

**Randolph Township Schools
Randolph High School**

**AP Environmental Science
Curriculum**

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Science, Technology, Engineering, and Math**
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Randolph Township Schools
Department of Science, Technology, Engineering, and Math
AP Environmental Science

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Randolph Township Schools

Mission Statement

We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.

Randolph Township Schools Affirmative Action Statement

Equality and Equity in Curriculum

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum addresses the elimination of discrimination and the achievement gap, as identified by underperforming school-level AYP reports for state assessment. The Curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

RANDOLPH TOWNSHIP BOARD OF EDUCATION EDUCATIONAL GOALS VALUES IN EDUCATION

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

- The needs of the child come first
- Mutual respect and trust are the cornerstones of a learning community
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
- A successful learning community communicates honestly and openly in a non-threatening environment
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth

Randolph Township Schools
Department of Science, Technology, Engineering, and Math
AP Environmental Science

Introduction

This course is designed to be the equivalent of a one-semester introductory college course in Environmental Science. Its goal is to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them. Laboratory and field investigations will be drawn from many areas of scientific study including biology, ecology, chemistry, physics, geology, meteorology and oceanography.

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
AP Environmental Science

SUGGESTED TIME ALLOTMENT	UNIT NUMBER	CONTENT - UNIT OF STUDY
3 weeks	I	Earth Systems and Resources
4 weeks	II	The Living World
3 weeks	III	Population Dynamics
3 weeks	IV	Land and Water Use
4 weeks	V	Energy Resources and Consumption
4 weeks	VI	Pollution
4 weeks	VII	Global Change
6 weeks	VIII	AP Exam Review
5 weeks	IX	Extensions and Enrichment

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
UNIT I: Earth Systems and Resources

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS	
Earth is made of systems that interact to support life on Earth.		<ul style="list-style-type: none"> • How do Earth's systems interact? • How do forces inside the Earth effect its topography? • How do the nonliving parts of Earth's systems provide the basic materials to support life? 	
KNOWLEDGE	SKILLS	CC/NJCCCS	
<p>Students will know:</p> <p>Chemical and physical properties of the geosphere.</p> <p>Types of tectonic plate boundaries, the action that occurs there, and the effects of the movements.</p> <p>The composition and properties of each layer of the atmosphere.</p> <p>How global wind and ocean currents are produced on the Earth's surface.</p> <p>Global water availability, categories of use, accessibility, and causes of depletion.</p>	<p>Students will be able to:</p> <p>Describe the chemical and physical properties of the geosphere.</p> <p>Identify plate boundaries and describe the action that is occurring at those boundaries.</p> <p>Describe the effects of the movement of crustal plates (i.e., earthquakes, sea floor spreading, mountain building, volcanic eruptions) at a given location on the planet.</p> <p>Describe the composition and properties of each layer of the atmosphere.</p> <p>Describe how global wind and ocean currents are produced on the Earth's surface.</p> <p>Describe water availability and the three primary categories of freshwater use.</p> <p>Discuss how freshwater can be both renewable and limited.</p> <p>Explain how groundwater is accessed.</p> <p>Relate the causes of surface and groundwater depletion to their effects.</p>	<p>5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.3.12.B.1 5.3.12.E.1 5.3.12.E.2 5.3.12.F.1 5.4.12.F.2 5.4.12.F.3 5.4.12.G.1</p>	

<p>Components of soil and the process by which soil forms.</p>	<p>Describe the components of soil and the process by which soil forms.</p> <p>Describe the horizons that make up a soil profile.</p> <p>Analyze a soil sample based on four characteristics used to classify soil.</p>	<p>5.4.12.G.3 5.4.12.G.4 5.4.12.G.5 5.4.12.G.6 5.4.12.G.7 RST.11-12.1 RST.11-12.2 RST.11-12.3</p>
<p>Practices that lead to soil degradation and soil conservation.</p>	<p>Describe practices that lead to soil erosion and some that can prevent it.</p> <p>Explain how and why we use and abuse soil and strategies to conserve soil.</p>	<p>RST.11-12.4 RST.11-12.5 RST.11-12.6 RST.11-12.7 RST.11-12.8 RST.11-12.9 RST.11-12.10</p>

