AG 525 ECOLOGY/ENVIRONMENTAL SCIENCE

COURSE DESCRIPTION: A course that provides science instruction and practical experience in environmental science including agricultural/industrial chemical issues, habitat preservation/restoration, remediation of damaged resources, conservation practices, environmental law and current environmental issues.

UNITS OF INSTRUCTION	MINUTES OF INSTRUCTION
Introduction To Environmental Science	470
Identification and Management of Ecosystems	940
Chemicals and the Environment	564
Land Uses, Regulations and Ordinances	564
Soil Conservation	564
Water Quality	564
Air Quality	564
TOTAL MINUTES	4,230

A. Introduction to Environmental Science

1. Introduction to Ecology

    a. Define ecology
    b. Describe the environment and its relationship with people
    c. Define natural resources
    d. Analyze environmental issues from political and scientific perspectives
    e. Discuss evolution of policy and public sensitivity to ecological issues
    f Explain the influence of animals and plants on the environment
    g. Describe the concepts of energy flow and material cycling

2. Human Relationships with the Environment

    a. Discuss world population trends and the impact on the environment
    b. Explore the impact of individuals on the environment
    c. Explain the principle of biological succession
    d. Distinguish between interaction and interdependence of species
    e. Discuss the principle of sustainable development from a global perspective
    f. Describe homeostasis within an ecosystem
    g. Identify environmental influences and limiting factors
    h. Explain the concepts of community and ecosystems

3. Agricultural Relationships with the Environment

   a. Define the significance of agricultural production to humans
   b. Identify positive impacts of agriculture on our lives
   c. Relate the concept of ecological sustainability to sustainable agricultural management
   d. List agricultural practices that contribute to improved quality of air and water
   e. Identify positive and negative impacts of agricultural production practices on the environment

B. Identification and Management of Ecosystems

1. Basic Ecological Concepts

   a. Identify the elements of an ecosystem
   b. Identify abiotic factors and explain their effects on an ecosystem
   c. Describe how energy is transferred from one organism to another using the concepts of producer, consumer, decomposer, food web, food chain, and biotic pyramid
   d. Define ecological succession

2. Ecosystems of the United States and Their Management

   a. Locate and describe the ecosystems within the United States
   b. Describe how abiotic environmental factors influence the locations of ecosystems
   c. Describe how ecosystems are impacted by human activities
   d. Explain how sustainable and multiple-use management approaches can help maintain ecological balance in ecosystems

3. Grassland Ecosystems

   a. Describe a grassland ecosystem and the abiotic factors influencing their distribution
   b. Identify and locate grassland ecosystems in the United States
   c. Describe ecological succession in grasslands
   d. Discuss the role of fire in grassland ecological succession
   e. Give examples of plant and animal association and of their adaptations to grassland habitats
   f. Give examples of human activities that have had impacts on grassland ecosystems
   g. Describe how the concepts of sustainability and multiple use can help to maintain grassland ecosystems

4. Forest Ecosystems

    a. Describe a forest ecosystem
    b. Locate the forest ecosystems found in the United States
    c. Identify the abiotic factors that affect the biota of forest ecosystems
    d. Explain how ecological succession occurs in forest ecosystems
    e. Interpret the value of forest ecosystems for humans
    £ Identify impacts of human activities on forest ecosystems
    g. Identify techniques that are used to manage forest ecosystems
    h. Describe how the concepts of sustainability and multiple use can help to maintain our forest resources

5. Aquatic Ecosystems

    a. Explain how water cycles function in the environment
    b. Identify abiotic factors that are important in aquatic ecosystems
    c. Describe the different types of aquatic ecosystems
    d. Explain the function of a watershed
    e. Name same examples of human influences on aquatic ecosystems
    f. Explain the watershed protection approach to managing aquatic ecosystems

6. Wetland Ecosystems

    a. Distinguish wetlands from other ecosystems
    b. Identify different types and locations of wetlands that are found in the U.S.
    c. Explain how wetlands function as ecosystems in transition
    d. Define the value of wetland ecosystems to humans
    e. Describe the impacts of humans on wetlands
    f. Explain how the concepts of sustainability help maintain wetland ecosystems

C. Chemicals and the Environment

1. The Importance of Chemicals

    a. Assess the economic benefits of chemical usage
    b. Evaluate the convenience and accessibility of chemicals
    c. Determine the implications ff chemicals were not used
    d. Identify chemicals used in households
    e. Identify chemicals used in agricultural practices

2. Chemicals Defined
    a. Define the meaning of chemicals
    b. Assess the history of chemical usage
    c. Distinguish between natural and synthetic chemicals

3. Safe Handling and Application Practices of Chemicals

   a. Identify the safety-assurance factors in using chemicals
   b. Identify the proper use and application of chemicals
   c. Evaluate the disposal systems for excess chemicals and containers
   d. Identify responsible practices in chemical application

