SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Environmental Science 2	Length of Course: 30 cycles
Grade Level(s): 12	Periods Per Cycle: 6
Units of Credit: 1	Length of Period: 43 minutes
Classification: Elective	Total Instructional Time: 129 hours

Course Description

Environmental Science 2 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.

Instructional Strategies, Learning Practices, Activities, and Experiences

Class Projects	Analytical Problem Solving	Critical Thinking Skills
Large-scale Projects	Collaborative Discussion	School-wide Compost Program
Presentations	Real-life Science Activities	

Assessments

Paper Pencil Tests	Projects (plan and teach Earth Day lessons to 6h grade; maintain the Rain Gardens and wetlands around campus; community connections with The Walk of Heroes and maintain Veterans' Memorial Garden)	Problem Solving- turning landfill waste into compost by collecting materials around the building each day
Quizzes		Labs-removal of invasive species; identification of native wetland plants, water and soil quality assessment, planting and maintaining the vegetable gardens
Debates	Research (Marcellus Shale hydrofracking, Chesapeake Bay dead zones, success/failure of federal legislation aimed at environmental issues)	

Materials/Resources

Textbook: Environment, The Science Behind The Stories (Pearson, 2007)	Handouts	Safety Equipment
	Laboratory Equipment	Technology Equipment

Adopted: 8/20/07
Revised: 5/15/17 (planned course overview only)

