

## AP Environmental Science Course Syllabus

### Course Description:

Welcome to APES! This class will look at many topics in Environmental Science. We will cover major environmental topics such as biodiversity, global warming, energy, the atmosphere, water, soil, human populations, and waste. Because this course is Environmental **Science** and not Environmental Studies, it will fulfill the 40% College Board and Texas requirements by providing a large laboratory and field investigation component. This allows students to learn about the environment through first hand observation.

### Textbook:

*Environmental Science; Toward a Sustainable Future* by Richard T. Wright and Bernard J. Nebel (Prentice Hall 8<sup>th</sup> edition, 2002)

### Course Outline:

Topic	Duration
Terrestrial Ecology <ul style="list-style-type: none"> <li>• Population dynamics</li> <li>• Communities and niches</li> <li>• Terrestrial biomes</li> <li>• Energy flow and pyramids</li> <li>• Biogeochemical cycles</li> <li>• Energy concepts</li> <li>• Biomagnification</li> </ul>	3 weeks
Third Rock from the Sun <ul style="list-style-type: none"> <li>• Geologic time scale</li> <li>• Plate tectonics</li> <li>• Earthquakes and volcanoes</li> <li>• Rock cycle</li> </ul>	2 weeks
Aquatic ecology <ul style="list-style-type: none"> <li>• Eutrophication</li> <li>• Freshwater biomes</li> <li>• Surface and groundwater issues</li> <li>• Conservation</li> </ul>	2 weeks
Human Populations <ul style="list-style-type: none"> <li>• Human population sizes &amp; distribution</li> <li>• Distribution and fertility rates</li> <li>• Growth rate and doubling times</li> <li>• Demographic transitions</li> <li>• Age structure diagrams</li> <li>• Global economics</li> <li>• Urban development and transportation</li> </ul>	4 weeks
Biodiversity <ul style="list-style-type: none"> <li>• Species diversity</li> <li>• Preservation, remediation, mitigation, restoration, conservation</li> <li>• Habitat loss</li> <li>• Exotic species</li> <li>• Endangered and extinct species</li> <li>• Deforestation</li> <li>• Economic impacts and decisions</li> <li>• Public and federal lands</li> <li>• Relevant laws</li> </ul>	2 weeks
Nonrenewable Resources and Energy	3 weeks

<ul style="list-style-type: none"> <li>• Energy forms, units and conversions</li> <li>• History and global energy use</li> <li>• Mining</li> <li>• Fossil fuel resources and use</li> <li>• Nuclear energy</li> <li>• Renewable energy</li> <li>• Energy conservation</li> <li>• Economic impacts and decisions</li> </ul>	
<p>Soil</p> <ul style="list-style-type: none"> <li>• Formation and composition</li> <li>• Physical and chemical properties</li> <li>• Soil types</li> <li>• Erosion and other soil problems</li> <li>• Conservation</li> <li>• Forestry, agriculture, and rangeland</li> </ul>	2 weeks
<p>Water</p> <ul style="list-style-type: none"> <li>• Pollution</li> <li>• Sources, causes, and effects</li> <li>• Surface and groundwater issues</li> <li>• Cultural Eutrophication</li> <li>• Water purification</li> <li>• Sewage treatment</li> <li>• Human health risks</li> <li>• Clean Water Act and other laws</li> </ul>	2 weeks
<p>Air</p> <ul style="list-style-type: none"> <li>• Air and noise pollution</li> <li>• Smog</li> <li>• Acid deposition</li> <li>• Indoor air pollutants</li> <li>• Clean Air Act and other laws</li> <li>• Human health risks</li> <li>• Stratospheric ozone and ozone depletion</li> <li>• Global warming</li> <li>• Economic impacts</li> </ul>	2 ½ weeks
<p>Pesticides</p> <ul style="list-style-type: none"> <li>• Types of pesticides</li> <li>• Cost and benefits of pesticide use</li> </ul>	2 ½ weeks