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
AP Environmental Science
Unit I: Earth Systems and Resources

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 weeks	Unit I – Earth Systems and Resources <ul style="list-style-type: none"> ○ Earth Science ○ Atmosphere ○ Global Water Resources and Use ○ Soil and Soil Dynamics 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
Unit II: The Living World

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS
Organisms interact with each other and with Earth's systems.		<ul style="list-style-type: none"> How is an ecosystem structured in terms of biotic and abiotic factors? Why do biological communities change in response to changing environmental conditions? Why is it important to protect biodiversity?
KNOWLEDGE	SKILLS	CC/NJCCCS
Students will know: How species interactions shape communities and how community properties affect species and populations. Characteristics of terrestrial and aquatic biomes. Levels of organization studied by ecologists. Relationship between habitat and survival. How living organisms capture energy and create organic compounds. Ecological significance of trophic levels. Relationship among levels of primary productivity and different biomes. Energy transfer rates among trophic levels.	Students will be able to: Discuss how species interactions shape biological communities. Recognize the characteristics of some major terrestrial and aquatic biomes as well as the factors that determine their distribution. Describe the different levels of organization studied by ecologists. Discuss how an organism's habitat relates to its survival. Describe how living organisms capture energy and create organic compounds. Distinguish among species, populations, communities, and ecosystems, and summarize the ecological significance of trophic levels. Analyze consequences of variations in net primary production among biomes. Explain how feeding relationships can have both direct and indirect effects on community members.	5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.2.12.B.3 5.3.12.B.1 5.3.12.B.2 5.3.12.B.3 5.3.12.B.4

How evolution produces species diversity.	Describe how evolution produces species diversity.	5.3.12.B.5
How community properties affect species and populations.	Analyze how community properties affect species and populations.	5.3.12.B.6
How species interactions shape biological communities.	Discuss how species interactions shape biological communities.	5.3.12.C.1
Why communities are dynamic and change over time.	Explain why communities are dynamic and change over time.	5.3.12.D.1
What happens to a community after a disturbance.	Describe what happens to a community after a disturbance.	5.3.12.D.2
Biogeochemical cycles including water, carbon, nitrogen, sulfur, and phosphorus.	Compare the ways that water, carbon, nitrogen, sulfur, and phosphorus cycle within ecosystems.	5.3.12.D.3
How the law of conservation of matter applies to the behavior of nutrients in the environment.	Explain how the law of conservation of matter applies to the behavior of nutrients in the environment.	5.3.12.E.1
		5.3.12.E.3
		5.3.12.E.4
		5.4.12.B.3
		5.4.12.E.1
		5.4.12.E.2
		5.4.12.F.1
		5.4.12.F.2
		5.4.12.F.3
		5.4.12.G.1
		5.4.12.G.4
		5.4.12.G.5
		5.4.12.G.6
		5.4.12.G.7
		RST.11-12.1
		RST.11-12.2
		RST.11-12.3
		RST.11-12.4
		RST.11-12.5
		RST.11-12.6
		RST.11-12.7
		RST.11-12.8
		RST.11-12.9
		RST.11-12.10

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
Unit II: The Living World

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
4 weeks	Unit 2 – The Living World <ul style="list-style-type: none"> ○ Ecosystem Structure ○ Energy Flow ○ Ecosystem Diversity ○ Natural Ecosystem Change ○ Biogeochemical Cycles 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
Unit III: Population Dynamics

