### BARTON COMMUNITY COLLEGE

**COURSE SYLLABUS**

**Fall 2005**

1. **GENERAL COURSE INFORMATION**

Course Number: LIFE 1413

Course Title: Environmental Science

Credit Hours: 3 Credits

Prerequisite: None

Division/Discipline: Liberal Arts and Sciences/Natural Sciences

Course Description: A study of current environmental conditions, issues, and problems. Students will study the different types of ecosystems, the use and availability of natural resources, population dynamics, and environmental risks. Students will also explore possible solutions to such environmental issues as global warming, acid rain, extinction of species, and energy waste by examining current scientific and political thought.

1. **CLASSROOM POLICY**

Students and faculty of Barton Community College constitute a special community engaged in the process of education. The college assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom.

The College reserves the right to suspend a student for conduct that is detrimental to the College’s educational endeavors as outlined in the College Catalog.

Plagiarism on any academic endeavors at Barton Community College will not be tolerated. Learn the rules of, and avoid instances of, intentional or unintentional plagiarism.

Anyone seeking an accommodation under provisions of the Americans with Disabilities Act should notify Student Support Services.

1. **COURSE AS VIEWED IN TOTAL CURRICULUM**

This 3-credit lecture course is especially designed for students who have an interest in the outdoors, ecological processes, and the influence that humans exert on their natural surroundings. When this course is successfully completed together with LIFE 1414 (Environmental Science Lab; 2 credits), these two courses collectively fulfill the lab science general education requirement at Barton County Community College.

This course transfers well and may be used to help fulfill credit and course requirements for general education at some of the Kansas Regents' institutions. However, general education requirements vary among institutions, and perhaps even among departments, colleges, or programs within an institution. Also, these requirements may change from time to time without notification. Therefore, it shall be the student's responsibility to obtain relevant information from intended transfer institutions during his (her) tenure at Barton County Community College to insure that he (she) enrolls in the most appropriate set of courses for the transfer program.

1. **ASSESSMENT OF STUDENT LEARNING/COURSE OUTCOMES**

Barton Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton, as a learning college, in finding ways to improve student learning.

This course is intended to provide students with:

1. An overview of the structure and function of ecosystems and the various kinds of ecosystems on Earth.
2. An understanding of population dynamics (including exponential growth) and the reasons why the increase of the human population rests at the heart of many environmental concerns.
3. An appreciation for the need to preserve biodiversity.
4. An understanding of the problems associated with the quantity and quality of water, food, fiber, and other natural resources.
5. An appreciation of how human behavior (including political and social forces) influence environmental health the quality of life.
6. An understanding of various forms of pollution and how excessive pollution is either prevented or treated to minimize its effects on the quality of life.
7. Knowledge of energy conversion processes and the advantages and disadvantages of the major types of energy (fossil fuels, solar, nuclear, etc.).
8. **COURSE COMPETENCIES**

Upon completion of the course, the student should be able to:

1. Recognize and describe the relationship between human population size, natural

resource use (and abuse), and an environmental ethic.

