

Principles of Environmental Science And Environmental Studies Syllabus

BIO K180/ENV K101 3 sem. hrs. credits

CRN#/Sec. - # 30357/M03 & # 30370/M03 e-mail: wdopirak@trcc.commnet.edu

Fall 2007

Phone: 860.892.5758

Web page:

http://www.trcc.commnet.edu/Prog_Study/Sciences/dopirak/index.htm

Three Rivers Community/Technical College

Mohegan Campus

Norwich, CT 06360

Office location: S-25

Office Hrs.

M + W 11:00 am – Noon & 5:00 – 6:00 pm

T +R 5:00 - 6:00 pm

(Or by appointment)

Required Text:

Wright, R.T. 2008. Environmental Science; Toward a Sustainable Future, 10th ed. Pearson/Prentice Hall. 682p.

Catalog Description:

This is a basic course in environmental studies that introduces ecological principles and a global perspective on environmental problems such as deforestation, droughts, floods, soil erosion, overpopulation, food shortages, and pollutants. Some field work will be included.

Primary Objectives:

In addition to understanding the cyclic nature of the environment, students should expect to learn the fundamentals of ecological principles and evolutionary processes. Also, emphasis will be placed on awareness of current biological concerns, i.e. global warming, ozone depletion, greenhouse effect, acid rain, and other environmental pollutants and their profound effect on the environment.

Attendance Policy:

Students are expected to attend class regularly, as in accordance with school attendance policy. If a class is missed due to circumstances beyond your control, **please**, be sure to notify your instructor and make the necessary arrangements for obtaining the lecture notes. **You will be responsible** for the material. A five point bonus will be implemented to your final grade if 100% class and field trip attendance is noted.

Grade Evaluation:

There will be three examinations. Although the subject matter does tend to build on itself, the final examination is not cumulative. There will be weekly quizzes. After 10 quizzes, the lowest quiz grades will be dropped. **There will be no makeup quizzes!!** Exam and quiz questions will consist of multiple choice and/or short answers. Homework questions will come directly from the “Questions for Review” section following every chapter, as indicated within the tentative lecture schedule. In addition to a written 3-5 page research paper, a ten minute group oral presentation is expected. Selections for your paper could be taken from a list of topics found within this syllabus or from your own interests. An outline for your paper is expected by mid-semester. More will be said pertaining to your paper through the semester.

Suggestions for the course:

To gain a better understanding be sure to read the required reading sections **before** coming to class. Also, be prepared to participate in classroom discussions.

Final Grade:

100-98= A	79-77= C+
97-93= A	76-73= C
92-90= A-	72-70= C-
89-87= B+	69-65= D+
86-84= B	64-60= D
83-80= B-	59-00= F

Grading:

Final grade will based on the following:

Examinations-----	-60%
Quizzes -----	-10%
Homework Assignments -----	05%
Term Paper -----	-15%
Oral Presentation -----	-05%
Class Participation -----	<u>-05% +</u>
-----	-100%

Add/Drop Procedures:

Please consult the school catalog for this policy.

Academic and Classroom Misconduct:

The instructor has the primary responsibility for control over classroom behavior and maintenance of academic integrity, and can order the temporary removal or exclusion from the classroom of any student engaged in conduct violative of the general rules and regulation of the institution. Extended or permanent exclusion from classroom or further disciplinary action can be effected only through appropriate college procedure. Plagiarism, cheating, or any form of academic dishonesty is **prohibited**.

Academic and Classroom Misconduct (cont.)

Students guilty of academic dishonesty directly or indirectly will receive a **zero** for an exercise or exam and may receive an **F** for the course in addition to other possible disciplinary sanctions which maybe imposed through the regular institutional procedures. Any student that believes he or she has been erroneously accused may appeal the case through the appropriate institutional procedures if their grade was affected.

Disabilities Statement:

If you have a hidden or visible disability which may require classroom or test-taking modifications, please see me as soon as possible.

College Withdrawal Policy:

A student who finds it necessary to discontinue a course once class has met must provide written notice to the registrar. Withdrawal forms are available at the Registrar's Office. Students who do not withdraw, but stop attending **will receive** a grade of "F" for the final grade. Students are advised that withdrawal from 50% or more of their classes will result in being placed on **Progress Probation** for the following semester. Eligibility for refund of tuition is based upon date of withdrawal when received by the Registrar. **Verbal withdrawals cannot be accepted.**

Research Paper Topics:

- 1) The coevolution of climate and life.
- 2) Trophic structure and ecosystem stability.
- 3) Cyclic patterns in ecological systems.
- 4) Ecological habitats and niches.
- 5) Aquatic ecosystems and their role in systems ecology.
- 6) Biological evolution and natural selection.
- 7) The evolution of our thinking about evolution: Creatism vs. Darwinism.
- 8) Biodiversity and its role in environmental science.
- 9) Energy resources and their impact/role on/in the environment.
- 10) Historical development of environmental science.
- 11) Acid precipitation.
- 12) Global warming or wayward winds?
- 13) Greenhouse effect and its environmental consequence.
- 14) The effects of pollution on ecological systems.
- 15) Wildlife and fishery management; why should we care?
- 16) Oil spills and their devastating effect on marine systems ecology.
- 17) Energy alternatives; coping with man's needs.
- 18) Symbiotic relationships in ecological systems.
- 19) Oceanic pollution.