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS	
Growing human population impacts the environment.		<ul style="list-style-type: none"> How do changes in population size relate to environmental conditions? Why is it difficult to determine carrying capacity for human populations? How do government agencies regulate human population growth? 	
KNOWLEDGE	SKILLS	CC/NJCCCS	
Students will know: Factors that influence population growth rate. How limiting and biotic potential affect population growth. Characteristics of human populations that are used by demographers. Trends in human population growth. How to interpret age structure diagrams. How the demographic transition leads to a stable population size. How technological advances have contributed to human population growth. The history of human population growth. Total fertility rates and replacement fertility. How social, economic, and religious beliefs affect population growth rates.	Students will be able to: Describe the factors that influence a population's growth rate. Explain how limiting factors and biotic potential affect population growth. Identify characteristics of human population that are studied by demographers. Explain recent trend in population growth. Explain what age structure diagrams tell you about a population. Describe how technological advances have contributed to human population growth. Analyze the history of human population growth. Describe total fertility rates and replacement fertility. Relate how social, economic, and religious beliefs affect population growth rates.	5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.4.12.E.1 5.4.12.E.2 5.4.12.F.1 5.4.12.F.2 5.4.12.F.3	

Strategies employed by governments to curb or promote population growth.	Discuss strategies employed by governments to curb or promote population growth.	5.4.12.G.1 5.4.12.G.5 5.4.12.G.6 5.4.12.G.7
Relationships among human population growth and resources use and availability.	Relate human population growth with resource use and availability	RST.11-12.1 RST.11-12.2 RST.11-12.3
How humans impact the environment.	Describe how humans impact their environments.	RST.11-12.4 RST.11-12.5
Why population growth is a problem in terms of quality of life and habitat destruction.	Describe why population growth is a problem in terms of how population growth affects quality of life.	RST.11-12.6 RST.11-12.7 RST.11-12.8
	Describe the impact of increased human population the rate of habitat destruction.	RST.11-12.9 RST.11-12.10
	Discuss the negative and positive impacts of technology.	

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
AP Environmental Science
Unit III: Population Dynamics

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 weeks	Unit 3 – Population Dynamics <ul style="list-style-type: none"> ○ Population Biology ○ Human Population Dynamics ○ Human Population Size ○ Impact of Human Population Growth 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
UNIT IV: Land and Water Use

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS	
All organisms depend on land and water to survive.		<ul style="list-style-type: none"> How can we balance our needs for housing and jobs with the needs of the environment? How can we use Earth's resources sustainably? How can we balance our growing demand for food with our need to protect the environment? 	
KNOWLEDGE	SKILLS	CC/NJCCCS	
Students will know: Methods of organic and sustainable agriculture. Types of control of agricultural pests. Environmental risks of pesticides. Importance of pollinators. History and consequences of industrial agriculture and green revolution. Forest types of the world. Economic and ecological value of forests. Costs and benefits of different methods of timber harvest. Potential effects of fire suppression on an ecosystem.	Students will be able to: Evaluate methods of organic and sustainable agriculture. Identify and evaluate methods used to control agricultural pests. Evaluate the environmental risks of pesticide use. Identify the value of pollinators and evaluate the risk of pollinator population declines. Discuss the history of the industrial agriculture and green revolutions and evaluate positive and negative environmental and human health consequences. Discuss the types and uses of world forests. Analyze some of the ecological and economical values of forest resources. Describe the costs and benefits of the different methods of timber harvesting. Discuss the potential effects of fire suppression on an ecosystem and on future fires.	5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.2.12.B.3 5.3.12.B.1 5.4.12.E.1 5.4.12.E.2 5.4.12.F.1 5.4.12.F.2	

Relationship of consumer demand to sustainable forestry.	Explain how consumer demand is important to sustainable forestry.	5.4.12.F.3
Benefits of forest restoration.	Explain how restoring forests has benefits.	5.4.12.G.1
Location and status of grazing lands around the world.	Describe the location and state of grazing lands around the world.	5.4.12.G.3
Deforestation levels around the world.	Discuss the current levels of deforestation in the United States and in developing nations.	5.4.12.G.4
Differences between land cover and land use.	Differentiate between land cover and land use, and describe how people affect both.	5.4.12.G.5
Status of prairie restoration efforts.	Evaluate plans to restore prairies.	5.4.12.G.6
How urbanization occurs.	Explain how and where urbanization occurs.	5.4.12.G.7
Environmental impacts of urbanization.	Analyze and predict the environmental impacts of urbanization.	RST.11-12.1
Patterns and consequences of urban sprawl.	Describe the contributors to sprawl and its patterns.	RST.11-12.2
Value of open space.	Explain the impacts urban sprawl has on an area.	RST.11-12.3
Status of progress towards sustainability in cities around the world.	Analyze the importance of open space to a livable city.	RST.11-12.4
Urban challenges in developing and developed countries.	Discuss the progress toward sustainability some cities have made and its importance to the world.	RST.11-12.5
Types and locations of protected areas.	Compare and contrast urban challenges in the developing world and the developed world.	RST.11-12.6
How minerals form.	Evaluate the types and locations of nature preserves.	RST.11-12.7
Types of resources that are mined.	Describe how minerals form.	RST.11-12.8
Different mining methods.	Identify the types of resources that are mined.	RST.11-12.9
Negative impact of mining on the environment and society.	Evaluate different methods used for mining.	RST.11-12.10
	Describe the negative impact of mining on the environment and society.	

