

Thomas S. Wootton High School – AP Environmental Science
Semester A & B Objectives & Syllabus

Mr. John M. Fitz
John_M_Fitz@mcpsmd.org

Classroom 207
Office 203 (301-279-8594)

Office Hours: 5th and 6th periods (except on APES lab days), before/after school by appointment.

Course Description:

AP Environmental Science is a year long, rigorous, upper-level science course that is comparable to an introductory college course in environmental science. The APES course provides students with the principles, concepts, and methodologies to understand the interrelationships of our natural world. Major environmental issues and problems will be critically evaluated to include possible solutions. This course will prepare students to take the national AP exam in environmental science and college credit can be obtained from participating colleges and universities.

General Course Goals:

1. Develop an understanding of the process of science, especially environmental science.
2. Prepare for the national APES examination given in May.
3. Provide the knowledge needed to make informed decisions regarding environmental issues.
4. Learn to make positive impacts on the environment.

Important Course Website: EDLINE must be activated tonight! Email me if you need your activation code. https://www.edline.net/pages/Wootton_High_School

Grading and Reporting Categories: Your marking period grade will be based on:

- 60% - Summative Assessments:
 - Summative assessments include unit tests and most quizzes. These cumulative tests will model the same format as the national AP test and will include multiple choice (selected response) and essay (free response questions or frq's) questions. Testing day for science is **Monday** and **Thursday**.
- 35% - Formative Assessments:
 - Formative assessments include all laboratory assignments, chapter packages, other class work, and most projects.
- 5% - Homework (practice):
 - Homework usually includes practice math problems, warm-ups, and other shorter assignments.

MCPS Grading Scale:

- Typical scales used: 89.5 – 100% = A, for example. 89.4% = B. Cutoffs are not arbitrarily signed. Please remember that all of the work for the entire marking period determines your grade, not simply the last assignment.

Textbook:

Environmental Science for AP by Friedland, Andrew, et al. (New York, NY: W.H. Freeman and Company), 2012. It's brand new and must be covered! Replacement Cost: \$125.00

Review Book:

Barron's AP Environmental Science, 5th ed. by Thorpe, Gary. 2013. Replacement: \$20.00

Some Things to Consider:

1. Late work – unless posted otherwise, the firm deadline for any late work for things due during the week will be the first day of the next week. Chapter package work is different and will have the same due and deadline date and will NOT be accepted late. Other types of late work may be accepted, but you MUST hand in work to me personally. **It is NEVER OK to put work of any kind in my mailbox in the front office.** If you need an extension for some reason, see me.
2. You must do your own work. It is not OK to have answers to analysis questions or any other assignments that are identical to others in the class, even when working on group labs.
3. Every course and teacher is unique and has different expectations. I have high expectations for you, particularly with lab work. One specific example includes graphs, tables, and charts. These need to be labeled and have descriptive titles. We will practice good science in this class.
4. We all know that cell phones/electronic devices are prohibited. However, using these in class on a test/quiz day will be considered an act of cheating. I will confiscate them, I will give you a zero on that assessment (no retakes), I will call home, and I will file an academic dishonesty referral that will stay on your permanent record.

APES Double Period Labs and Scheduling Issues:

This course includes an extensive laboratory and fieldwork component. To facilitate this requirement, we will have regular (expect one per week) extended period labs. Students are expected to be an active participant in all laboratory work. Students who fail to report to lab will be required to participate in an alternative assignment related to the lab (i.e. an oral presentation).

- *Double Period Lab Day for 4th period* –
4-5 (4th period APES plus their 5th pd lunch)
- *Double Period Lab Day for 7th periods* –
6-7 (7th period APES plus their 6th pd lunch)-**reports to class earlier than normal**

AP Test:

All students are expected to take the national AP Test in early May. Those who do take the AP test will be exempt from the final exam and will complete an AP project that will represent their final exam grade. The AP test is a three-hour exam consisting of 100 multiple choice questions that represent 60 percent of the exam and four essays (free response questions) that represent 40 percent of the exam.

To be Successful in this Course:

Attend class; read text assignments in a timely manner; participate in labs, group, and other student dependent activities; **and come in to get extra help.**

Student Expectations: Students are always expected to:

- Be respectful,
- Be prepared to think, read, write, and be an active participant, everyday.
- Complete assignments on time,
- Ask questions,
- Have fun (learning is better this way), and
- Take ownership and responsibility for their education

APES Unit Topics & Textbook Correlation: Times and Sequence are Subject to Change.

Unit 1: Intro to Env. Science/Matter&Energy/ (2-3 wks)

Chapter 1: Studying the State of our Earth

Chapter 2: Environmental Systems

Unit 2: The Living World (5-6 wks)

Chapter 3: Ecosystem Ecology

Chapter 4: Global Climates and Biomes

Chapter 5: Evolution and Biodiversity

Unit 3: Biological and Human Populations (3-4 wks)

Chapter 6: Population and Community Ecology

Chapter 7: The Human Population

Unit 4: Earth Systems and Resources (3-4 wks)

Chapter 8: Earth Systems

Chapter 9: Water Resources

Unit 5: Land Use (3-4 wks)

Chapter 10: Land, Public and Private

Chapter 11: Feeding the World

Unit 6: Energy Resources and Consumption (3-4 wks)

Chapter 12: Nonrenewable Energy Sources

Chapter 13: Achieving Energy Sustainability

Unit 7: Pollution (7-8 wks)

Chapter 14: Water Pollution

Chapter 15: Air Pollution and Stratospheric Ozone Depletion

Chapter 16: Waste Generation and Waste Disposal

Chapter 17: Human Health and Environmental Risks

Unit 8: Global Change and a Sustainable Future (1-2 wks)

