

APES TOPIC OUTLINE

Earth Systems and Resources (10-15%)	The Living World (10-15%)	Population (10-15%)	Land and Water Use (10 – 15%)
<ul style="list-style-type: none"> • Earth Science Concepts (geologic time scale; plate tectonics, earthquakes, volcanism; seasons; solar intensity and latitude) • The Atmosphere (composition; structure; weather and climate; atmospheric circulation and the Coriolis Effect; atmosphere-ocean interactions; ENSO) • Global Water Resources and Use (freshwater/saltwater; ocean circulation; agricultural, industrial, and domestic use; surface and groundwater issues; global problems; conservation) • Soil and Soil Dynamics (rock cycle; formation; composition; physical and chemical properties; main soil types; erosion and other soil problems; soil conservation) 	<ul style="list-style-type: none"> • Ecosystem Structure (biological populations and communities; ecological niches; interactions among species; keystone species; species diversity and edge effects; major terrestrial and aquatic biomes) • Energy Flow (photosynthesis and cellular respiration; food webs and trophic levels; ecological pyramids) • Ecosystem Diversity (biodiversity; natural selection; evolution; ecosystem services) • Natural Ecosystem Change (climate shifts; species movement; ecological succession) • Natural Biogeochemical Cycles (carbon, nitrogen, phosphorous, sulfur, water conservation of matter) 	<ul style="list-style-type: none"> • Population Biology Concepts (population ecology; carrying capacity; reproductive strategies; survivorship) • Human population dynamics (historical population sizes; distribution; fertility rates; growth rates and doubling times; demographic transition; age-structure diagrams) • Human population size (strategies for sustainability; case studies; national policies) • Impacts of human population growth (hunger; disease; economic effects; resource use; habitat destruction) 	<ol style="list-style-type: none"> 1. Agriculture <ul style="list-style-type: none"> • Feeding a growing population (human nutritional requirements; types of agriculture; Green Revolution; genetic engineering and crop production; deforestation; irrigation; sustainable agriculture) • Controlling Pests (types of pesticides; costs and benefits of pesticide use; integrated pest management; relevant laws) 2. Forestry (tree plantations; old-growth forests; forest fires; forest management; national forests) 3. Rangelands (overgrazing; deforestation; desertification; rangeland management; federal rangelands) 4. Mining (mineral formation; extraction; global reserves; relevant laws and treaties) 5. Other Land Use <ul style="list-style-type: none"> • Urban Land Development (planned development; suburban sprawl; urbanization) • Transportation infrastructure (federal highway system; canals and channels; roadless areas; ecosystem impacts) • Public and federal lands (management; wilderness areas; national parks; wildlife refuges; forests; wetlands) • Land conservation options (preservation; remediation; mitigation; restoration) • Sustainable land-use strategies 6. Fishing (fishing techniques; overfishing; aquaculture; relevant laws and treaties) 7. Global Economics (globalization; World Bank; Tragedy of the Commons; relative laws and treaties)

Energy Resources and Consumption (10 – 15%)	Pollution (25 – 30%) Take Heed!	Global Change (10 – 15%)
<ol style="list-style-type: none"> Energy Concepts (energy forms; power; units; conversions; Laws of Thermodynamics) Energy Consumption <ul style="list-style-type: none"> History (Industrial Revolution; exponential growth; energy crisis) Present global energy use Future energy needs 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 fossil fuel energy sources) 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) Hydroelectric Power (dams; flood control; salmon; silting; other impacts) Energy Conservation (energy efficiency; CAFE standards; hybrid electric cars; mass transit) Renewable Energy (solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages) 	<ol style="list-style-type: none"> Pollution Types <ul style="list-style-type: none"> 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) Noise Pollution (sources; effects; control measures) 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) Solid Waste (types; disposal; reduction) Impacts on the Environment and Human Health <ul style="list-style-type: none"> Hazards to Human Health (environmental risk analysis; acute and chronic effects; dose-response relationships; air pollutants; smoking and other risks) Hazardous Chemicals in the Environment (types of hazardous waste; treatment/disposal of hazardous waste; cleanup of contaminated sites; biomagnification; relevant laws) Economic Impacts (cost-benefit analysis; externalities; marginal costs; sustainability) 	<ol style="list-style-type: none"> 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) Global Warming (greenhouse gases and the greenhouse effect; impacts and consequences of global warming; reducing climate change; relevant laws and treaties) Loss of Biodiversity <ul style="list-style-type: none"> Habitat loss; overuse; pollution; introduced species; endangered and extinct species Maintenance through conservation Relevant laws and treaties