Research Paper Topics (cont.)

- 20) Ecological genetics and evolutionary ecology.
- 21) Predator-prey interactions.
- 22) Adaption and speciation.
- 23) Genetic variation, genetic drift, gene flow, and mutations.
- 24) The earth's life-support systems: How far can they be pushed?
- 25) The origin of life.
- 26) The scientific method.
- 27) Geological and ecological history.
- 28) Oceanic ecosystems.
- 29) Limnological ecosystems.
- 30) Migratory movements.
- 31) Solid, toxic, and hazardous waste.
- 32) Recycling: Waste into wealth
- 33) Hypoxia in freshwater
- 34) Sinkholes: Causes & effects
- 35) National parks
- 36) Environmental ethics
- 37) Environmental politics and economics
- 38) Pests and pesticides
- 39) Food and hunger
- 40) Mineral resources
- 41) Noise pollution
- 42) Climate and weather patterns
- 43) Zoos and captive breeding
- 44) The Amazon: A vanishing rainforest
- 45) Reforestation

Syllabus Revisions:

This schedule may be subject to change as the instructor sees fit. Any changes will be announced by the instructor in advance.

**“This we know: Man did not weave thy web of life; he is merely a strand in it.
Whatever he does to the web, he does to himself”.**
Chief Stealth

**BIO 128- Principles of Environmental Science
Fall 2007**

Detailed Course Objectives

- 1) The student will be able to define **matter** and list the forms and structure of matter.
- 2) The student will be able to define the **Laws of Conservation of Matter**, as well as, the first and second **Laws of Thermodynamics**.
- 3) The student will be able to relate these laws to the **environment** and the specific problems existing therein.
- 4) The student will be able to identify and define the terms **biosphere, ecosystems, biomes, habitat, niche, and community**.
- 5) The student will be able to describe the major **types of ecosystems** and the changes which occur in these ecosystems.
- 6) The student will be able to describe the different types of **biomes** and their characteristics.
- 7) The student will be able to describe the **trophic levels** and the various organisms involved in each of these levels.
- 8) The student will be able to demonstrate knowledge of the **carbon, nitrogen, oxygen, and phosphorous cycles**.
- 9) The student will be able to describe a **food chain, food web, and pyramid of energy**.
- 10) The student will be able to recognize and describe **abiotic and biotic factors** in ecosystems and their interaction in the system.
- 11) The student will gain knowledge of the various environmental problems such as **pollution, soil erosion, floods, droughts, greenhouse affect, and ozone deterioration**.
- 12) The student will develop an understanding of the **interrelationships** between the population and it's use and abuse of **natural resources**.
- 13) The student will gain an understanding of the **population growth** and it's impact on the environment.
- 14) The student will be able to identify the major types of **natural resources** and any problems existing with their use.
- 15) The student will become aware of the **renewable and non-renewable resources**.
- 16) The student will be able to define the various **types of pollution** and their effects on the environment.
- 17) The student will be able to define the areas of concern for future **human impact** on the environment.
- 18) The student will be **encouraged** to design possible solutions for problems which are currently arising in the environment.
- 19) The student will be encouraged to **develop an ethical social conscience** with regard for the environment.
- 20) The student will select an environmental topic then research, write, and present that topic.

Detailed Course Outline:

I. Introduction

- A) What is Science?
 1. The Scientific Method
 2. Science and Technology
- B) What is Environmental Science
 1. Ecology
 2. Ecologist
 3. Systems Analysis in Ecology

II. Matter and Energy

- A) Definition of Matter
- B) Physical States of Matter
 1. Solids
 2. Liquids
 3. Gases
- C) The Law of Conservation of Matter
- D) The Law of Conservation of Energy
 1. The First Law of Thermodynamics
 2. The Second Law of Thermodynamics
- E) Matter and Energy Laws and Environmental Problems
- F) Energy Flow and Trophic Structure
 1. The Source of Energy
 2. Trophic Levels
 - a) Producers
 - b) Consumers
 - c) Decomposers
 3. Food Chains and Trophic Structure
 4. Trophic Structure and Ecosystem Stability