Chapter 18: Conservation of Biodiversity

Chapter 19: Global Change

Chapter 20: Sustainability, Economics, and Equity

AP Environmental Science Topics List (From the College Board and APES Course Description)

Part I: APES Course Goals:

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

Part II: APES Topic Outline

I. Earth Systems and Resources (10-15%)

A. Earth Science Concepts

(Geologic time scale; plate tectonics, earthquakes, volcanism; seasons; solar intensity and latitude)

B. The Atmosphere

(Composition; structure; weather and climate; atmospheric circulation and the Coriolis Effect; atmospheric-ocean interactions; ENSO)

C. Global Water Resources and Use

(Freshwater/saltwater; ocean circulation; agricultural, industrial, and domestic use; surface and groundwater issues; global problems; conservation)

D. Soil and Soil Dynamics

(Rock cycle; formation; composition; physical and chemical properties; main soil types; erosion and other soil problems; soil conservation)

II. The Living World (10-15%)

A. Earth Science Concepts

(Biological populations and communities; ecological niches; interactions among species; keystone species; species diversity and edge effects; major terrestrial and aquatic biomes)

B. Energy Flow

(Photosynthesis and cellular respiration; food webs and trophic levels; ecological pyramids)

C. Ecosystem Diversity

(Biodiversity; natural selection; evolution; ecosystem services)

D. Natural Ecosystem Change

(Climate shifts; species movement; ecological succession)

E. Natural Biogeochemical Cycles

(Carbon, nitrogen, phosphorus, sulfur, water, conservation of matter)

III. Populations (10-15%)

- A. Population Biology Concepts
(Population ecology; carrying capacity; reproductive strategies; survivorship)

- B. Human Population
 - a. Human population dynamics
(Historical population sizes; distribution; fertility rates; growth rates and doubling times; demographic transition; age-structure diagrams)

 - b. Population size
(Strategies for sustainability; case studies; national policies)

 - c. Impacts of population growth
(Hunger; disease; economic effects; resource use; habitat destruction)

IV. Land and Water Use (10-15%)

- A. Agriculture
 - a. Feeding a growing population
(Human nutritional requirements; types of agriculture; Green Revolution; genetic engineering and crop production; deforestation; irrigation; sustainable agriculture)

 - b. Controlling pests
(Types of pesticides; cost and benefits of pesticide use; integrated pest management; relevant laws)

- B. Forestry
(Tree plantations; old growth forests; forest fires; forest management; national forests)

- C. Rangelands
(Overgrazing; deforestation; desertification; rangeland management; federal rangelands)

- D. Other Land Use
 - a. Urban land development
(planned development; suburban sprawl; urbanization)

 - b. Transportation infrastructure
(Federal highway system; canals and channels; roadless areas; ecosystem impacts)

 - c. Public and federal lands
Management; wilderness areas; national parks; wildlife refuges; forests; wetlands)

 - d. Land conservation options
(Preservation; remediation; mitigation; restoration)

 - e. Sustainable land-use strategies

- E. Mining
(Mineral formation; extraction; global reserves; relevant laws and treaties)

- F. Fishing
(Fishing techniques; overfishing; aquaculture; relevant laws and treaties)

- G. Global Economics
(Globalization; World Bank; Tragedy of the Commons; relevant laws and treaties)

V. Energy Resources and Consumption (10-15%)

- A. Energy Concepts
(Energy forms; power; units; conversions; Laws of Thermodynamics)

B. Energy Consumption

- a. History
(Industrial Revolution; exponential growth; energy crisis)
- b. Present global energy use
- c. Future energy needs

C. Fossil Fuel Resources and Use

(Formation of coal, oil, and natural gas; extraction/purification methods; world reserves and global demand; synfuels; environmental advantages/disadvantages of sources)

D. Nuclear Energy

(Nuclear fission process; nuclear fuel; electricity production; nuclear reactor types; environmental advantages/disadvantages; safety issues; radiation and human health; radioactive wastes; nuclear fusion)

E. Hydroelectrical Power

(Dams, flood control; salmon; silting; other impacts)

F. Energy Conservation

(Energy efficiency; CAFE standards; hybrid electric vehicles; mass transit)

G. Renewable Energy

(Solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages)

VI. Pollution (25-30%)

A. Pollution Types

- a. Air pollution
(Sources – primary and secondary; major air pollutants; measurement units; smog; acid deposition – causes and effects; heat islands and temperature inversions; indoor air pollution; remediation and reduction strategies; Clean Air Act and other relevant laws)
- b. Noise pollution
(Sources; effects; control measures)
- c. Water pollution
(Types; sources; causes and effects; cultural eutrophication; groundwater pollution; maintaining water quality; water purification; sewage treatment/septic systems; Clean Water Act and other relevant laws)
- d. Solid waste
(Types; disposal; reduction)

B. Impacts on the Environment and Human Health

- a. Hazards to human health
(Environmental risk analysis; acute and chronic effects; dose response relationships; air pollutants; smoking and other risks)
- b. Hazardous chemicals in the environment
(Types of hazardous waste; treatment/disposal of hazardous waste; cleanup of contaminated sites; biomagnification; relevant laws)

C. Economic Impacts

(Cost-benefit analysis; externalities; marginal costs; sustainability)

VII. Global Change (10-15%)

A. Stratospheric Ozone

(Formation of stratospheric ozone; ultraviolet radiation; causes of ozone depletion; effects of ozone depletion; strategies for reducing ozone depletion; relevant laws and treaties)

B. Global Warming

(Greenhouse gases and the greenhouse effect; impacts and consequences of global warming; reducing climate change; relevant laws and treaties)

C. Loss of Biodiversity

- a. Habitat loss; overuse; pollution; introduced species; endangered and extinct species
- b. Maintenance through conservation
- c. Relevant laws and treaties