How mining is regulated.	Explain how mining is regulated.	
How mineral use and mining can become more responsible.	Describe ways that mineral use can become more responsible.	
Different fishing techniques.	Evaluate different fishing techniques.	
Consequences of overfishing on aquatic systems.	Discuss the consequences of overfishing on aquatic ecosystems.	
Benefits of Clean Water Act.	Discuss the benefits the Clean Water Act has had on aquatic ecosystems.	
How wetlands and streams are restored.	Compare approaches to restoring wetlands and streams.	
Trends in human population and resource consumption.	Describe the recent trends in human population and resource consumption.	
Economic worldviews.	Analyze economic worldviews.	
How the Tragedy of the Commons leads to environmental degradation.	Describe the Tragedy of the Commons.	
Major environmental laws, treaties, and conventions.	Evaluate major environmental laws.	
Purpose of international treaties and conventions.	Explain the purposes of international treaties and conventions.	

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Unit IV - Curriculum Pacing Chart
AP Environmental Science

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 weeks	Unit IV – Land and Water Use <ul style="list-style-type: none"> ○ Agriculture ○ Forestry ○ Rangelands ○ Other Land Uses ○ Mining ○ Fishing ○ Global Economics 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
UNIT V: Energy Resources and Consumption

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS	
Humans use and exploit environmental resources.		<ul style="list-style-type: none"> How will we be able to depend on nonrenewable energy sources for our energy needs in the future? Why is it important to develop alternative energy sources? How is the environment impacted by humans energy use? 	
KNOWLEDGE	SKILLS	CC/NJCCCS	
Students will know: How to differentiate among energy, work, and power. Different forms of energy. How to solve energy conversion problems. The Laws of Thermodynamics. How our energy use has varied over time. How human society currently uses energy resources. Predictions regarding the future demands of energy. How fossil fuels are formed. The uses of coal and how it is removed from the ground. The benefits and disadvantages of using coal. The uses of oil and how it is extracted. The consequences and rewards of exploiting oil.	Students will be able to: Compare and contrast energy, work, and power. Identify different forms of energy. Solve energy conversion problems. Apply the Laws of Thermodynamics to examples or scenarios. Describe how our energy use has varied over time. Describe how human society currently uses energy resources. Predict the future demand for energy. Explain how fossil fuels are formed. Describe the uses of coals. Evaluate how coal is removed from the ground. Describe the benefits and disadvantages of using coal. Describe the uses of oil and how it is extracted. Analyze the consequences of exploiting oil.	5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.2.12.B.3 5.3.12.B.1 5.4.12.E.1 5.4.12.E.2 5.4.12.F.1 5.4.12.F.2 5.4.12.F.3	

