

AP Environmental Science
Topic Outline
2017-2018

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, phosphorous, 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; road less 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; over fishing; 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 demands; synfuels; environmental advantages/ disadvantages of sources)

D. Nuclear Energy

(Nuclear fission processes; 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 Zone

(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