
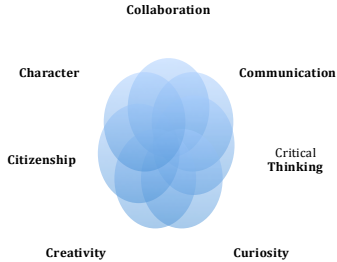


Content Area: Science	Course: AP Environmental Science	Grade Level: 11-12
	R14 The Seven Cs of Learning 	
Unit Titles	Length of Unit	
<ul style="list-style-type: none"> Environmental Systems and the Sustainability of Earth's Resources 	<ul style="list-style-type: none"> 2 weeks + summer 	
<ul style="list-style-type: none"> Water resources and pollution 	<ul style="list-style-type: none"> 5 weeks 	
<ul style="list-style-type: none"> Ecosystems, Global Climates and Biomes 	<ul style="list-style-type: none"> 4 weeks 	
<ul style="list-style-type: none"> Evolution & Earth Systems 	<ul style="list-style-type: none"> 3 weeks 	
<ul style="list-style-type: none"> Population and community Ecology 	<ul style="list-style-type: none"> 4 weeks 	
<ul style="list-style-type: none"> Energy Resources and Sustainability 	<ul style="list-style-type: none"> 3 weeks 	
<ul style="list-style-type: none"> Air pollution, Human Health and Environmental Risks 	<ul style="list-style-type: none"> 4 weeks 	
<ul style="list-style-type: none"> Biodiversity and Global Change 	<ul style="list-style-type: none"> 3 weeks 	

Strands	Course Level Expectations
Big Idea 1	<ul style="list-style-type: none"> Students will understand the makeup of all Earth systems and their importance to living organisms
Big Idea 2	<ul style="list-style-type: none"> Students will develop an in depth understanding of the interactions between living organisms and their environment.
Big Idea 3	<ul style="list-style-type: none"> Students will understand human population trends and the impact of the increasing human population on the environment
Big Idea 4	<ul style="list-style-type: none"> Students will understand the value of land and water resources as well as the consequences of their overuse, and humankind's role in creating a sustainable future.
Big Idea 5	<ul style="list-style-type: none"> Students will gain an understanding of current energy consumption, the current and future needs of nonrenewable energy sources and the development of renewable energy and alternative energy sources.
Big Idea 6	<ul style="list-style-type: none"> Students will understand the sources of pollution and the effects of pollutants on the environment and human health Students will recognize the economic impacts of pollution, and relevant laws dealing with pollution.
Big Idea 7	<ul style="list-style-type: none"> Students will recognize the benefits and consequences of human activity on the environment

* Course expectations based the course outlines from the College Board. For more information visit:
<https://apcentral.collegeboard.org/courses/ap-environmental-science?course=ap-environmental-science>

This page left blank intentionally.

Unit Title	Environmental Systems, and the Sustainability of Earth's Resources	Length of Unit	2 weeks + summer
-------------------	--	-----------------------	------------------

Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • How are scientific experiments different in environmental science? • Why should we value the earth?
Standards*	Big Idea: 1,5,6,7
Unit Strands & Concepts	<ul style="list-style-type: none"> • Ecosystem Structure • Energy • Economic Impacts • Sustainability
Key Vocabulary	Biotic, Abiotic, anthropogenic, ecological footprint, entropy,, microlending, precautionary principle

Unit Title	Environmental Systems, and the Sustainability of Earth's Resources	Length of Unit	weeks + summer
-------------------	--	-----------------------	----------------

Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • How to define the field of environmental science and discuss its importance. • Ways in which humans have altered and continue to alter our environment. • The scientific method and its application to the study of environmental problems. • The components and states of matter. • Various forms of energy and discuss the first and second laws of thermodynamics. • How natural systems change over time and space. • That economic systems are based on three forms of capital - natural, human, and manufactured. • The relationship among sustainability, poverty, personal action, and stewardship. • Sustainability in a variety of environmental contexts including human well-being. 	<ul style="list-style-type: none"> • Measure sustainability using the ecological footprint. • Describe some of the unique challenges and limitations of environmental science. • Describe key environmental indicators that help us evaluate the health of the planet. • Define systems within the context of environmental science. • Explain how scientists keep track of inputs, outputs, and changes to complex systems. • Describe the ways in which ecological systems depend on energy inputs. • Evaluate ways in which traditional economic analysis can do a better job of including the costs of economic activities on the environment and on people • Explain the role of laws and regulations in attempting to protect our natural and human capital.

