Environmental Science for Agriculture and Natural Resources
Subject Code: 010720
Course & Unit Descriptions

Course Description:

Learners will study relationships between organisms and their environment. Principles of biogeochemical cycles, air-water-land relationships, non-point pollution, and wetlands will be applied. Learners will examine economic fundamentals of resource development, agriculture sustainability, energy needs and pollution control. Learners will analyze and interpret data gathered from ecosystems, population studies, forest management practices, pesticide use, land use and waste management. Learners will develop responses to environmental problems and develop management strategies for responsible conservation and resource development.

Unit: Agriculture and Food Resources

Students will identify world food issues, principle types of agriculture and challenges of Agricultural. Students will identify solutions to agricultural problems and develop a restoration and/or land use plan.

Benchmark: 5.14 Habitat Management and Restoration
Level 1: Monitor an area to determine what characteristics currently exist in a specific habitat.
Level 2: Establish goals for remediating a specific habitat.

Indicators:

5.14.1	Identify the properties and characteristics of habitats.
5.14.2	Explain wetlands classification (e.g., swamp, marsh, bog, fen).
5.14.3	Explain the functions of wetlands, forests, grasslands and other habitats.
5.14.4	Describe the biotic components of different types of habitats.
5.14.5	Delineate wetlands according to government standards.
5.14.6	Explain the impact of an increasing human population on habitats.
5.14.7	Explain the government's role in habitat restoration and conservation.
5.14.8	Identify techniques used in habitat management, mitigation, enhancement and restoration programs.

Academic Standards

English:	Use multiple resources to enhance comprehension of vocabulary. (Acquisition of Vocabulary F, 8-10; Acquisition of Vocabulary E, 11-12)
Math:	Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10)
Science:	Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10) Explain that humans are an integral part of the Earth's system and the choices humans make today impact natural systems in the future. (Earth and Space Sciences C, 11-12) Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10) Explain how humans are connected to and impact natural systems. (Life Sciences B, 11-12) Explain how human choices today will affect the quality and quantity of life on earth. (Life Sciences F, 11-12) Explain how societal issues and considerations affect the progress of science and technology. (Scientific Ways of Knowing C, 11-12)
Social Studies:	Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 7.3 Pest Management
Level 1: Identify common types of plant pests and apply basic pest management control methods
Level 2: Scout and identify specific plant pests and plant damage and apply specialized pest management control methods

Indicators

7.3.02	Examine interrelationships between plants, pests, humans and environment (e.g., non-native species, climate change)
7.3.04	Determine and implement pest management safety practices (e.g., MSDS, EPA, OSHA, PPE)
7.3.05	Develop an integrated pest management plans based on pest life cycles, available treatments and application methods
7.3.06	Select application methods, implement pest control plan (i.e. organic and non-organic) and evaluate effectiveness and impact on environment

Academic Standards

English:	Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math:	Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data. (Data Analysis D, 8-10)
Science:	Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10)
Social Studies:	Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Unit: Environmental Quality

The student will determine water, air and soil quality according to industry standards, and recommend protection and restoration techniques.

Benchmark: 5.2 Water
Level 1 Assess water quality using basic indicators.
Level 2 Analyze and interpret the biological, chemical and physical properties of water quality.

Indicators

5.2.1	Measure pH, dissolved oxygen (DO), biological oxygen demand (BOD), temperature and macro invertebrate populations to determine water quality.
5.2.2	Measure hardness, nitrogen, phosphorus, vegetation and physical characteristics of lentic and lotic waters to determine water quality.
5.2.3	Explain the hydrological cycle (e.g., condensation, evaporation, transpiration) and how human activity impacts the cycle.
5.2.4	Explain the biotic and abiotic factors affecting water quality.
5.2.5	Monitor and analyze water quality and quantity.
5.2.6	Explain the interactions between human activities and the earth's hydrosphere (e.g., septic systems, desalinization, point and nonpoint sources of pollution).
5.2.7	Implement practices that maintain or improve water quality.