1. Identify at least one human culture or society (either historically or currently) that
2. failed to develop an environmental ethic and suffered the consequences;
3. recognized the importance of an environmental ethic and benefited from that ethic.
4. Briefly describe the history of the recent environmental movement in the United
5. States by relating the following individuals, groups, events, etc. that were associated with important environmental activities and the approximate dates of those activities.
6. Define stewardship and the importance of this concept in preserving biodiversity.
7. Describe the relationship between the use of DDT and the endangerment of various birds.
8. Relate recent human population increases with changes in the rates of natural resource consumption, soil degradation, atmospheric changes, and the loss of biodiversity and the importance of these changes to the future of humankind.
9. Explain the origin of the term sustainable development
10. List the major and minor components of ecosystems, and describe the relationships among these various components of an ecosystem.
11. Generally describe the major biomes on Earth with regard to temperature and annual precipitation.
12. Diagram and label a real or hypothetical food chain and food web.
13. Identify a specific example of each of the following: producer, primary consumer, secondary consumer, tertiary consumer, detritivore (detritus feeder), and decomposer.
14. Describe the important role that detritivores and decomposers play in the ecosystem.
15. Explain how the niche of organisms relates to the potential for competition between or among species.
16. Explain how the law of tolerance (limits of tolerance) for a species relates to distribution and how it might be affected by environmental change.
17. Differentiate among the following terms: atom, molecule, compound, biotic, and abiotic.
18. Define energy and list at least six different forms of energy.
19. Describe energy flow into, through, and out of ecosystems.
20. Understand how population’s levels are affected by factors such as biotic potential, recruitment, death, and environmental resistance.
21. Describe two extreme examples of different reproductive strategies and how each contributes to continuation of the species.
22. Differentiate between threatened and endangered.
23. Describe how territoriality relates to competition and population structure.
24. Explain how the carrying capacity is related to population increase and population stability.
25. Differentiate between the J-shaped and S-shaped population growth curves.
26. Describe the process of ecological succession in a given area.
27. Differentiate between primary and secondary succession.
28. Describe what is meant by ecological stability.
29. Generally describe what is meant by adaptation, and list at least specific examples of adaptation in plant or animals.
30. Define evolution in the most general sense; then, define biological evolution.
31. Define species and describe how different species remain distinctive from one another.
32. Compare and contrast artificial selection and natural selection.
33. Explain how genes and DNA are related to the process of biological evolution.
34. Explain the manner in which new species arise or are formed (speciation).
35. Provide evidence for long-term, large-scale changes that have occurred on Earth.
36. Explain the concept of a “population explosion,” and relate it to the condition of the human world population in the 1990s.
37. Differentiate between total fertility and replacement fertility.
38. Explain the proportional relationship between negative environmental impact and population size, consumptiveness of lifestyle, and environmental regard.
39. Differentiate between immigration and emigration, and explain how both potentially influence a country’s ability to deal with human population and environmental concerns.
40. Explain how affluence influences environmental concerns in a positive and negative manner.
41. Characterize and contrast the projected demographics of developed and developing countries during the next 30-40 years.
42. Contrast the doubling times typical of populations in developed and developing countries.
43. Explain the origin and function of the World Bank.
44. Describe how the debt crisis has affected both developing nations and the environment of these nations.
45. Graph the relationship between total fertility rate and per capita income.
46. Define the golden rules and importance of sustainable agriculture.
47. Compare and contrast the meanings of hunger, malnutrition, and undernutrition and their effects on humans.
48. Describe and understand the root causes of hunger around the world.
49. Describe at least three characteristic of sustainable agriculture.
50. List and briefly describe at least four general characteristics of soils that relate to overall soil fertility.
51. Name the three major types of soil particles based upon particle size and generally compare these particle sizes relative to water infiltration, water-holding capacity, nutrient-holding capacity, aeration, and workability.
52. Generally describe nutrient flow in the soil ecosystem.
53. Compare and contrast topsoil and subsoil relative to soil particle size, coloration, amount of humus, and water-holding capacity.
54. Differentiate among splash, sheet, and gully erosion. What is a “desert pavement,” and how is it formed?
55. List and briefly describe the three agricultural practices that expose the soil to increased erosion.
56. Create a list of at least five different kinds of pests, depending upon their “noxious, destructive, or troublesome” nature.
