



SPRING GROVE AREA SCHOOL DISTRICT



PLANNED COURSE OVERVIEW

Course Title: Environmental Science I Grade Level(s): 10-12 Units of Credit: 1 Classification: Core/Elective	Length of Course: Full Year Periods Per Cycle: 6 Length of Period: 40 Minutes Total Instructional Time: 120 Hours
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Course Description

Environmental science is a multidisciplinary course that helps students better understand the relationship between humans and the world they live in. This course, as an applied science, will incorporate principles of chemistry and biology to help achieve practical goals. The focus of environmental science is conservation and the protection of natural resources. *This course does qualify for Future Farmers of American (FFA) coursework.*

Instructional Strategies, Learning Practices, Activities, and Experiences

Class Projects Discussion Lecture	Lab Activities Worksheets Concept Mapping	Demonstrations Field Activities Debates
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Instructional Videos Assessments

Tests and Quizzes Debates Research	Projects Presentations Design / Construct Models	Labs Class Assignments
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Materials/Resources

Outdoor resources-wetlands, rain gardens	Laboratory Equipment	Technology
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Adopted: 11/20/91

Revised: 7/15/98; 11/15/01; 8/20/07; 5/22/23

https://springgroveareasco.sharepoint.com/sites/PrivateSGASD/Shared Documents/AASG/NEWCURR/SCIENCE/2023/HS Science Elective Courses/Environmental Science 1/Environmental Sci 1_Overview.doc

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Introduction to Environmental Science</p> <ul style="list-style-type: none">• Understanding Environment• Time Periods Effect on Environment• Population Growth and Demographics• Sustainability/Ecological Footprint	<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>NRS.02.01. Analyze the interrelationships between natural resources and humans.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Ecosystems/Ecology</p> <ul style="list-style-type: none">• Systems-Levels of Organization• Species Interactions• Species Adaptation• Ecosystem Dynamics	<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>NRS.01.06. Apply ecological concepts and principles to living organisms in natural resource systems.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Energy Flow and Matter</p> <ul style="list-style-type: none"> • Energy Flow in Ecosystems • Cycling of Materials • How Ecosystems Change-Succession 	<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>MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.</p> <p>NRS.01.03.01.c. Evaluate and make recommendations to lessen the impact of human activity on the ability of the atmosphere to regulate biogeochemical cycles.</p> <p>NRS.01.05.01. b. Analyze and summarize examples of stages of succession.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Biomes/Kinds of Ecosystems</p> <ul style="list-style-type: none">• Define Biomes• What Defines Certain Biomes• Forests, Grasslands, Deserts, Tundra	<p>HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.</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-LS2-8. Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.</p> <p>ESS.03.05.02. a. Examine and explain the role played by habitats on environmental service systems.</p>

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<p>Water</p> <ul style="list-style-type: none">• Water Resources• Freshwater and Ocean Pollution• Water Quality Assessments	<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>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>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.01.04. Apply ecological concepts and principles to aquatic natural resource systems.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Air, Atmosphere, and Climate</p> <ul style="list-style-type: none">• Air Pollution and Effects on Human Health• Acid Precipitation• Climate and Climate Change• Ozone Layer-Greenhouse Gasses	<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>NRS.01.03. Apply ecological concepts and principles to atmospheric natural resource systems.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Land</p> <ul style="list-style-type: none">• Urban Areas• Land Use Practices• US Public Land	<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>ESS.05.02. Perform assessments of environmental conditions using equipment, machinery, and technology.</p> <p>RS.01.05. Apply ecological concepts and principles to terrestrial natural resource systems.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Food and Agriculture</p> <ul style="list-style-type: none">• Feeding the World• Food• Soil Science• Pest Control• Agricultural Practices and Regulations	<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>MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</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>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Biodiversity and Invasive Species</p> <ul style="list-style-type: none"> • Invasive Species • Biodiversity at Risk • Public Policy-Future • Sustaining Biodiversity 	<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>NRS.01.06.02.b. Analyze factors that influence the establishment and spread of invasive species and determine the appropriate steps to prevent or minimize the impact of invasive species.</p> <p>NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Energy and Resources</p> <ul style="list-style-type: none"> • Renewable vs. Nonrenewable • Fossil Fuels • Nuclear Energy • Energy Conservation and Alternative Energy Sources 	<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>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>Waste</p> <ul style="list-style-type: none">• Solid Waste• Hazardous Waste• Waste Option for the Future• Waste Regulations	<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>ESS.04.02. Manage safe disposal of all categories of solid waste in environmental service systems.</p>

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<p>Environmental Action and Policy</p> <ul style="list-style-type: none"> • International Cooperation • US Policy 	<p>HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</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>