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Biology (BIOL)1513 Introduction to Environmental Studies With Lab (4) CSU:UC

Advisory: Eligibility for English 1000 and 1005 and Math 1050, or 1 year of high school algebra, strongly recommended

Total Hours: 48 hours lecture, 48 hours lab (96 total hours)

Catalog Description: This is an interdisciplinary introduction to ecology through the study of contemporary environmental problems of renewable and nonrenewable resources. The socioeconomic and political concerns of resource shortages, pollution, conservation, and management will be discussed. Field trips are required to certain local points of geological interest. The student may opt to receive credit in only one of the following courses: Biology 1503 or Biology 1513.

Type of Class/Course: Degree Credit

Texts: Raven, Peter H., Linda R. Berg and David M. Hassenzahl. *Environment*. 7<sup>th</sup> Ed. John Wiley & Sons, Inc., 2010. Text.

Krumhardt, Barbara A. and Danielle M. Wirth. *Experiences in Environmental Science*. 2<sup>nd</sup> Ed. Star Publishing Company, Inc., 2005. Text.

Additional Required Materials: None

Course Objectives:

By the end of the course, a successful student will be able to

1. demonstrate an understanding and appreciation of the problems of man and the world he lives in, and
2. discuss ecological principles and cultural implications of natural science concepts.

Course Scope and Content (Lecture):

- Unit I Introduction to the Environment
- A. The nature of environmental degradation
  - B. Environmental problems
  - C. The costs of environmental pollution
  - D. Secure and legal approaches to pollution control
- Unit II The Ecology of Natural Systems
- A. Energy relationships within an ecosystem
  - B. Nutrient cycles
  - C. Major Ecosystem of the earth
  - D. Ecosystems and natural balance
- Unit III Ecosystem and Population growth
- A. Population growth and carrying capacity
  - B. Environmental resistance

- Unit IV            The Extinction of Species
- A.     Habitat Loss
  - B.     Species Overpopulation
  - C.     Introduced Species
- Unit V            Growth and Control of Human Populations
- A.     Predicting future populations
  - B.     The demographic transition
  - C.     Zero population growth
- Unit VI           Population Changes and the Human Condition
- A.     Land use
  - B.     Consequences of population design
  - C.     Currents worldwide population trends
- Unit VII           World Resources-Energy & Materials
- A.     The laws of thermodynamics
  - B.     Fossil fuels
  - C.     Nuclear fuels
  - D.     Renewable energy sources
  - E.     Water resources
- Unit VIII          Energy: Pollution Consumption & Conservation
- A.     Energy production and pollution
  - B.     Electricity
  - C.     Thermal pollution
  - D.     Solar energy
  - E.     Other renewable resources
  - F.     Energy consumption and conservation in transportation, industry and at home
- Unit IX           Nuclear Energy
- A.     Controversy
  - B.     Radioactivity
  - C.     Biological effects of radiation
  - D.     Nuclear fission
  - E.     Nuclear fusion
- Unit X            Herbicides & Pesticides
- A.     Benefits and Problems with Pesticides
  - B.     Risks of Pesticides to Human Health
  - C.     Alternatives to Pesticides
  - D.     Laws Controlling Pesticide Use
- Unit XI           Air Pollution
- A.     Sources
  - B.     Effects
- Unit XII           Water Pollution
- A.     Types of Water Pollution
  - B.     Sewage
  - C.     Water Quality Today
  - D.     Improving Water Quality
  - E.     Laws Controlling Water Pollution

- Unit XIII      Solid Wastes  
A.      Sources and quantities  
B.      Disposal methods  
C.      Recycling

- Unit XIV      Noise Pollution  
A.      The decibel scale  
B.      The effects of noise

Course Scope and Content (Laboratory):

Unit I Basic Laboratory Skills

- A.      Lab Safety / Use of Laboratory Equipment  
B.      Microscopy

Unit II          Populations

- A.      Cemetery Investigation  
B.      Community Population Analysis

Unit III        Agriculture

- A.      Soil Analysis  
B.      Your Place in the Food Chain

Unit IV        Water

- A.      Surface Water Analysis  
B.      Tap & Wastewater Treatment

Unit V         Biodiversity

- A.      Estimating Population Size  
B.      Wildlife Diversity / Habitat and Niche

Unit VI        Waste Products of Modern Culture

- A.      Solid Wastes: Landfill  
B.      Air Pollution

Unit VII       Earth Systems

- A.      Weather and the Environment  
B.      Energy

Unit VIII      Environmental Evaluations

- A.      Analysis of a Natural Community  
B.      Personal Impact Analysis

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 8 hours per week outside of the regular class time doing the following:

1.      Studying
2.      Answering questions

3. Completing required reading
4. Written work

Methods of Instruction:

1. Lectures and demonstrations given by instructors
2. Assigned readings from texts and selected references
3. Guest lecturers on specific topics
4. Discussion by students
5. Films
6. Field Trips

Methods of Evaluation:

1. Substantial writing assignments, including:
  - a. essay exams
  - b. term or other papers
2. Computational or non-computational problem-solving demonstrations, including:
  - a. exams
  - b. quizzes
3. Other examinations, including:
  - a. multiple choice items
  - b. matching items
  - c. completion

Laboratory Category: Extensive Laboratory

Pre delivery criteria: All of the following criteria are met by this lab.

1. Curriculum development for each lab.
2. Published schedule of individual laboratory activities.
3. Published laboratory activity objectives.
4. Published methods of evaluation.
5. Supervision of equipment maintenance, laboratory setup, and acquisition of lab materials and supplies.

During laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is physically present in lab when students are performing lab activities.
2. Instructor is responsible for active facilitation of laboratory learning.
3. Instructor is responsible for active delivery of curriculum.
4. Instructor is required for safety and mentoring of lab activities.
5. Instructor is responsible for presentation of significant evaluation.

Post laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is responsible for personal evaluation of significant student outcomes (lab exercises, exams, practicals, notebooks, portfolios, etc.) that become a component of the student grade that cover the majority of lab exercises performed during the course.
2. Instructor is responsible for supervision of laboratory clean up of equipment and materials.