57. Differentiate among the various kinds of “pesticides.”
58. Compare and contrast “chemical control” of pests and “ecological control” of pests, and relate both to integrated pest management (IPM).
59. Contrast the “first-generation” and “second-generation” pesticides in terms of their chemical makeup, their synthesis, and their relative toxicity to man.
60. Describe some problems that typically stem from the use of chemical pesticides.
61. List and describe the four categories of natural (biological) pest control.
62. Describe society’s influence on the tendency for farmers, gardeners, and orchards to use pesticides.
63. Describe the concept of integrate pest management (IPM).
64. Compare the amount of fresh water on the earth to the amount of salt water present.
65. Describe, diagram, and label the hydrologic cycle.
66. Differentiate among the following terms: water quality vs. water quantity; freshwater vs. salt water; hard water vs. soft water.
67. Differentiate between consumptive and non-consumptive uses of water.
68. Describe how saltwater intrusion occurs and the consequences of this process.
69. Describe at least three consequences or events associated with storm water mismanagement.
70. Define pollution in human terms and understand how nonbiodegradable materials add to the effects of pollution.
71. Name and briefly describe the various kinds of plants and microscopic plants (e.g., algae) that are grouped according to the habitat in which each is found, i.e. a freshwater lake or pond.
72. Differentiate between the oligotrophic and eutrophic conditions of lakes and ponds. Describe the interrelationships between the amount of aquatic detritus, biochemical oxygen demand (BOD), rate of decomposition, and dissolved oxygen.
73. Understand the ecological significance and effects of cultural eutrophication.
74. Compare the productivity of freshwater wetlands and salt marsh with that of other biomes.
75. Generally describe the ecological effects and potential human health effects of not treating sewage and wastewater.
76. Understand the types of pollutants that occur in raw sewage and the various types of phases of raw sewage treatment. Also understand environmental implications of materials released from sewage treatment.
77. List and describe the four major hazardous properties of hazardous materials.
78. Also understand the origins of numerous hazardous materials and their effect on the environment.
79. Describe the following three techniques for hazardous waste disposal: deep-well injection, surface impoundments, and landfills.
80. Describe the structure of the atmosphere (i.e., its major layers) and how these layers relate to the atmosphere’s temperature profile and protection by the ozone layer.
81. Understand basic climatic terms and the relationship between the climate and air pollution.
82. Know different types of air pollutants and their effects on human health and the environment.
83. Understand the environmental implications of destruction of the ozone layer.
84. Describe various technologies that are used to remove particulates from combustion fumes from factories and automobiles.
85. Know the pH ranges for acids and bases and the logarithmic nature of the pH scale.
86. Compare and contrast acid deposition and acid precipitation. Describe the causes and effects of acid precipitation with regard to human activities and the environment.
87. Name the gases that contribute to the greenhouse effect. Describe the process by which global warming occurs and consequences of this phenomenon.
88. Understand the importance of ozone in the atmosphere and its role in protecting humans from harmful UV radiation.
89. Explain how forests are affected by intensive logging (e.g., by clear cutting).
90. Generally describe the trend in the last few decades for the marine fisheries industry.
91. Differentiate between preservation and conservation of natural resources. Which of these works within the framework of “maximum sustainable yield?”
92. Describe the general composition of municipal solid waste (e.g., percentages of various materials). Explain current trends in solid waste disposal, i.e. recycling, composting, combustion.
93. List and describe some of the problems associated with landfills and the selection of landfill sites.
94. Describe how a waste-to-energy facility operates and know the advantages of such a facility.
95. List and describe the three solutions to better managing solid wastes.
96. Know the kinds of fossil fuels and the outlook for future use of these resources.
97. Differentiate between renewable and non-renewable energy sources.
98. Generally describe the patterns of usage of coal, oil, natural gas, and nuclear power during the past century. Understand the implications of this country’s dependence on foreign oil sources.
99. Describe the principle behind generating nuclear power and the hazards and safety precautions associated with radioactive wastes. Know the following terms: isotope, atomic number, atomic mass, fission, fusion, and chain reaction
100. List and describe alternative fuels that have promising potential for the future and cleaning up the environment.
101. Describe the importance of ecosystems as a natural resource.
102. Differentiate between various types of public and private lands
103. Explain the term “urban sprawl” and identify current urban trends and their effects on the environment. Identify the importance of limiting the urban sprawl as it relates to food production.
104. **INSTRUCTOR EXPECTATIONS OF STUDENTS IN CLASS**
105. **TEXTBOOK AND OTHER REQUIRED MATERIALS**
106. **REFERENCES**

#### **METHODS OF INSTRUCTION AND EVALUATION**

## ATTENDANCE REQUIREMENTS

1. **COURSE OUTLINE**