Assessments:	Interim and summative assessments Laboratory performance assessment: Impact of a can of food
Teacher Resources:	Environmental Science for AP Textbook, Region 14 Implementation Guide

Unit Title	Water resources and pollution	Length of Unit	5 weeks
-------------------	--------------------------------------	-----------------------	---------

Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • Why is water scarcity an issue? • What makes water safe to drink?
Standards*	Big Idea: 1,6
Unit Strands & Concepts	<ul style="list-style-type: none"> • Global Water Resources and Use • Pollution
Key Vocabulary	floodplain, aqueduct, desalination, irrigation, point & nonpoint source, eutrophication, sediments, thermal pollution

Unit Title	Water resources and pollution	Length of Unit	5 weeks
-------------------	--------------------------------------	-----------------------	---------

Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • Earth's natural sources of water • The major human uses of water • Point and nonpoint sources of pollution • The ways in which human wastewater can cause water pollution • Contaminants that are non-chemical pollutants. • The connections among industrialization, affluence, and water-pollution legislation. 	<ul style="list-style-type: none"> • Discuss the ways in which humans manage water distribution • Identify the factors that will affect the future availability of water • Evaluate the different technologies that humans have developed for treating wastewater • Identify the major types of heavy metals and other substances that pose serious hazards to humans and the environment. • Discuss the impacts of oil spills and how such spills can be remediated.

Assessments:	Interim and summative assessments. Laboratory assessment: Nonnewaug River Study Simulation: Fish Banks
Teacher Resources:	Environmental Science for AP Textbook, Region 14 Implementation Guide

Unit Title	Ecosystems, Global Climates and Biomes	Length of Unit	4 weeks
-------------------	---	-----------------------	---------

Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • How does matter cycle in ecosystems? • How does climate affect the nature and location of biomes?
Standards*	Big Idea: 1 & 2
Unit Strands & Concepts	<ul style="list-style-type: none"> • Ecosystem Structure • Energy • Natural Ecosystem Change • Natural Biogeochemical Cycles
Key Vocabulary	producer, consumer, photosynthesis, cellular respiration, food chain, trophic levels, food web, decomposers, biomass, biosphere, ecological disturbance, albedo, adiabatic cooling and heating, latent heat release, Hadley cell, Coriolis effect,, El Nino

Unit Title	Ecosystems, Global Climates and Biomes	Length of Unit	4 weeks
-------------------	---	-----------------------	---------

Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • The basic components of an ecosystem • How carbon, nitrogen, and phosphorus cycle within ecosystems • The major terrestrial biomes • The major aquatic biomes • The amount of chemical energy available to organisms at each successive feeding level in food chains and webs decreases as it flows through ecosystems. • Differences in long-term average annual precipitation and temperature lead to the formation of tropical, temperate, and cold deserts, grasslands, and forests, and largely determine their locations • How biomass energy moves within an ecosystem 	<ul style="list-style-type: none"> • Explain how ecosystems respond to natural and anthropogenic disturbances • Discuss the values of ecosystems and how humans depend on them • Explain the forces that drive global circulation patterns and how those patterns determine weather and climate • Construct a scientific explanation detailing the effect of minor alterations in abiotic or biotic factors on the interconnected systems in a local ecosystem. • Model the flow of energy through a given ecosystem • Construct a model of the Earth's major biomes including their biotic and abiotic factors

Assessments:	Interim and summative assessments. Laboratory assessment
Teacher Resources:	Environmental Science for AP Textbook, Region 14 Implementation Guide

Unit Title	Evolution & Earth Systems	Length of Unit	3 weeks
Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • How are ecological footprints affecting the earth? • How do speciation, extinction, and human activities affect biodiversity? 		
Standards*	Big Idea: 1 & 2		
Unit Strands & Concepts	<ul style="list-style-type: none"> • Soil and Soil Dynamics • Ecosystem Diversity 		
Key Vocabulary	mutation, artificial selection, adaptation, genetic drift, bottleneck effect, founder effect, speciation, niche		

