



# SPRING GROVE AREA SCHOOL DISTRICT



## PLANNED COURSE OVERVIEW

<b>Course Title:</b> Environmental Science II <b>Grade Level(s):</b> 11-12 <b>Units of Credit:</b> 1 <b>Classification:</b> Elective		<b>Length of Course:</b> Full Year <b>Periods Per Cycle:</b> 6 <b>Length of Period:</b> 40 Minutes <b>Total Instructional Time:</b> 120 Hours	
<b>Course Description</b>			
<p>Environmental Science II is an advanced course that provides in-depth study of the relationships between organisms and their physical surroundings. Students will use current, integrated case studies that provide a context for understanding science and environmental concerns. The focus is on the effects of humans and human activities within the worldwide ecosystem. Investigation into the methods and findings of numerous established academic disciplines will contribute to the breadth of this course, from ecology to geology to chemistry to economics to political science to ethics. Extended laboratory activities will be included with each unit of study. Students electing this course must meet the prerequisite of a “B” in the first level of Environmental Science or a “C” in Chemistry 1.  <i>This course does qualify for Future Farmers of American (FFA) coursework.</i></p>			
<b>Instructional Strategies, Learning Practices, Activities, and Experiences</b>			
Class Projects Large-Scale Projects Presentations Earth Day Lesson for 6 <sup>th</sup> Graders	Analytical Problem Solving Collaborative Discussion Real-Life Science Activities	Critical Thinking Skills School-Wide Compost Program Maintenance of Wetlands, Rain Gardens, and Veterans’ Memorial	
<b>Assessments</b>			
Projects Debates Presentations	Plan and Teach Lessons (Earth Day) Research	Lab Activities Class Assignments	
<b>Materials/Resources</b>			
Outside Resources (i.e. Wetlands, Rain Garden, Veteran’s Memorial)	Laboratory Equipment	Technology	

**Adopted:** 8/20/07

**Revised:** 5/15/17 (overview only), 5/22/23

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Foundations of Environmental Science</b></p> <ul style="list-style-type: none"> <li>• Nature of Environmental Science</li> <li>• Biodiversity and Invasive Species</li> <li>• Sustainability</li> </ul>	<p>HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.</p> <p>HS-LS2-6. Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions but changing conditions may result in a new ecosystem.</p> <p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.</p> <p>NRS.01.06.02. c. Evaluate the presence and impact of invasive species on natural resources in a given area and devise a plan to prevent, control or eliminate invasive species from that habitat.</p> <p>NRS.02.05. Communicate information to the public regarding topics related to the management, protection, enhancement, and improvement of natural resources.</p> <p>NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region.</p>

<b>CONTENT/KEY CONCEPTS</b>	<b>OBJECTIVES/STANDARDS</b>
<p><b>Environmental Ethics</b></p> <ul style="list-style-type: none"><li>• Current Environmental Issues</li><li>• Influential Environmentalist</li></ul>	<p>HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.</p> <p>ESS.02.02. Compare and contrast the impact of current trends on regulation of environmental service systems (e.g., climate change, population growth, international trade, etc.).</p> <p>NRS.02.03. Analyze how modern perceptions of natural resource management, protection, enhancement and improvement change and develop over time.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Environmental Policy</b></p> <ul style="list-style-type: none"> <li>• Environmental Based Court Cases</li> <li>• Policy Making</li> <li>• Conservation Policies and Regulations</li> </ul>	<p>HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.</p> <p>HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.</p> <p>ESS.02.01. Interpret and evaluate the impact of laws, agencies, policies, and practices affecting environmental service systems.</p> <p>ESS.02.02. Compare and contrast the impact of current trends on regulation of environmental service systems (e.g., climate change, population growth, international trade, etc.).</p> <p>NRS.02.01. Examine and interpret the purpose, enforcement, impact and effectiveness of laws and agencies related to natural resource management, protection, enhancement, and improvement (e.g., water regulations, game laws, historic preservation laws, environmental policy, etc.).</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Ecology</b></p> <ul style="list-style-type: none"> <li>• From Chemistry to Energy of Life</li> <li>• Evolution, Biodiversity, Population Ecology</li> <li>• Species Interactions and Community Ecology</li> <li>• Endangered and Extinct Species</li> </ul>	<p>HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.</p> <p>HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.</p> <p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>HS-LS2-8. Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.</p> <p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.</p> <p>HS-LS2-8. Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.</p> <p>HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.</p> <p>HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.</p> <p>HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.</p> <p>NRS.01.06. Apply ecological concepts and principles to living organisms in natural resource systems.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Critical Components of Food and Agriculture</b></p> <ul style="list-style-type: none"> <li>• Human Population</li> <li>• Soil</li> <li>• Future of Food</li> <li>• Food Insecurity and Waste</li> <li>• Biotechnology</li> </ul>	<p>HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.</p> <p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</p> <p>ESS.03.02. Apply soil science and hydrology principles to environmental service systems.</p> <p>ESS.05.02. Perform assessments of environmental conditions using equipment, machinery, and technology.</p> <p>AS.08. Analyze environmental factors associated with animal production.</p>

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<p><b>Management</b></p> <ul style="list-style-type: none"> <li>• Resource Management</li> <li>• Conservation Biology</li> <li>• Urbanization</li> <li>• Environmental Health and Toxicology</li> </ul>	<p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.</p> <p>HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.</p> <p>ESS.04.03. Apply techniques to ensure a safe supply of drinking water and adequate treatment of wastewater according to applicable rules and regulations.</p> <p>ESS.05.02. Perform assessments of environmental conditions using equipment, machinery, and technology.</p> <p>NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Resources, Problems, and Solutions</b></p> <ul style="list-style-type: none"> <li>• Freshwater Resources</li> <li>• Oceans</li> <li>• Atmospheric Science and Air Pollution</li> <li>• Global Climate Change</li> </ul>	<p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.</p> <p>HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.</p> <p>NRS.01.03. Apply ecological concepts and principles to atmospheric natural resource systems.</p> <p>ESS.04.03. Apply techniques to ensure a safe supply of drinking water and adequate treatment of wastewater according to applicable rules and regulations.</p> <p>NRS.01.04. Apply ecological concepts and principles to aquatic natural resource systems.</p>



CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Renewable vs. Nonrenewable Resources</b></p> <ul style="list-style-type: none"> <li>• Fossil Fuels</li> <li>• Conventional Energy</li> <li>• New Renewable Energy Alternatives</li> </ul>	<p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.</p> <p>NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.</p> <p>NRS.03.01. Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.).</p>