III. Ecosystems

- A) Biosphere
- B) What is an Ecosystem
 1. Abiotic Factors
 2. Biotic Factors
 3. Biotic and Abiotic Interactions
- C) Ecosystem Functions: Nutrient Cycling
 1. Element Cycling
 - a) Carbon
 - b) Phosphorous
 - c) Oxygen
 - d) Nitrogen
 - e) Water

III. Ecosystems (cont.)

2. Energy Flow in Ecosystems
- D) Ecological Habitats and Niches
 1. Fundamental Niche
 2. Realized Niche
 3. General versus Specialized Niches
- E) Species Interactions
 1. Competition
 - a) Interspecific Competition
 - b) Intraspecific Competition
 - c) Competitive Exclusion Principle
 2. Mutualism
 - a) Symbiosis
 3. Comensalism

IV. The Major Types of Ecosystems

- A) Terrestrial Ecosystem
 1. Biomes and Their Characteristics
 - a) Deserts
 - b) Grasslands
 - c) Tropical Rain Forests
 - d) Coniferous Forests
 - e) Deciduous Forests
- B. Aquatic Ecosystems and Their Major Characteristics
 - 1) Physical properties of water
 - 2) Limnology
 - a) The Lentic Environment
 - b) The Lotic Environment
 - c) The Estuarine Environment
 - 3) Marine Biology
 - a) Salt Marshes
 - b) The Neritic Environment
 - c) The Pelagic Environment

V. Biological Evolution and Natural Selection

- A. Ecological Communities
- B. Ecological Succession
 - 1) Primary Succession
 - 2) Secondary Succession
- C. Human Impacts on Ecosystems

VI. Population Biology

- A) Demography
 - 1. Fecundity and Survival Schedules
 - 2. Instantaneous Rate of Increase
- B) Urbanization
- C) Effects of Increased Human Population on the Natural Resources
 - 1. The Problem of Food Producing Capacity
 - 2. Water Management
 - 3. Human Impacts on Soil and Ground Water
 - 4. Total Effect of Overpopulation
 - 5. Population Control
 - a) Fertility versus Birth Control

VII. Pollution

- A) Types
 - 1. Air
 - a) Sources of Air Pollution
 - b) Effects of Air Pollution on Human Health
 - c) Effects of Air Pollution on the Environment
 - d) Possible Controls of Air Pollution
 - 2. Water
 - a) Sources of Water Pollution
 - 1. Acid Precipitation
 - b) Effects of Water Pollution on Human Health
 - c) Effects of Water Pollution on the Environment
 - d) U. S. Water Pollution Control Laws
 - 3. Noise
 - a) Sources of Noise Pollution
 - b) Effects of Noise Pollution on Human Health
 - c) Effects of Noise Pollution on the Environment
 - d) Possible Controls of Noise Pollution
 - 4. Solid and Hazardous Wastes
 - a) What is Sewage
 - b) Problems With Sewage
 - c) Disposal of Solid Wastes
 - d) Types of Hazardous Wastes
 - e) Sources of Hazardous Wastes
 - f) Control and Management of Hazardous Wastes
 - g) Effects of Hazardous Wastes on the Environment

VIII. Natural Resources

- A) Soil
 - 1. Uses, Components, and Profiles
 - 2. Formation
 - 3. Erosion
 - 4. Conservation and Land Use
- B) Water
 - 1. Supply and Use of Water Resources
 - 2. Water Resource Management
 - 3. Water Conservation
 - 4. Droughts
- C) Plant and Animal Resources
 - 1. Wilderness, Forest, and Rangeland Management
 - 2. Preservation of Wild Plants and Animals
 - 3. Protecting Wild Species From Extinction
 - 4. Wildlife and Fishery Management
- D) Food Resources
 - 1. World Agricultural System
 - 2. Increasing Crop Yields
 - 3. Cultivating More Land
 - 4. Fish Farming versus Catching Fish
 - 4. Food Production and Distribution
- E) Mineral Resources
 - 1. Locating and Extracting Minerals
 - 2. Environmental impacts of Mining
 - 3. Problems with Nonrenewable Minerals
- F) Energy Resources
 - 1. History of Energy Use
 - 2. Nonrenewable energy Resources
 - a) Fossil Fuels
 - 1. Oil
 - 2. Coal
 - 3. Natural Gas
 - b) Geothermal Energy
 - c) Nuclear Energy
 - 3. Renewable Energy Resources
 - a) Solar
 - b) Wind
 - c) Water
 - d) Biomass
 - e) Energy uses versus Energy Conservation

IX. Special Topics

TBA