Unit Title	Evolution & Earth Systems	Length of Unit	3 weeks
Critical Content: My students will Know ...		Key Skills: My students will be able to (Do) ...	
<ul style="list-style-type: none">• The concept of biodiversity and how it is measured• The ways in which evolution can occur• The rock cycle and discuss its importance in environmental science• How soil forms and describe its characteristics• The theory of plate tectonics and discuss its importance in environmental science• As environmental conditions change, the balance between the formation of new species and the extinction of existing species determines the earth’s biodiversity.• Human activities are decreasing biodiversity by causing the extinction of many species and by destroying or degrading habitats needed for the development of new species• Populations evolve when genes mutate and give some individuals genetic traits that enhance their abilities to survive and to produce offspring with these traits (natural selection)		<ul style="list-style-type: none">• Explain the concept of an ecological niche• Explain how environmental change affects speciation and extinction• Describe the formation of Earth and the distribution of critical elements on Earth.• Explain how elements and minerals are extracted for human use• Analyze how weathering and erosion affect the rate of sedimentation• Identify the physical and chemical properties of soil and explain how they impact plant growth	
Assessments:	Interim and summative assessments. Laboratory assessment		
Teacher Resources:	Environmental Science for AP Textbook, Region 14 Implementation Guide		

Unit Title	Population and Community Ecology	Length of Unit	4 weeks
-------------------	---	-----------------------	---------

Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • What are the effects of increased global populations? • How do communities and ecosystems respond to changing environmental conditions?
Standards*	Big Idea: 3 & 4
Unit Strands & Concepts	<ul style="list-style-type: none"> • Human Population • Feeding and Growing Population • Agriculture, Fishing, and Mining
Key Vocabulary	carrying capacity, growth rate, exponential growth, logistic growth,, K-selected species, R-selected species, keystone species, bioaccumulation, genetic engineering, genetically modified organisms

Unit Title	Population and Community Ecology	Length of Unit	weeks
-------------------	---	-----------------------	-------

Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • The levels of complexity found in the natural world • The process of ecological succession • How latitude, time, area, and distance affect the species richness of a community • The potential limits to human population growth • Important aspects of global and national population growth using demographic terminology and tools • How people have attempted to harmonize economic development with sustainable development • Human nutritional needs and the challenges of overcoming hunger and malnutrition. • The benefits and costs of using genetically modified organisms in agriculture. • Alternatives to industrial farming methods 	<ul style="list-style-type: none"> • Contrast the ways in which density-dependent and density-independent factors affect population size. • Explain growth models, reproductive strategies, survivorship curves, and meta-populations. • Describe species interactions and the roles of keystone species • Evaluate the social, economic, and environmental factors that have contributed to decreasing growth rates in many countries. • Analyze relationships among changes in population size, economic development, and resource consumption at global and local scales • Explain the development of modern industrial agriculture, the role played by inputs such as irrigation water, fertilizers, and pesticides, and the environmental consequences of modern farming methods. • Explain the environmental impacts of various approaches to raising and harvesting meat and fish.

Assessments:	Interim and summative assessments. Laboratory assessment
Teacher Resources:	Environmental Science for AP Textbook, Region 14 Implementation Guide

Unit Title	Energy Resources and Sustainability	Length of Unit	3 weeks
-------------------	--	-----------------------	---------

Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • How can we cut energy waste? • How can we make the transition to a more sustainable energy future?
Standards*	Big Idea: 5
Unit Strands & Concepts	<ul style="list-style-type: none"> • Energy Consumption and Conservation • Fossil Fuel Resources and Use • Renewable Energy
Key Vocabulary	renewable and nonrenewable energy, fossil fuels,, nuclear energy,, radioactivity, Half- life, photovoltaic solar cell, geothermal energy

Unit Title	Energy Resources and Sustainability	Length of Unit	3 weeks
-------------------	--	-----------------------	---------

Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • How energy use and energy resources have varied over time, both in the United States and worldwide • The various means of generating electricity • The uses and consequences of using coal, oil, natural gas, and nuclear fuels • Renewable energy resources • Strategies to conserve energy and increase energy efficiency • The various forms of biomass energy 	<ul style="list-style-type: none"> • Compare the energy efficiencies of the extraction and conversion of different fuels • Describe projections of future supplies of our conventional energy resources • Explain the advantages and disadvantages of hydroelectricity, solar energy, geothermal energy, wind energy, and hydroge as energy resources. • Describe the environmental and economic options we must assess in planning our energy future.