4. Regulating and Controlling Chemical Uses

   a. Assess the developmental and regulatory processes for chemicals
   b. Identify governmental provisions concerning chemical applications
   c. Analyze benefits versus potential adverse effects of chemicals
   d. Identify federal regulations governing the disposal of industrial wastes
   e. Determine how chemical residues are measured in the environment

D. Land Uses, Regulations and Ordinances

1. Land Uses and Land Use Planning

   a. Define land
   b. Explain what is meant by land use
   c. Compare past and present uses of land including alternative uses of land
   d. Explain land use planning and the reasons for planning for land uses

2. Soil Effects on Land Uses

   a. Analyze soil properties that affect how land is used
   b. Identify the effects that natural processes have on soil properties
   c. Determine the influences of natural disasters on land uses
   d. Use a soil survey to determine possible uses of land

3. Land Use Issues

   a. Understand the relationships between land uses and population growth
   b. Define the rights and responsibilities of land owners
   c. Identify laws pertaining to land use

E. Soil Conservation

1. Characteristics of Soil

   a. Describe the composition of soil and explain how it is formed
   b. Explain the functions of soil
   c. Relate the importance of soil to the lives of humans

2. Physical Properties of Soils

   a. Explain the importance of soil texture
   b. Illustrate soil structure and explain its importance
   c. Appraise soil based on soil color
   d. Describe how soil characteristics affect the uses of land

3. Soil Erosion and the Effects of Human Activities on Soil Erosion

   a. Define soil erosion
   b. Assess the impacts of soil erosion on the environment
   c. Distinguish between geological erosion and man-made soil erosion
   d. Assess the causes and effects of man-made soil erosion
   e. Discover ways that soil erosion can be prevented or reduced

4. Environmental Impacts of Soil Degradation

   a. Define soil degradation
   b. Assess the impacts of soil degradation on the environment
   c. Categorize the different types of soil erosion
   d. Explain the effects that agricultural pesticides and chemicals have an soil properties and characteristics
   e. Discuss the effects of waste disposal on soil properties and characteristics
   f. Suggest ways that soil degradation can be controlled

5. Methods of Soil Erosion Control

   a. Classify land according to its best use
   b. Distinguish between mechanical and vegetative soil erosion control
   c. Analyze methods of controlling farm and non-farm soil erosion
   d. Identify government agencies and programs that are involved with soil conservation

F. Water Quality

1. The Importance of Water Quality to Humans

   a. Determine the different uses of water
   b. Describe factors that make water quality important to society
   c. Identify societal costs associated with water quality
   d. List economic factors associated with water quality

2. Understanding Water Quality

   a. Identify the factors that affect water quality
   b. Identify the different classifications of water quality

c. Describe how water is processed in the hydrologic cycle
d. Suggest factors that may distort the natural processes by which water quality is maintained

3. Factors that Influence the Quality of Water

a. Identify contaminants that influence water quality
b. Assess the cumulative effects of pollution on water quality
c. Describe the steps in municipal and commercial waste treatment systems
d. Describe different animal waste handling systems

4. Measures to Ensure Water Quality

a. Identify federal, state and local standards and regulations for water quality
b. Explain how water quality thresholds are determined
c. Identify human activities which can maintain or improve the quality of water
d. Analyze industrial activities that are designed to maintain or improve water quality

5. Management Practices that Enhance the Quality of Water

a. Explore the impacts that wetlands have on water quality
b. Describe the relationships between water quality and watersheds
c. Identify soil conservation practices that maintain or improve water quality
d. Describe the impact of water conservation on water quality

G. Air Quality

1. Air Pollutants and Their Effects

a. Name the major air pollutants
b. Describe the effects of major air pollutants on the health of people and animals
c. Explain the effects of major air pollutants on the health of plants
d. Describe how major air pollutants can damage material objects
e. Describe how noise pollution can be damaging to the hearing of humans and animals

2. Quality of Life and Air Pollution

a. Describe the sources of the major air pollutants
b. Describe how the major air pollutants are regulated and controlled
c. Explain how the damage done by the major air pollutants affects the economy

d. Explain the economic impacts of controlling air pollution
e. Describe the benefit-cost analysis used in economics to compare the benefits to control air pollution versus the cost

3. Acid Rain

a. Assess the cumulative effects of acid rain (precipitation)
b. Identify the possible air pollutants, which influence the pH of precipitation
c. Identify sources of air pollutants, which cause acid precipitation
d. Describe the processes and technologies that are used to control air pollution
e. Describe the implementation of the 1990 Clean Air Act in relation to acid precipitation

4. Clean Air Act and Environmental Law

a. Describe the impacts of past human activities on air quality
b. Describe the effects of air pollution on the US. and other countries
c. Explain how the Clean Air Act has impacted air quality
d. Describe air pollution allowances
e. Identify governmental regulations and the monetary costs associated with maintaining air quality
f. Describe how air quality legislation is passed