Academic Standards

English:	Use multiple resources to enhance comprehension of vocabulary. (Acquisition of Vocabulary F, 8-10; Acquisition of Vocabulary E, 11-12) Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Acquisition of Vocabulary D, 11-12)

Math: Apply various measurement scales to describe phenomena and solve problems. (Measurement B, 11-12) Apply mathematical knowledge and skills routinely in other content areas and practical situations. (Mathematical Processes B, 8-10)

Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10) Explain that humans are an integral part of the Earth's system and the choices humans make today impact natural systems in the future. (Earth and Space Sciences C, 11-12) Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10) Describe how human activities can impact the status of natural systems. (Life Sciences G, 9-10) Explain how humans are connected to and impact natural systems. (Life Sciences B, 11-12)
Explain how human choices today will affect the quality and quantity of life on earth. (Life Sciences F, 11-12) Describe the identifiable physical properties of substances (e.g., color, hardness, conductivity, density, concentration and ductility). Explain how changes in these properties can occur without changing the chemical nature of the substance. (Physical Sciences C, 9-10) Make appropriate choices when designing and participating in scientific investigations by using cognitive and manipulative skills when collecting data and formulating conclusions from the data. (Scientific Inquiry A, 11-12)

Benchmark: 5.8 Water Use and Management (Hydrology)
Level 1 Identify sources of water (e.g., surface water, soil water, bedrock water, aquifer).
Level 2 Collect and interpret data for a localized water use and management plan.

Indicators:
5.8.1 Explain hydrology.
5.8.2 Explain the geological and meteorological principles affecting groundwater supply.
5.8.3 Conduct a channel flow analysis.
5.8.4 Identify the basic criteria for a water well design.
5.8.5 Identify the differences in groundwater potential.
5.8.6 Assess the potential for water contamination at a specific site.
5.8.7 Measure volumes of water (e.g., wells, ponds, runoff, waterways).
5.8.8 Control water (e.g., pumps, dams, retention ponds, drainage).
5.8.9 Define, delineate and assess watersheds and streams.

Academic Standards
English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12) Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)

Math: Use proportional reasoning and apply indirect measurement techniques, including right triangle trigonometry and properties of similar triangles, to solve problems involving measurements and rates. (Measurement D, 8-10) Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 8-10) Apply various measurement scales to describe phenomena and solve problems. (Measurement B, 11-12) Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10) Create and analyze tabular and graphical displays of data using appropriate tools, including spreadsheets and graphing calculators. (Data Analysis and Probability A, 11-12) Design and perform a statistical experiment, simulation or study; collect and interpret data; and use descriptive statistics to communicate and support predictions and conclusions. (Data Analysis and Probability C, 11-12) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Science: Describe how Earth is made up of a series of interconnected systems and how a change in one system affects other systems. (Earth and Space Sciences B, 11-12) Describe how

human activities can impact the status of natural systems. (Life Sciences G, 9-10) Explain the ways in which the processes of technological design respond to the needs of society. (Science and Technology A, 9-10) Predict how human choices today will determine the quality and quantity of life on Earth. (Science and Technology A, 11-12)

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 5.5 Air

Level 1 Measure levels of oxygen, carbon dioxide and particulate matter.

Level 2 Assess air quality, and determine its impact on the environment.

Indicators:

5.5.1 Determine the chemical and physical properties of air (e.g., composition, density, pressure).

5.5.2 Explain chemical cycles and how they relate to the biosphere, geosphere and atmosphere (e.g., nitrogen cycle, oxygen cycle, sulfur cycle).

5.5.3 Explain human and natural factors affecting air quality (e.g., volcanic eruptions, forest fires, greenhouse gases, dust, farming practices).

5.5.4 Monitor and evaluate air quantity and quality.

5.5.5 Assess the potential for air contamination at a specific site.

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Acquisition of Vocabulary F, 8-10; Acquisition of Vocabulary E, 11-12)
Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Acquisition of Vocabulary D, 11-12)

Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 8-10) Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10) Describe how Earth is made up of a series of interconnected systems and how a change in one system affects other systems. (Earth and Space Sciences B, 11-12) Explain that humans are an integral part of the Earth's system and the choices humans make today impact natural systems in the future. (Earth and Space Sciences C, 11-12) Describe how human activities can impact the status of natural systems. (Life Sciences G, 9-10) Explain how human choices today will affect the quality and quantity of life on earth. (Life Sciences F, 11-12)

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12) Critique data and information to determine the adequacy of support for conclusions. (Social Studies Skills and Methods B, 11-12)

Unit: Soil

Students will determine and analyze the physical, biological and chemical properties of soils and other plant growing media. Students will utilize their knowledge of soil characteristics to overcome soil use limitations.