<ul style="list-style-type: none"> <li>• Hazards to human health</li> <li>• Hazardous chemicals</li> <li>• Integrated Pest Management</li> <li>• Relevant laws</li> </ul>	
<b>Meteorology</b> <ul style="list-style-type: none"> <li>• Seasons</li> <li>• Solar intensity and latitude</li> <li>• ENSO</li> <li>• Weather and climate</li> <li>• Atmospheric circulation and the Coriolus Effect</li> </ul>	2 weeks
<b>Marine Ecology</b> <ul style="list-style-type: none"> <li>• Saltwater</li> <li>• Ocean circulation</li> <li>• Global problems</li> <li>• Fishing techniques</li> <li>• Overfishing</li> <li>• Relevant laws and treaties</li> </ul>	2 weeks
<b>Waste Management</b> <ul style="list-style-type: none"> <li>• Solid waste disposal and reduction</li> <li>• Hazard chemicals and wastes</li> </ul>	2 weeks

Labs and Activities:

All labs and activities are conducted by the students in groups of 2-4 on a block schedule of 1 hour and 20 minutes.

Terrestrial Ecology:

Tragedy of the Commons	Goal – to learn what a common is and how humans can affect the commons
EcoColumn	Goal – to study the interrelationships between the land and water
Community Structure	Goal – to conduct population studies in an ecosystem
Terrestrial Ecology Field Study	Goal – to visit a natural ecosystem and

	conduct tests on the soil, different populations and other aspects of the terrestrial environment
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### Third Rock from the Sun

Earthquake activity	Goal – to learn how to read seismograms, locate epicenters and look at temperature gradients in the Earth
Virtual earthquake	Goal – to use an online tutorial program to read seismograms and locate the epicenter of an earthquake
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

### Aquatic Ecology

Estimating the populations of Daphnia	Goal – to learn to estimate the population size by removal sampling techniques
Web assignment on water management	Goal – to learn the difference between storm drains and storm sewers and to find out how water gets to our houses
Water, water everywhere	Goal – to learn about the different water issues occurring around the world
Aquatic field study	Goal – to test the water at a local river for chemical characteristics, flow rate, bacteria, aquatic life and diversity

### Human Populations

World Population Lab	Goal – to view histograms and dynamic histograms of different countries and learn to interpret them
Histogram Lab	Goal – practice interpreting histograms
Too Many People Activity	Goal – to graph population by dates, 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
Videos – “World in the Balance” and “The People Bomb”	Goal – to see the different population issues around the globe and ways to combat the problems

### Biodiversity

Dallas Zoo Project	Goal –to study an endangered species and then visit a local zoo to observe and evaluate the habitat of a given species
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### Nonrenewable Resources and Energy

Solar panel lab	Goal – to learn how photovoltaic cells work and how much energy they generate
Cookie lab	Goal – to discuss the impact of our use of fossil fuels and how that use affects the environment
Renewable Energy poster assignment	Goal –to compare the different renewable resources for energy
Research on nuclear energy	Goal – to evaluate the positive and negative aspects of nuclear energy
Video – “Chernobyl Heart”	Goal – to see the negative aspects of nuclear energy and learn what happened at Chernobyl

## Soil

Soil texture lab	Goal –to learn how to determine the texture of a soil sample
Soil permeability lab	Goal – to learn how to calculate the permeability of a sample of soil
Soil chemical lab	Goal – to determine the amount of Nitrogen, Phosphorous, and Potassium in a sample of soil and decide the best choice of fertilizers for that sample
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

## Water

Organic waste and its effect on dissolved O <sub>2</sub>	Goal – to learn how biological waste such as human feces affects water quality
Fish lab – Nuclear energy and its effect on the environment	Goal – to see the effects 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
Field trip to sewage treatment plant	Goal – to tour a sewage treatment plant and better understand the process of sewage treatment

## Air

Air pollution lab	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

## Pesticides

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 level on a plant
Earthworm and pesticides lab	Goal – to determine the environmental effects of various pesticides on soil dwelling organisms

## Meteorology

Doppler effect activity	Goal – to determine how Doppler radar locates storms and measures storm intensity
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

## Marine Ecology

Kelp research	Goal –to learn about the different ways kelp can be beneficial to humans, wildlife, and the environment
Marine field study	Goal – to visit a local aquarium to learn about beach zones, marine wildlife and habitat
Great Barrier Reef brochure activity	Goal – to study the characteristics and importance of the largest reef in the world

## Waste Management

Landfill and composting research	Goal – to learn how landfill work and what are the laws and requirements of one
Field trip to the landfill	Goal – to visit a local landfill to see how they manage and safely dispose of our town's waste