The characteristics and uses of natural gas.	Explain the characteristics of natural gas.	5.4.12.G.1
The advantages and disadvantages of natural gas.	Illustrate the advantages and disadvantages of natural gas.	5.4.12.G.3
The differences and similarities of nuclear fusion and fission.	Contrast nuclear fusion and fission.	5.4.12.G.4
How nuclear power plants generate electricity.	Describe how a nuclear power plant generates electricity.	5.4.12.G.5
The advantages and disadvantages of nuclear energy.	Analyze the potential risk of nuclear power.	5.4.12.G.6
The issues and risks associated with nuclear power and radioactive waste.	Evaluate the problems associated with radioactive waste.	5.4.12.G.7
How river water can be used to generate electricity.	Describe how river water can be used to generate electricity.	RST.11-12.1
Benefits and costs of hydroelectric power.	Identify costs and benefits of hydroelectric power.	RST.11-12.2
Benefits and costs of dams and diversions.	Analyze the problems associated with dams and diversions.	RST.11-12.3
How energy conservation can help us meet our energy needs.	Explain how energy conservation can help us meet our energy needs.	RST.11-12.4
Methods of energy conservation.	Describe methods of energy conservation.	RST.11-12.5
Energy efficiency and CAFÉ standards.	Analyze CAFÉ and energy efficiency standards.	RST.11-12.6
Benefits and current status of renewable energy resources.	Explain the benefits and current status of renewable energy resources.	RST.11-12.7
Techniques for using solar energy to heat buildings and generate electricity.	Describe techniques for using solar energy to heat buildings and generate electricity.	RST.11-12.8
Differences between active and passive solar energy.	Discuss the differences between active and passive solar energy.	RST.11-12.9
Benefits and costs of solar energy.	Analyze the benefits and costs of solar energy.	RST.11-12.10
How wind energy can be used to produce electricity.	Explain how wind energy can be used to produce electricity.	
The benefits and costs of wind energy.	Analyze the benefits and costs of wind energy.	

How a hydrogen fuel cell works and how they are used.	Describe how a hydrogen fuel can be produced.	
	Discuss the potential of fuel cells.	
	Explain the way fuel cells work and how they are used.	
How we get energy from biomass and how it is used.	Explain how we get energy from biomass and how it is used.	
How geothermal energy is harnessed and used.	Describe how geothermal energy is harnessed and used.	
How energy from the ocean can generate electricity.	Describe how energy from the ocean can generate electricity.	

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
AP Environmental Science
Unit V – Energy Resources and Consumption

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 weeks	Unit V – Energy Resources and Consumption <ul style="list-style-type: none"> ○ Energy Concepts ○ Energy Consumption ○ Fossil Fuel Resources and Use ○ Nuclear Energy ○ Hydroelectric Power ○ Energy Conservation ○ Renewable Energy 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
UNIT VI: Pollution

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS
Pollution impacts the environment and human health.		<ul style="list-style-type: none"> • What is the relationship between environmental health and our own health? • How can we best balance our own interests and needs with the health of the environment? • How do our choices as consumers and waste producers affect our environment?
KNOWLEDGE	SKILLS	CC/NJCCCS
Students will know: Natural sources of air pollution. Human-caused sources of air pollution. How climate, topography, and atmospheric processes affect air quality. The effects of air pollution on human health. Current air quality conditions and future prospects. Sources of noise pollution. Effects of noise pollution. Potential control measures for noise pollution. Sources and types of water pollution. How to investigate water quality.	Students will be able to: Identify natural sources of air pollution. Discuss human-caused air pollution. Explain how climate topography and atmospheric processes affect air quality. Compare the effects of air pollution. Evaluate air pollution control. Evaluate current air conditions and future prospects. Identify sources of noise pollution. Describe the effects of noise pollution. Describe control measures for noise pollution. Describe the types and effects of water pollutants. Analyze water quality.	5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.2.12.B.2 5.2.12.B.3 5.2.12.C.1 5.3.12.A.6 5.3.12.B.1