Benchmark: 5.1 Soils

Level 1 Determine and analyze the physical, biological and chemical properties of soils and other plant growing media

Level 2 Utilize knowledge of soil characteristics and soil information resources to overcome any existing soil use limitations

Indicators

5.1.01 Classify soil types based on composition (e.g., aggregate size, organic matter, texture)
5.1.02 Inventory soils and determine land use capabilities
5.1.03 Interpret soil survey data to implement conservation practices
5.1.04 Select techniques that reduce soil erosion and compaction based on soil and land properties (e.g., no till, subsurface and watershed drainage)
5.1.05 Evaluate soil limitations (e.g., wildlife/wetlands habitats, septic systems, drainage, agriculture and socio-economic considerations, preservation easements)
5.1.06 Explain current and historical interactions between human activities and soils (e.g., wetlands use, urbanization, desertification, finite resources, habitat change, climate change)
5.1.07 Identify soil forming factors and explain how they produce variability in soils

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Describe and interpret rates of change from graphical and numerical data. (Algebra J, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)
Social Studies: Use appropriate data sources and geographic tools to analyze and evaluate public policies. (Geography C, 11-12)

Unit: Environmental Contaminants and Solid Waste Management

Students will identify types of environmental contaminants and hazardous waste; determine treatment/disposal of contaminants and hazardous waste; indentify best practices to clean up contaminated sites; explain biomagnifications and relevant laws.

Benchmark: 5.4 Contaminants

Level 1 Determine the presence of contaminants, and follow reporting procedures.
Level 2 Assess the affected area, determine the source and type of contaminant, and respond appropriately

Indicators

5.4.1 Determine the types, sources and impact of natural and man-made contaminants (e.g., manure; wastewater; soil; agriculture, residential and industrial chemicals).
5.4.2 Explain and implement programs and policies related to contaminants.
5.4.3 Identify, comply with and implement contaminant control, remediation and prevention practices (e.g., biological, radiological, sanitation, buffer strips for run-off).
5.4.4 Monitor, analyze and evaluate levels of contaminants from a point source and a non-point source.

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Acquisition of Vocabulary F, 8-10; Acquisition of Vocabulary E, 11-12)
Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 8-10)
Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10)
Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Science: Describe how human activities can impact the status of natural systems. (Life Sciences G, 9-10)
Explain how human choices today will affect the quality and quantity of life on earth. (Life Sciences F, 11-12)

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12) Critique data and information to determine the adequacy of support for conclusions. (Social Studies Skills and Methods B, 11-12)

Benchmark: 5.10 Solid Waste and Renewable Resource Management

Level 1 Collect and dispose of solid waste using the best available technology.

Level 2 Control and process solid waste using both available and alternative technologies.

Indicators

5.10.1 Collect, analyze and treat waste materials (e.g., mortalities, manure, garbage).

5.10.2 Identify the risks associated with solid waste accumulation, utilization and disposal.

5.10.3 Determine an acceptable site for disposing solid waste.

5.10.4 Describe the processes of aerobic and anaerobic waste decomposition (biotic and abiotic influences).

5.10.5 Describe and monitor solid waste disposal procedures (e.g., landfills, lagoons, runoff).

5.10.6 Describe and implement waste management methods (e.g., composting facility, waste incineration, recycling).

5.10.7 Explain the control processes and potential uses for waste byproducts (e.g., landfill gas, sludge, manure, methane).

5.10.8 Describe standard operational techniques, and identify design requirements for specific purposes (e.g., landfill, lagoon, leachate treatment).

5.10.9 Describe site closure methods and post-closure monitoring.

5.10.10 Determine the volume of solid waste generated by an operation or facility.

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Acquisition of Vocabulary F, 8-10; Acquisition of Vocabulary E, 11-12) Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)

Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 8-10) Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Patterns, Functions and Algebra D, 8-10) Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10) Create and analyze tabular and graphical displays of data using appropriate tools, including spreadsheets and graphing calculators. (Data Analysis and Probability A, 11-12) Design and perform a statistical experiment, simulation or study; collect and interpret data; and use descriptive statistics to communicate and support predictions and conclusions. (Data Analysis and Probability C, 11-12) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10) Explain that humans are an integral part of the Earth's system and the choices humans make today impact natural systems in the future. (Earth and Space Sciences C, 11-12) Explain the ways in which the processes of technological design respond to the needs of society. (Science and Technology A, 9-10)

Benchmark: 5.9 Pollution Control

Level 1 Comply with pollution control measures.

Level 2 Evaluate pollution control measures.