CONTENT Env. Science II – Gr. 12	**STANDARDS**	**GRADE-LEVEL BENCHMARKS** **GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Foundations of Environmental Science • The nature of environmental science • Environmental ethics and economics	**S11.A.1.1** **S11.A.1.2** **S11.A.2.1**	**S11.A.1.1.1** Compare and contrast scientific theories, scientific laws, and beliefs (e.g., stages of ecological succession; biotic and abiotic factors; the population bomb) **S11.A.1.2.1** Apply and explain scientific concepts to societal issues using case studies (e.g., the lesson of Easter Island, Spotting sewage by satellite) **S11.A.2.1.** Critique the elements of an experimental design	Laboratory activities Teacher demonstrations Research projects Worksheets Field activities Teacher-made lab activities Q and A sessions Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
TIME: 18 Days				
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Foundations of Environmental Science • Environmental policy	**S11.A.2.1** **S11.A.3.1** **S11.A.3.2** **S11.A.3.3**	**S11.A.2.1.2** Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate, communicate results) applicable to a specific technological design **S11.A.3.2.1** Compare the accuracy of predictions represented in a model to actual observations and behavior **S11.A.3.2.2** Describe advantages and disadvantages of using models to simulate processes and outcomes	Laboratory activities Teacher demonstrations Research projects Worksheets Nature Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Foundations of Environmental Science • From chemistry to energy to life **TIME:** 6 Days	**S11.A.3.1** **S11.B.1.1** **S11.B.1.3**	**S11.A.3.1.1** Apply systems analysis, showing relationships (e.g., flowcharts, decision trees, dichotomous keys, mind map), input and output, and measurements to explain a system and its parts **S11.B.1.1.1** Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical, ecological) **S11.B.1.1.3** Compare and contrast cellular processes (e.g., photosynthesis and cellular respiration)	Laboratory activities Teacher demonstrations Research projects Worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Ecology • Evolution, biodiversity and population ecology • Species interactions and community ecology • Environmental systems and ecosystem ecology	**S11.A.1.1** **S11.B.3.1** **S11.B.3.2**	**S11.A.1.1.4** Explain how specific scientific knowledge or technological design concepts solve practical problems (e.g., theory of evolution, laws of supply and demand) **S11.B.3.1.1** Explain the significance of diversity in ecosystems **S11.B.3.2.1** Use evidence to explain how cyclical patterns in population dynamics affect natural systems **S11.B.3.2.2** Explain biological diversity as an indicator of a healthy environment **S11.B.3.2.3** Explain how natural processes (e.g., seasonal change, catastrophic events, habitat alterations) impact the environment over time	Laboratory activities Teacher demonstrations Research projects Worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Critical Components • Human population **TIME:** 6 Days	**S11.A.3.2** **S11.B.3.3**	**S11.A.3.2.3** Describe how relationships represented in models are used to explain scientific or technological concepts (e.g., life spans, size of populations, topographic maps) **S11.B.3.3.2** Compare and contrast the impact of management practices (e.g., production, processing, research, development, marketing, distribution, consumption, by-products) in meeting the need for commodities locally and globally	Laboratory activities Teacher demonstrations Research projects Worksheets Reinforcement and vocabulary worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Critical Components • Soil and agriculture • Agriculture, biotechnology, and the future of food **TIME:** 18 Days	**S11.A.2.2** **S11.A.3.1** **S11.B.3.1** **S11.B.3.3**	**S11.A.2.2.2** Explain how technology is used to extend human abilities and precision (e.g., GPS, spectroscope, scanning electron microscope, pH meters, probes, interfaces, imaging technologies, telescope) **S11.A.3.1.2** Analyze and predict the effect of making a change in one part of a system on the system as a whole **S11.B.3.1.2** Explain the biotic (i.e., plant, animal, and microbial communities) and abiotic (i.e., soil, air, temperature, and water) components of an ecosystem and their interaction **S11.B.3.3.3** Explain the environmental benefits and risks associated with human-made systems (e.g., integrated pest management, genetically engineered organisms, organic food production)	Laboratory activities Teacher demonstrations Research projects Worksheets Reinforcement and vocabulary worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Management • Conservation biology • Resource management • Urbanization • Environmental health and toxicology **TIME:** 30 Days	**S11.A.3.1** **S11.B.3.1** **S11.D.1.2** **S11.D.1.3**	**S11.A.3.1.2** Analyze and predict the effect of making a change in one part of a system on the system as a whole **S11.B.3.1.5** Predict how limiting factors (e.g., physical, biological, chemical factors) can affect organisms **S11.D.1.2.1** Evaluate factors affecting availability, location, extraction, and use of natural resources **S11.D.1.3.3** Explain factors (e.g., nutrient loading, turbidity, rate of flow, rate of deposition, biological diversity) that affect water quality and flow through a water system	Laboratory activities Teacher demonstrations Research projects Worksheets Reinforcement and vocabulary worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Resources, Problems and Solutions • Freshwater resources • The oceans **TIME:** 18 Days	**S11.B.3.3** **S11.C.2.2** **S11.D.1.3**	**S11.B.3.3** Explain how human-made systems impact the management and distribution of natural resources **S11.C.2.2.1** Explain the environmental impacts of energy use by various economic sectors (e.g., mining, logging, transportation) on environmental systems) **S11.D.1.3.3** Explain factors (e.g., nutrient loading, turbidity, rate of flow, rate of deposition, biological diversity) that affect water quality and flow through a water system	Laboratory activities Teacher demonstrations Research projects Worksheets Reinforcement and vocabulary worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Resources, Problems and Solutions • Atmospheric science and air pollution • Global climate change	**S11.D.2.1**	**S11.D.2.1.1** Describe how changes in concentration of minor components (e.g., O_2, CO_2, ozone, dust, pollution) in Earth's atmosphere are linked to climate change **S11.D.2.1.2** Compare the transmission, reflection, absorption, and radiation of solar energy to and by the Earth's surface under different environmental conditions (e.g., major volcanic eruptions, greenhouse effect, reduction of ozone layer; increased global cloud cover)	Laboratory activities Teacher demonstrations Research projects Worksheets Reinforcement and vocabulary worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Renewable versus Nonrenewable Resources • Fossil fuels: energy and impacts • Conventional energy alternatives • New renewable energy alternatives **TIME:** 24 Days	**S11.B.3.3** **S11.C.2.2** **S11.D.1.2**	**S11.B.3.3.1** Describe different human-made systems and how they use renewable and nonrenewable natural resources (e.g., energy, transportation, distribution, management, and processing) **S11.C.2.2.3** Give examples of renewable energy resources (e.g., wind, solar, biomass) and nonrenewable resources (e.g., coal, oil, natural gas) and explain the environmental and economic advantages and disadvantages of their use **S11.D.1.2.1** Evaluate factors affecting availability, location, extraction, and use of natural resources	Laboratory activities Teacher demonstrations Research projects Worksheets Reinforcement and vocabulary worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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Renewable versus Nonrenewable Resources • Waste management • Sustainable solutions **TIME:** 12 Days	**S11.A.3.1** **S11.B.3 .3** **S11.C.2.2** **S11.D.1.2**	**S11.A.3.1.2** Analyze and predict the effect of making a change in one part of a system on the system as a whole **S11.B.3.3.1** Describe different human-made systems and how they use renewable and nonrenewable natural resources (e.g., energy, transportation, distribution, management, and processing) **S11.C.2.2.2** Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion, resource depletion) **S11.D.1.2.2** Explain the impact of obtaining and using natural resources for the production of energy and materials (e.g., resource renewal, amount of pollution, deforestation)	Laboratory activities Teacher demonstrations Research projects Worksheets Reinforcement and vocabulary worksheets Field activities Teacher-made lab activities Q and A sessions with partner Class discussion/debates Internet links Written stories, brochures, pamphlets Concept mapping Visual aids: charts, diagrams	Objective test Performance-based test Quizzes Homework Self-check Journal writing Oral presentations Quiz game Research projects Construct a labeled model Graph interpretations Map interpretations Essays Illustrations Lab write-ups Compose a story Construct a comic strip Power-point presentations
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