How water pollution is controlled.	Explain water pollution control.	5.4.12.E.1
Water-related legislation.	Summarize water-related legislation.	5.4.12.E.2
Components of solid waste.	Identify the components of solid waste.	5.4.12.F.1
How wastes have been and are being disposed of and/or treated.	Describe how wastes have been--and are being--disposed of or treated.	5.4.12.F.2
How we might shrink our waste stream.	Identify how we might shrink the waste stream.	5.4.12.F.3
How global disease is changing.	Describe health and disease and how global disease burden is now changing.	5.4.12.G.1
Types of environmental health hazards.	List the types of environmental health hazards.	5.4.12.G.3
How chemical hazards affect human health.	Discuss how chemical hazards affect human health.	5.4.12.G.4
	Compare and contrast epidemiology and toxicology.	5.4.12.G.5
Why emerging diseases are important to monitor and control.	Explain why emerging diseases are important to monitor and control.	5.4.12.G.6
How to minimize toxic effects.	Characterize mechanisms for minimizing toxic effects.	5.4.12.G.7
How to measure toxicity.	Evaluate risk assessment and acceptance.	RST.11-12.1
How to evaluate risk and manage risk.		RST.11-12.2
Why individuals respond differently to the same environmental hazards.	Describe the reasons why individuals respond differently to the same environmental hazards.	RST.11-12.3
Sources of hazardous waste.	Describe some of the sources of hazardous wastes.	RST.11-12.4
How to explain what makes chemicals hazardous.	Explain what makes chemicals hazardous.	RST.11-12.5
Where chemical hazards can be found in the environment.	Discuss where chemical hazards can be found in the environment.	RST.11-12.6
Current methods of hazardous waste disposal.	Describe current methods for hazardous waste disposal.	RST.11-12.7
		RST.11-12.8
		RST.11-12.9
		RST.11-12.10

<p>Indoor chemical hazards.</p> <p>How to explain biomagnification.</p> <p>Agencies that regulate hazardous waste.</p> <p>Relationship between economics and the environment.</p> <p>How economic worldviews compare.</p> <p>How to relate population, technology, and resource scarcity.</p> <p>How market mechanisms can reduce pollution.</p> <p>How some economies are working towards sustainability.</p>	<p>Identify some indoor chemical hazards.</p> <p>Describe biomagnification.</p> <p>Identify agencies that regulate hazardous waste.</p> <p>Explain the relationship between economics and the environment.</p> <p>Analyze economic worldviews.</p> <p>Scrutinize population, technology, and scarcity.</p> <p>Summarize how market mechanisms can reduce pollution.</p> <p>Describe ways that economies are working toward sustainability.</p>	
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RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
AP Environmental Science
Unit VI - Pollution

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
4 weeks	Unit VI – Pollution <ul style="list-style-type: none"> ○ Air Pollution ○ Noise Pollution ○ Water Pollution ○ Solid Waste ○ Hazards to Human Health ○ Hazardous Chemicals in the Environment ○ Economic Impacts 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
UNIT VII: Global Change

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS	
Earth is undergoing change due to natural causes and impact of humans.		<ul style="list-style-type: none"> How can we best balance our own interests and needs with the health of the environment? How can we reduce our use of ozone depleting products and reduce the emissions of greenhouse gases? What are the causes and consequences of a warming Earth? 	
KNOWLEDGE	SKILLS	CC/NJCCCS	
Students will know: How stratospheric ozone is formed. How air pollutants cause ozone depletion. The effects of ozone depletion. Strategies for reducing ozone depletion. Environmental laws dealing with ozone depletion. Evidence of global warming. Probable causes of global climate change. How we know recent climate change is human-caused. Effects of climate change. Methods used to study climate change. How climate change is affecting people now. How climate change may affect people in the future.	Students will be able to: Explain how stratospheric ozone is formed. Explain how air pollutants cause ozone depletion. Describe strategies for reducing ozone depletion. Describe some major environmental laws dealing with ozone depletion. Describe international efforts to reduce the ozone hole. Identify evidence of global warming. State the probable cause of global climate change. Explain how we know recent climate change is human-caused. Analyze the effects of climate change. Explain three methods used to study climate change. Explain how climate change is affecting people now. Predict future effects of climate change on people.	5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.2.12.B.1 5.2.12.B.2 5.2.12.B.3 5.2.12.C.1 5.2.12.D.1 5.3.12.A.6	