Indicators:

5.9.1 Identify the presence of pollution and pollutants.
5.9.2 Perform an environmental sampling, and chart and analyze the results.
5.9.3 Describe the environmental impact from both industrial and non-industrial processes.
5.9.4 Quantify the extent of pollution.
5.9.5 Locate sources of pollution (e.g., point source and non-point source).
5.9.6 Monitor and conduct remediation activities.
5.9.7 Monitor radioactive contamination.
5.9.8 Monitor noise and light pollution, and implement abatement measures.

Academic Benchmarks

Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 8-10) Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10) Create and analyze tabular and graphical displays of data using appropriate tools, including spreadsheets and graphing calculators. (Data Analysis and Probability A, 11-12) Design and perform a statistical experiment, simulation or study; collect and interpret data; and use descriptive statistics to communicate and support predictions and conclusions. (Data Analysis and Probability C, 11-12) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10) Explain that humans are an integral part of the Earth's system and the choices humans make today impact natural systems in the future. (Earth and Space Sciences C, 11-12) Describe how human activities can impact the status of natural systems. (Life Sciences G, 9-10) Explain how human choices today will affect the quality and quantity of life on earth. (Life Sciences F, 11-12)

Benchmark: 5.11 Potable Water Treatment Operations

Level 1 Select a potable water treatment method for a specific purpose.
Level 2 Monitor the water treatment processes for potable water at a specific site.

Indicators:

5.11.6 Monitor the control and treatment of contaminants in water (e.g., trihalomethanes, sulfur, lead, bacteria, algae, nitrates).
5.11.8 Identify methods for preventing backflow.

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Acquisition of Vocabulary F, 8-10; Acquisition of Vocabulary E, 11-12) Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Acquisition of Vocabulary D, 11-12) Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10) Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population. (Data Analysis and Probability G, 8-10) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10) Explain that humans are an integral part of the Earth's system and the choices humans make today

impact natural systems in the future. (Earth and Space Sciences C, 11-12) Explain the ways in which the processes of technological design respond to the needs of society. (Science and Technology A, 9-10)

Benchmark: 5.12 Wastewater Treatment Operations
Level 1 Select a wastewater treatment method for a specific purpose.
Level 2 Monitor the wastewater treatment methods for a specific site.

Indicators:
5.12.1 Identify the components of a wastewater treatment system.
5.12.2 Collect wastewater samples.
5.12.3 Describe wastewater collection systems.
5.12.4 Identify, analyze and reconcile the components of wastewater with state and local standards.
5.12.5 Troubleshoot wastewater collection systems.
5.12.6 Describe the processes in wastewater treatment (e.g., mixing, coagulation and flocculation; disinfection; treatment system; effluent disposal; solids management).
5.12.7 Analyze process optimization and treatment processes for the treatment train, effluent disposal and biosolids management in wastewater treatment.
5.12.8 Identify methods for cross-connection and backflow prevention.
5.12.9 Identify industrial pretreatment programs.

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Acquisition of Vocabulary F, 8-10; Acquisition of Vocabulary E, 11-12)
Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Acquisition of Vocabulary D, 11-12)
Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10)
Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population. (Data Analysis and Probability G, 8-10)
Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10) Explain that humans are an integral part of the Earth's system and the choices humans make today impact natural systems in the future. (Earth and Space Sciences C, 11-12) Explain the ways in which the processes of technological design respond to the needs of society. (Science and Technology A, 9-10)

Benchmark: 5.13 Hazardous Materials Management
Level 1 Differentiate between restricted and non-restricted hazardous materials.
Level 2 Follow handling, storage, and recording procedures for hazardous materials.

Indicators
5.13.5 Detect and identify hazardous materials.
5.13.6 Perform site evaluation to determine the presence and storage of hazardous materials.
5.13.7 Retrieve and evaluate hazardous materials and hazardous waste sample data.
5.13.10 Identify hazardous materials that can be recycled.

Academic Standards

English: Apply reading comprehension strategies to understand grade-appropriate text. (Reading Process A, 8-10; Reading Process A, 11-12)
Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)

Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10)
Design and perform a statistical experiment, simulation or study; collect and interpret data; and use descriptive statistics to communicate and support predictions and conclusions. (Data Analysis and Probability C, 11-12) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)

Unit: Ecosystem Structure

Students will identify the components of an ecosystem and determine conservation and restoration practices according to specific ecosystem characteristics.

Benchmark: 5.3 Ecosystems

Level 1 Identify ecosystems, and compare the components of ecosystems.
Level 2 Inventory and evaluate the habitats of specific ecosystems.