Assessments:	Interim and summative assessments. Laboratory assessment
Teacher Resources:	Environmental Science for AP Textbook, Region 14 Implementation Guide

Unit Title	Air Pollution, Human Health and Environmental Risks	Length of Unit	4 weeks
Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • How do scientists analyze environmental risk? • How can we make the transition to a more sustainable low-waste society? 		
Standards*	Big Idea: 6 & 7		
Unit Strands & Concepts	<ul style="list-style-type: none"> • Pollution • Global Warming • Human Health Risks 		
Key Vocabulary	smog, primary and secondary pollutants, anthropogenic, thermal inversion, chlorofluorocarbons, superfund, toxicology, teratogens, carcinogens, endocrine disruptors epidemiology, biomagnification		

Unit Title	Air Pollution, Human Health and Environmental Risks	Length of Unit	4 weeks
-------------------	--	-----------------------	---------

Critical Content: My students will Know ...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • The major air pollutants and where they come from • The causes and effects of stratospheric ozone depletion • The hazards of indoor air pollution, especially in developing countries • Waste generation from an ecological and systems perspective. • The implications of landfills and incineration • The problems associated with the generation and disposal of hazardous waste. • The three major categories of human health risk • The major historical and emerging infectious diseases • The five major types of toxic chemicals 	<ul style="list-style-type: none"> • Explain how photochemical smog and acid deposition are formed and describe the effects of each • Examine various approaches to the control and prevention of outdoor air pollution. • Describe how each of the three Rs - reduce, reuse, and recycle - as well as composting can avoid waste generation. • Present a holistic approach to avoiding waste generation and to treating solid waste • Distinguish between dose-response studies, retrospective studies, and prospective studies • Describe the factors that help determine the chemical concentrations that organisms experience • Explain the factors that go into a risk analysis and distinguish between the two major philosophies of chemical regulation

Assessments:	Interim and summative assessments. Laboratory assessment
Teacher Resources:	Environmental Science for AP Textbook, Region 14 Implementation Guide

Unit Title	Biodiversity and Global Change	Length of Unit	3 weeks
Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • What are the Impacts of Climate Change? • What are the characteristics and impacts of globalization? 		
Standards*	Big Idea: 4 & 7		
Unit Strands & Concepts	<ul style="list-style-type: none"> • Land Use and Conservation • Global Warming • Biodiversity 		
Key Vocabulary	maximum sustainable yield, urban sprawl, urban blight,, mass extinction, biodiversity, greenhouse gases, greenhouse effect, global warming, carbon sequestration		

Unit Title	Biodiversity and Global Change	Length of Unit	weeks
-------------------	---------------------------------------	-----------------------	-------

Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • The causes and consequences of urban sprawl • Approaches and policies that promote sustainable use of land • The causes of declining biodiversity • How genetic diversity, species diversity, and ecosystem function are changing over time. • How solar radiation and greenhouse gases warm our planet • How CO2 concentrations and temperatures have changed over time • How global warming is affecting people and the environment • How the Kyoto Protocol aims to reduce global warming 	<ul style="list-style-type: none"> • Describe the concepts of the tragedy of the commons and maximum sustainable yield and explain how they pertain to land use issues • Describe the effects of land use on the composition of soil • Describe the function, operation, and efficacy of the four major public land management agencies in the United States. • Describe the single-species approach to conserving biodiversity including the major laws that protect species • Explain the ecosystem approach to conserving biodiversity and how size, shape, and connectedness affect the number of species that will be protected • Distinguish among global change, global climate change, and global warming • Describe the importance of feedback loops in the process of global warming

Assessments:	Interim and summative assessments. Laboratory assessments
Teacher Resources:	Environmental Science for AP Textbook, Region 14 Implementation Guide