Solutions to slow climate change.	Identify some solutions being developed to slow climate change.	5.3.12.B.1
How to reduce greenhouse gases related to the use of electricity generation and transportation.	Analyze ways to reduce greenhouse gases related to the use and generation of electricity.	5.4.12.E.1
Environmental laws, treaties, and conventions related to climate change.	Describe some of the ways of reducing greenhouse gases related to transportation.	5.4.12.E.2
	Describe other strategies for reducing greenhouse gases.	5.4.12.F.1
	Describe some major environmental laws dealing with climate change.	5.4.12.F.2
	Explain how nations are working together to try to address climate change.	5.4.12.F.3
Threats to biodiversity.	Differentiate the components of biodiversity.	5.4.12.G.3
	Analyze the threats to biodiversity.	5.4.12.G.4
Strategies for managing ecosystems and habitats.	Describe three strategies for managing whole ecosystems and habitats.	5.4.12.G.5
Environmental laws related to biodiversity.	Describe some major environmental laws dealing with loss of biodiversity.	5.4.12.G.6
How biodiversity is monitored and current biodiversity trends.	Describe how biodiversity is monitored and explain current biodiversity trends.	5.4.12.G.7
		RST.11-12.1
		RST.11-12.2
		RST.11-12.3
		RST.11-12.4
		RST.11-12.5
		RST.11-12.6
		RST.11-12.7
		RST.11-12.8
		RST.11-12.9
		RST.11-12.10

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
AP Environmental Science
Unit VII – Global Change

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
4 weeks	Unit VII – Global Change <ul style="list-style-type: none"> ○ Stratospheric Ozone ○ Global Warming ○ Loss of Biodiversity 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
UNIT VIII: AP Exam Review

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS
Environmental science problems and issues typically relate to more than one discipline and therefore require an interdisciplinary approach to explain or solve.		<ul style="list-style-type: none"> How can an interdisciplinary approach be utilized to determine how to best balance our own interests and needs with the health of the environment?
KNOWLEDGE	SKILLS	CC/NJCCCS
<p>Students will know:</p> <p>The basic concepts of environmental science covered in this course.</p>	<p>Students will be able to:</p> <p>Apply their knowledge of environmental science to solve problems that require the application of principles from multiple units.</p>	5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.2.12.B.1 5.2.12.B.2 5.2.12.B.3 5.2.12.C.1 5.2.12.D.1 5.3.12.A.6 5.3.12.B.1 5.4.12.E.1

		5.4.12.E.2 5.4.12.F.1 5.4.12.F.2 5.4.12.F.3 5.4.12.G.3 5.4.12.G.4 5.4.12.G.5 5.4.12.G.6 5.4.12.G.7 RST.11-12.1 RST.11-12.2 RST.11-12.3 RST.11-12.4 RST.11-12.5 RST.11-12.6 RST.11-12.7 RST.11-12.8 RST.11-12.9 RST.11-12.10
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RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
AP Environmental Science
Unit VIII – AP Exam Review

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
6 weeks	Unit VIII – AP Exam Review <ul style="list-style-type: none"> ○ Earth Systems and Resources ○ The Living World ○ Population Dynamics ○ Land and Water Use ○ Energy Resources and Consumption ○ Pollution ○ Global Change 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science
UNIT IX: Extensions and Enrichment

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS
Earth is composed of systems and biological communities that are in constant interaction.		<ul style="list-style-type: none"> How can we sustainably interact with the environment and balance our own interests and needs with the health of the environment?
KNOWLEDGE	SKILLS	CC/NJCCCS
<p>Students will know:</p> <p>Several specific real-world applications of Environmental Science.</p>	<p>Students will be able to:</p> <p>Demonstrate in writing a thorough understanding of the application of skills and concepts of Environmental Science to real-world problems via teacher assigned projects.</p>	5.1.12.A.1 5.1.12.A.2 5.1.12.A.3 5.1.12.B.1 5.1.12.B.2 5.1.12.B.3 5.1.12.B.4 5.1.12.C.1 5.1.12.C.2 5.1.12.C.3 5.1.12.D.1 5.1.12.D.2 5.1.12.D.3 5.2.12.A.2 5.2.12.A.1 5.2.12.A.2 5.2.12.A.3 5.2.12.A.4 5.2.12.A.5 5.2.12.A.6 5.2.12.B.1 5.2.12.B.2 5.2.12.B.3 5.2.12.C.1 5.2.12.D.1 5.3.12.A.6 5.3.12.B.1 5.4.12.E.1