Indicators:

5.3.1 Explain and illustrate basic ecological principles and cycles (e.g., nitrogen cycle, food web, energy pyramid).
5.3.2 Explain biotic (plant and animal) interactions with the abiotic (non-living) environment.
5.3.5 Inventory and evaluate the characteristics of different ecosystems (e.g., pond, stream, crop lands, open land, brush lands, grasslands, woodlands, wetlands).
5.3.6 Discuss restoration ecology and its role in repairing damaged landscapes.
5.3.7 Identify and contrast biomes globally.
5.3.8 Determine the factors that affect ecological succession.
5.3.9 Determine the impact that native and non-native invasive species have on ecosystems.

Academic Standards

Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Science: Explain that many processes occur in patterns within the Earth's systems. (Earth and Space Sciences B, 9-10) Explain the flow of energy and the cycling of matter through biological and ecological systems (cellular, organismal and ecological). (Life Sciences D, 9-10) Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10) Describe how human activities can impact the status of natural systems. (Life Sciences G, 9-10) Relate how biotic and abiotic global changes have occurred in the past and will continue to do so in the future. (Life Sciences D, 11-12) Explain the interconnectedness of the components of a natural system. (Life Sciences E, 11-12)

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12) Use appropriate data sources and geographic tools to analyze and evaluate public policies. (Geography C, 11-12) Critique data and information to determine the adequacy of support for conclusions. (Social Studies Skills and Methods B, 11-12)

Unit: Sustainable Energy

Students will identify energy use, alternative energy sources, energy conservation, environmental ramifications and end-use efficiency improvements that will allow for sustainability of resources.

Benchmark: 5.3 Ecosystems
Level 1 Identify ecosystems, and compare the components of ecosystems.
Level 2 Inventory and evaluate the habitats of specific ecosystems.

5.3.3 Differentiate between renewable and nonrenewable components of ecosystems.
5.3.4 Model positive environmental practices for sustainability of resources.

Academic Standards
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)
Science: Explain that many processes occur in patterns within the Earth's systems. (Earth and Space Sciences B, 9-10) Explain the flow of energy and the cycling of matter through biological and ecological systems (cellular, organismal and ecological). (Life Sciences D, 9-10) Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10) Describe how human activities can impact the status of natural systems. (Life Sciences G, 9-10) Relate how biotic and abiotic global changes have occurred in the past and will continue to do so in the future. (Life Sciences D, 11-12) Explain the interconnectedness of the components of a natural system. (Life Sciences E, 11-12)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12) Use appropriate data sources and geographic tools to analyze and evaluate public policies. (Geography C, 11-12) Critique data and information to determine the adequacy of support for conclusions. (Social Studies Skills and Methods B, 11-12)

Unit: Forest Management Practices

Students will identify sustainable forest management practices and develop stewardship practices that maintain forest productivity, biodiversity, relevant ecological and economic function.

Benchmark: 5.3 Ecosystems
Level 1: Identify ecosystems and compare components of ecosystems
Level 2: Inventory and evaluate habitats of specific ecosystems

Indicators
5.3.09 Determine the impact that native and non-native invasive species have on ecosystems

Academic Standards
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Science: Explain that many processes occur in patterns within the Earth's systems. (Earth and Space Sciences B, 9-10)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Unit: Population Studies

Using industry standards, students will use identification tools to manage populations in a habitat. Students will follow all local, state, and federal guidelines to manage ecosystems and habitats.

Benchmark: 1.5 Population Management

Level 1: Differentiate reproductive processes across species, and determine the extent to which breeding programs can be implemented for an intended purpose or outcome.
Level 2: Develop, implement and evaluate a reproduction and/or population management plan.

Indicators:

1.5.3	Practice ethical and responsible animal population management (e.g., spaying, neutering, euthanasia, birth control, relocation, reintroduction, hunting).
1.5.5	Select and implement reproductive management practices (e.g., male-to-female ratios, fertility, soundness for breeding, age and weight for breeding and timing, other requirements for breed and species integrity), and monitor embryos and fetuses.

