests
- B. Forestry
- C. Rangelands
- D. Other Land Use
 - 1. Urban land development
 - 2. Transportation infrastructure
 - 3. Public and federal lands
 - 4. Land conservation options
 - 5. Sustainable land-use strategies
- E. Mining
- F. Fishing
- G. Global Economics

V. Energy Resources and Consumption

- A. Energy Concepts
- B. Energy Consumption
 - 1. History
 - 2. Present global energy use
 - 3. Future energy needs
- C. Fossil Fuel Resources and Use
- D. Nuclear Energy
- E. Hydroelectric Power
- F. Energy Conservation
- G. Renewable Energy

VI. Pollution

- A. Pollution Types
 - 1. Air pollution
 - 2. Noise pollution
 - 3. Water pollution
 - 4. Solid waste
- B. Impacts on the Environment and Human Health
 - 1. Hazards to human health
 - 2. Hazardous chemicals in the environment
- C. Economic Impacts

VII. Global Change

- A. Stratospheric Ozone
- B. Global Warming
- C. Loss of Biodiversity
 - 1. _Habitat loss; overuse; pollution; introduced species; endangered and extinct species
 - 2. Maintenance through conservation
 - 3. Relevant laws and treaties

Labs and Activities:

Labs are conducted by students in groups of 2. There is one lab per week, consisting of a 55 minute period, plus additional time afterschool as needed. Additionally, field studies are an additional 30 minutes.

Earth Systems and Resources:

Tragedy of the Commons	Goal- to learn what a common is and how humans can harm it
EcoColumn	Goal- to study the interrelationships between the land and the water
Doppler effect activity	Goal- to determine how Doppler radar locates storms and measures storm intensity
Rock cycle and formation activity	Goal- to learn to determine the relative ages of fossils to define the ages of rocks and to understand radioactive decay.
Virtual earthquake	Goal- to use an online tutorial program to read seismograms, and locate epicenters of an earthquake
Water, water everywhere	Goal- to learn the different water issues occurring around the world
Soil texture lab	Goal- to learn how to determine the texture of a sample of soil

The Living World:

EcoColumn (continued)	Goal- to study the interrelationships between the land and the water
Endangered Species Report	Goal: research an endangered species and compare with a case study of a similar extinct species
Community Structure	Goal- to do population studies of an ecosystem
Terrestrial Ecology Field Study	Goal- to visit a natural ecosystem and do tests on the soil, different populations and other important aspects of the terrestrial environment.
Aquatic field study	Goal- to test the water at a local river for chemical characteristics; flow rate, bacteria, aquatic life and diversity
Marine field study	Goal- to visit a local aquarium and beach to learn about beach zones, wildlife and habitats
Soil chemical lab	Goal- to determine the amount of Nitrogen, Phosphorous and Potassium in a sample of soil and to decide the best choice of fertilizers for that sample
Great Barrier Reef brochure activity	Goal- to study the characteristics and importance of the largest reef in the world

Populations:

Estimating populations of Daphnia	Goal- to learn to estimate the population size by removal sampling techniques
World Population Lab	Goal- to view histograms and dynamic histograms of different countries and learn to interpret them
Histogram Lab	Goal- to practice interpreting histograms
Too Many People Activity	Goal- to graph population data, interpret population trends and evaluate the impact of populations on natural resources
Comparing the populations in China and India	Goal- to see the different ways the two largest countries in the world have approached population issues
Movie- "The People Bomb"	Goal- to see different population issues around the globe and ways to combat the problems

Land and Water Use:

Soil bulk density and structure lab	Goal- to compare the mass to volume of a soil sample to determine the particle density of that sample
Soil permeability lab	Goal- to learn how to calculate the permeability of a sample of soil
Cookie lab	Goal- to discuss the impact of our use of fossil fuels and how that use affects the environment
Web assignment on water management	Goal- to learn the difference between storm drains and storm sewers and to find out where and how our water gets to our houses
Public Lands Presentation	Goal- to research types of public lands (national forests, wildlife reserves, national parks) and give a presentation about one of them, analyzing history, use, and possible future

Energy Resources and Consumption:

Renewable Energy	Goal- to compare the different renewable
------------------	--

poster assignment	resources for energy
Research on Cape Wind	Goal- to evaluate the positive and negative aspects of wind power
Video- “Chernobyl Heart”	Goal- to see the negative side of nuclear energy and what happened at Chernobyl
True Cost Contest	Goal—students research the externalized costs, subsidies, taxes, and tax credits for various types of energy to get at the “true cost” of using coal and oil

Pollution:

Organic waste and its effect on dissolved O ₂	Goal- to learn how biological waste such as human feces affects the water quality
Fish lab- Nuclear energy and its affect on the environment	Goal- to see the affect of nuclear power plants and heat on the aquatic environment
Sewage treatment lab	Goal- to learn how our wastes are treated at the sewage treatment plant
Pesticide label lab	Goal- to learn the environmental and human effects of some common household pesticides
Toxicity of herbicides lab	Goal- to evaluate different herbicides to determine their toxicity and effect on a plant
Earthworm and pesticide lab	Goal- to determine the environmental effects of various pesticides on soil dwelling organisms
Landfill and composting research	Goal- to learn how landfills work and what are the laws and requirements of one
Clean Air Acts research	Goal—students use primary sources to understand the history and scope of the Clean Air Acts and associated laws

Global Change:

Air pollution lab- Sulfur and Nitrogen dioxides	Goal- to test our local air for pollutants that are harmful to human health and lead to global warming
Volcano activity	Goal- to see how much air pollutants some historical volcanoes have put into our atmosphere and the environmental effects of these

Which gets hotter land or water lab	Goal- to determine if land or oceans absorb heat faster and discuss the implications of the findings on the Earth's weather systems
Thermal Expansion of Water	Goal—students will conduct experiments on precisely measured volumes of water to see how thermal expansion leads to rising oceans
Environmental Debate	Goal—students research one side of a current environmental issue and take part in an Oxford-style debate