		5.4.12.E.2 5.4.12.F.1 5.4.12.F.2 5.4.12.F.3 5.4.12.G.3 5.4.12.G.4 5.4.12.G.5 5.4.12.G.6 5.4.12.G.7 RST.11-12.1 RST.11-12.2 RST.11-12.3 RST.11-12.4 RST.11-12.5 RST.11-12.6 RST.11-12.7 RST.11-12.8 RST.11-12.9 RST.11-12.10
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RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
AP Environmental Science
Unit IX – Extensions and Enrichment

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
5 weeks	Unit IX – Extensions and Enrichment <ul style="list-style-type: none"> ○ Applications of all previously studied units. 	Textbook: Withgott and Brennan, <i>Environment, The Science Behind The Stories</i> , 2011. Online Textbook Resources: http://www.masteringenvironmentalscience.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science

APPENDIX A

RESOURCES:

Textbook:

Environment, The Science Behind The Stories

Authors: Withgott and Brennan

ISBN13: 9780132182485

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Online Textbook Resources:

<http://www.masteringenvironmentalscience.com/>

Technology:

- Spreadsheet software such as Excel
- Word processor software such as Word
- Presentation software such as Powerpoint

Web addresses:

Hippocampus AP Environmental Science videos and animations:

<http://www.hippocampus.org/HippoCampus/Earth%20Science;jsessionid=89266BBEE7678248358128E3FFF9D8F8?view=Media&user=poloachkevin>

Online Textbook Resources:

<http://www.masteringenvironmentalscience.com/>

Earthlabs online simulations and lab activities:

<http://serc.carleton.edu/eslabs/index.html>

Bird Conversation Research, Inc. lab activities:

http://www.birdconservationresearch.org/educators/lab_activities.php

NOAA Earth System Research Lab Carbon Cycle resources:

<http://www.esrl.noaa.gov/gmd/outreach/index.html>

Kennesaw State University Environmental Science Project Resources:

<http://esa21.kennesaw.edu/activities/activities.htm>

Cornell University Environmental Inquiry

<http://ei.cornell.edu/teacher/index.html>

Annenberg Learner Resources (interactives):

<http://www.learner.org/interactives/rockcycle/index.html>

Suggested Lab Exercises:

- Water pollution testing
- Macroinvertebrate sampling
- Plankton identification
- Greenhouse gases
- Methane bioreactors
- Secondary Succession
- Avian point counts
- World Population Growth
- Airborne Particulate Pollution
- Toxicology/LD50
- Natural selection simulation.
- Water purification
- Soil Salinization
- Soil Analysis
- Organic Gardening
- Worm composting
- PCQM forest structure analysis
- Herpetile sampling
- Biodiversity sampling
- Specific heat and climate
- Copper extraction
- Energy and recycling
- Net Primary Productivity
- Predator-Prey simulation

- Population distribution and survivorship
- Solar absorption
- Acid rain
- Nitrates, phosphates, and algae
- Solar cookers
- What's a watershed
- Cereal Box Lab (waste reduction)

Suggested Videos/Documentaries:

- National Geographic Strange Days on Planet Earth
- Dirt! The Movie
- Homo toxicus
- Crude
- Gasland
- Flow
- Fuel
- An Inconvenient Truth
- Food, Inc.
- Nova: World in the Balance
- Addicted to Plastic
- Frontline: Heat
- Frontline: Hot Politics
- National Geographic: Human Footprint
- CNN: Planet in Peril

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science

APPENDIX B

ASSESSMENT:

- Quiz
- Test
- Individual Projects
- Group Projects
- Lab Reports
- Homework

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science

APPENDIX C

Opportunities exist for interdisciplinary units with courses such as Statistics, Animal Behavior, Marine Biology, Earth Systems, and Genetics.

RANDOLPH TOWNSHIP SCHOOL DISTRICT
AP Environmental Science

APPENDIX D

It is assumed that the student has successfully completed Biology.