Environmental Science
03003

Rationale Statement:

Agriculture and tourism are South Dakota's two leading industries. For these industries to thrive, we must continue to protect and manage the environment with conservation in mind. Environmental Science is a course that enables students to develop an understanding of the natural environment and the environmental problems the world faces. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences and skills competition such as the Environmental/Natural Resources Career Development Event and related agricultural proficiency awards. Each student will complete a Supervised Agricultural Experience Program/Internship.

Suggested grade level: 11th – 12th

Topics covered:

- Ecosystems and Biomes
- Biodiversity
- Population dynamics
- Human influences on the environment
- Conservation
- Pollution
- Energy sources
- Civic responsibility

Indicator #1: Examine ecological principles and functions.	
Bloom's Taxonomy Level	**Standard and Examples**
Analyzing	**ES1.1 Examine the structure and function of ecosystems.** Examples: • Compare organisms such as producers, consumers or decomposers, given a description of their environment. • Compare commensalism, parasitism, competition and mutualism, given a scenario with examples. • Examine graphs associated with an organism's needs within a habitat. • Defend that energy for life is provided by the sun and flows through systems. • Develop a food web, given organisms and their role in the environment. • Compare and contrast ways that systems change over time.
Analyzing	**ES1.2 Analyze the major biomes of the earth and the biodiversity associated with these biomes.** Examples: • Distinguish animals or plants indigenous to an environment. • Distinguish the biome in which an animal or plant lives. • Compare and contrast various biomes. • Examine the relationship of climate to biome type.
Analyzing	**ES1.3 Analyze population dynamics.** Examples: • Analyze the relationship of habitat changes to plant and animal population density. • Examine a population graph. • Test the carrying capacity of a sample ecosystem. • Compare ways that populations change over time. • Analyze possible causes of extinction. • Examine variations within a species and how they affect the likelihood of survival.

Indicator #2: Evaluate human population dynamics on the environment.	
Bloom's Taxonomy Level	**Standard and Examples**
Evaluating	**ES2.1 Evaluate factors affecting the human population.** Examples: • Appraise the role of agriculture in relation to human population growth. • Evaluate the major causes of the population explosion. • Evaluate how health care and education affect population growth rates. • Assess population profiles for different countries.
Evaluating	**ES2.2 Evaluate the consequences of human population growth.** Examples: • Argue the ecological consequences of continued population growth. • Summarize the economic impact of population growth. • Differentiate the ways in which population growth compounds social and environmental issues in industrialized regions versus third world regions.
Evaluating	**ES2.3 Evaluate approaches that address over-population.** Examples: • Judge the pros and cons of lowering reproductive rates as a possible solution to the population problem. • Recommend actions individuals can take toward producing stable world population. • Select agriculture advancements that should be researched or employed to meet the hunger demands of the human population.

Indicator #3: Appraise our natural resources, their conservation and management.	
Bloom's Taxonomy Level	**Standard and Examples**
Understanding	**ES3.1 Explain the types, uses and history of renewable and nonrenewable resources.** Examples: • Identify examples of renewable and nonrenewable resources. • Discuss the benefits and drawbacks of society's use of mineral resources. • Explain the use and status of the major renewable and nonrenewable resources.
Evaluating	**ES3.2 Assess methods of conservation of common non–energy natural resources.** Examples: • Assess ways that society conserves and wastes resources. • Judge the effectiveness of various conservation practices on air, water and soil. • Support that there are limits to the use of natural resources. • Defend a plan for the conservation of a specific natural resource.
Analyzing	**ES3.3 Examine the impact of waste production and management on the environment.** Examples: • Examine how technological advances such as fertilizers, Freon and acid rain have impacted the environment. • Compare and contrast the impact of waste management methods on resource reserves.

Indicator #4: Examine energy sources and their conservation.	
Bloom's Taxonomy Level	**Standard and Examples**
Analyzing	**ES4.1 Compare and contrast conventional and alternative energy sources.** Examples: • Appraise examples of renewable and nonrenewable energy sources. • Assess the different amounts and kinds of energy resources used in a geographic area. • Compare the economic and environmental impact of the bio-fuel industry. • Assess and report on the importance of energy conservation. • Compare fossil fuel exploration, reserves and production. • Compare careers that relate to energy, heat or electricity.
Analyzing	**ES4.2 Examine the types of energy-related pollution.** Examples: • Compare and contrast energy sources in terms of their pollution on the environment. • Assess the pros and cons of utilizing alternative energy sources. • Appraise the consequences of continued reliance on fossil fuels. • Investigate local air pollution, noise pollution, water pollution and solid waste and trace the origins of each.
Analyzing	**ES4.3 Compare various methods of energy conservation.** Examples: • Examine the steps that individuals and corporations can take to conserve energy. • Examine how solar energy can be used as a home energy supply. • Examine how geothermal energy can be utilized. • Examine how flowing water can be used to generate electricity. • Compare the energy efficiency of major appliances.

Indicator #5: Examine consequences of human interaction with the environment.	
Bloom's Taxonomy Level	**Standard and Examples**
Analyzing	**ES5.1 Examine the causes, environmental effects and methods for controlling pollution.** Examples: • Compare and contrast pollution problems in different places in the United States. • Examine the effects of greenhouse gases and Global Warming. • Compare data on ground level ozone, acid rain and stratospheric ozone.
Analyzing	**ES5.2 Examine environmental impact on human health.** Examples: • Analyze potential health effects of exposure to various environmental hazards such as radon, UV radiation or ground-level ozone. • Compare risk reduction actions for potentially hazardous substances. • Distinguish the costs and benefits of pesticide use on food crops.
Analyzing	**ES5.3 Appraise the sustainability of human practices as they relate to water quality, agriculture/forestry/fishing, mining, energy and land use.** Examples: • Examine personal practices, the environmental impacts each has and possible solutions to decrease one's impact on the environment. • Compare and contrast various practices in terms of their economic, societal and environmental impacts. • Compare and contrast different agricultural practices in terms of their environmental impact. • Appraise conservation measures in the home. • Recommend an Integrated Pest Management plan.

Indicator #6: Appraise personal and civic responsibility with regard to the environment.	
Bloom's Taxonomy Level	**Standard and Examples**
Evaluating	**ES6.1 Evaluate personal views concerning the environment.** Examples: • Assess personal actions on the environment. • Articulate a position on a critical environmental issue. • Defend a position on city or county zoning changes, taking into account conservation and development.
Evaluating	**ES6.2 Evaluate the rights and responsibilities of citizens in maintaining a healthy environment.** Examples: • Select ways that an individual can contribute to environmental quality in the community. • Evaluate the potential impact of citizen participation on issues related to the environment and their community. • Defend an action plan for addressing an environmental issue and participate thoughtfully and effectively in environmental decision making.