AP Environmental Science
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Class information may be found on instructor websites at lacueva.aps.edu.

Objectives: The Advanced Placement Environmental Science course is designed to by the equivalent of a one-semester introductory college course in Environmental Science. AP Environmental Science is a rigorous science course that emphasizes a multidisciplinary approach integrating biology, chemistry, physics, geology, climatology, oceanography, and human population dynamics along with political and economic approaches. The laboratory component consists of the utilization of the “hands on approach” to learning, incorporating lab activities and exercises including field observations and analysis.

AP Environmental Science will provide students with (1) the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, (2) methods to identify and analyze environmental problems both natural and man-made, (3) methods to evaluate the relative risks associated with environmental problems, and (4) evaluation tools to examine alternative solutions to environmental problems along with solutions for resolution or prevention.

As an interdisciplinary science course, AP Environmental Science embraces a wide variety of topics. Within this approach, specific themes or constructs cut across many interrelated areas. The following themes reflect and provide a foundation for the structure of the course. These include the following: (1) The Earth is an interconnected system, (2) Humans and human activity alter natural systems, (3) Environmental problems have a cultural and social context, and (4) Human survival depends on developing practices that will achieve sustainable systems.

Success in AP Environmental Science depends on the realization and appreciation that the course is meant to be taught on a college level. Students should expect to spend considerable time outside of school in preparation for the class.


Materials:  
Scientific Calculator  
Pencils or pens (black or blue ink only, please)  
Colored Pencils  
Spiral notebook, or binder with loose leaf paper for notes  
Composition book for field journal  
Paper towels, tissue, or hand soap would be appreciated

Methods:  
Instruction will be delivered through lecture, discussion, projects, papers and homework.  
One class session per week will be spent at our pitfall trap sites on and around campus as part of a yearlong lab monitoring insect population and leaf litter. All fieldwork, lab work and lab reports will be kept in a field journal. Mathematical models and calculations (like the Shannon-Weaver Diversity Index) will be employed to determine environmental impacts and biodiversity. Students will be required to attend one Saturday session per year collecting specimens in the Rio Grande bosque as part of the Bosque Ecosystem Monitoring Program. Students will begin a “life list” in which they will identify and study 15 species per semester. Current events pertaining to the environment will be required weekly. One research paper will be required each semester. All tests will be comprehensive.

Homework will include project presentations, problem-based learning research, independent research and experimentation, laboratory discussion with formal and informal write-ups, and additional reading assignments as required by the instructor.

Exams and Grading:  
Grades will consist of homework, announced and unannounced quizzes, reports and research assignments, laboratory pre and post quizzes and laboratory write-ups, both formal and informal and announced lecture-discussion exams. Class exams will follow the College Board method prescribed by the National AP Environmental Science Exam that includes a multiple-choice and essay question approach.

Grades will be weighted as follows:  
Tests/Quizzes 40%  
Homework/Classwork 20%  
Labs/Projects/Fieldwork 20%  
Final Exam 20%

Laboratory Information:  Students may work individually or with lab partners as assigned. Pre and post lab information will be given. Lab reports will be due as assigned. Lab grades can be assessed on (1) pre and post quizzes, (2) individual or group lab reports (both formal and informal), lab participation, and (3) performance based assessment. All safety rules for laboratory participation will be followed as prescribed and or posted.

Attendance:  Class attendance is crucial to success in AP Environmental Science. Students are expected to be in class for every meeting. I will follow the school and district policies regarding make up work. Tardiness will not be tolerated.

NO late work will be accepted for credit!
Electronic devices: The use of cell phones and MP3 players in class is prohibited in school and district policies. These devices will be confiscated and turned in to the office if they are seen or heard.

Dress code: The school/district dress code is expected to be followed at all times. Students out of dress code will be referred to the office.

Course Outline: The following outline of major topics serves to describe the scope of the AP Environmental Science course and exam. The order of topics in the outline holds no special significance, since there are many different sequences in which the topics can be appropriately addressed in the course. The percentage after each major topic heading shows the approximate proportion of multiple-choice questions on the exam that pertain to that heading; thus, the percentage also indicates the relative emphasis that should be placed on the topics in the course.

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; atmosphere–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. Ecosystem Structure
      (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. Population (10–15%)

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

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

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

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

IV. Land and Water Use (10–15%)

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

   2. Controlling pests
      (Types of pesticides; costs 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
   1. Urban land development
      (Planned development; suburban sprawl; urbanization)
   2. Transportation infrastructure
      (Federal highway system; canals and channels; roadless areas; ecosystem impacts)
   3. Public and federal lands
      (Management; wilderness areas; national parks; wildlife refuges; forests; wetlands)
   4. Land conservation options
      (Preservation; remediation; mitigation; restoration)
   5. 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
      1. History
         (Industrial Revolution; exponential growth; energy crisis)
      2. Present global energy use
3. 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. Hydroelectric 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

1. 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)

2. Noise pollution
   (Sources; effects; control measures)

3. 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)

4. Solid waste
   (Types; disposal; reduction)
B. Impacts on the Environment and Human Health

1. Hazards to human health
   (Environmental risk analysis; acute and chronic effects; dose-response relationships; air pollutants; smoking and other risks)

2. 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

1. Habitat loss; overuse; pollution; introduced species; endangered and extinct species

2. Maintenance through conservation

3. Relevant laws and treaties