Academic Standards

Math:	Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number, Number Sense and Operations G, 8-10) Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis and Probability F, 8-10) Use descriptive statistics to analyze and summarize data, including measures of center, dispersion, correlation and variability. (Data Analysis and Probability B, 11-12) Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10) Apply mathematical modeling to workplace and consumer situations, including problem formulation, identification of a mathematical model, interpretation of solution within the model, and validation to original problem situation. (Mathematical Processes J, 11-12)
Science:	Describe how human activities can impact the status of natural systems. (Life Sciences G, 9-10) Explain the interconnectedness of the components of a natural system. (Life Sciences E, 11-12)
Social Studies:	Analyze how issues may be viewed differently by various cultural groups. (People in Societies A, 11-12)

Benchmark: 1.3 Care and Management

Level 1: Describe the fundamental care and management practices for animals and select, handle, mark, manage environmental conditions, and provide general care for a limited number of animals or animal species
Level 2: Describe comprehensive care practices for animals and apply advanced management procedures to select, handle, mark, and manage environmental conditions

Indicators

1.3.04	Apply and record animal identification procedures and requirements (e.g., tagging, tattooing, ear notching, banding, branding, painting, electronic microchip implanting)
1.3.05	Estimate carrying capacity of the environment and its impact on animal health
1.3.06	Explain predator/prey relationships (e.g., predator control, species propagation, invasive species control) and implement measures to control predators when necessary

Academic Standards

Math:	Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science:	Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10)

Benchmark: 3.10 Business Regulation, Law and Related Issues

Level 1: Identify and describe government regulations and societal issues related to a specific business enterprise or environmental project

Level 2: Determine the impact of government regulations and societal issues on an environmental project or the performance of a business enterprise

Indicators

3.10.02	Explain the purpose and impact of government regulations
3.10.03	Identify local, state and federal regulations relative to compliance
3.10.06	Identify governmental agencies and non-governmental organizations that impact agricultural/environmental issues
3.10.07	Research history, politics and policies related to issues
3.10.08	Assess the impact of issues affecting the industry and recommend solutions

Academic Standards

English:	Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)
Math:	Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Social Studies:	Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 3.11 Research and Analysis

Level 1: Conduct a study or survey, select descriptive statistics, create graphical displays and draw conclusions

Level 2: Conduct a problem-based study applying scientific methodology and using descriptive statistics to communicate and support predictions and conclusions

Indicators

3.11.01	Identify research problems and structure a statistical experiment, simulation or study related to the problem
3.11.02	Create a hypothesis and set the probability of acceptance based on review of valid literature
3.11.03	Establish and implement procedures for systematic collection, organization, and use of data
3.11.04	Select and apply sampling methods that appropriately represent the population to be studied
3.11.05	Create, interpret and use tabular and graphical displays and descriptive statistics to describe data
3.11.08	Draw conclusions based on observations and/or data analysis and disseminate information to interested parties

Academic Standards

English:	Formulate open-ended research questions suitable for inquiry and investigation and adjust questions as necessary while research is conducted. (Research A, 8-10; Research A, 11-12)
Math:	Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)
Science:	Participate in and apply the processes of scientific investigation to create models and to design, conduct, evaluate and communicate the results of these investigations. (Scientific Inquiry A, 9-10)

Benchmark: 5.14 Habitat Management and Restoration
Level 1: Monitor an area to determine what characteristics currently exist in a specific habitat
Level 2: Establish goals for remediating a specific habitat

Indicators
5.14.09 Survey and monitor species within a habitat

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 5.3 Ecosystems
Level 1: Identify ecosystems and compare components of ecosystems
Level 2: Inventory and evaluate habitats of specific ecosystems

Indicators
5.3.04 Model positive environmental practices for sustainability of resources
5.3.09 Determine the impact that native and non-native invasive species have on ecosystems

Academic Standards
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Science: Explain that many processes occur in patterns within the Earth's systems. (Earth and Space Sciences B, 9-10)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Unit: Public Relations

Using communication skills, students will facilitate presentations to local and community groups on the importance of responsible conservation and resource development.

Benchmark: 3.7 Communication Skills
Level 1: Integrate a variety of communication techniques to gather and convey information to an individual or small group
Level 2: Conduct a business meeting using decision-making techniques

Indicators
3.7.01 Apply techniques to participate in/facilitate a group discussion
3.7.02 Apply active listening strategies
3.7.03 Develop and deliver formal and informal presentations
3.7.04 Articulate ideas and impact audience through verbal and nonverbal communication
3.7.05 Communicate directions in an organized manner appropriate to the audience
3.7.07 Extract relevant, valid information from materials and cite sources of information
3.7.08 Develop reports and documents that organize information accurately and use formatting techniques for user friendliness
3.7.09 Select and use appropriate channel for workplace communication
3.7.10 Practice etiquette when using communication techniques

Academic Standards

English:	Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)
Math:	Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)
Social Studies:	Evaluate the reliability and credibility of sources. (Social Studies Skills and Methods A, 9 - 10)