BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

PSC 10 - Introduction to Environmental Science **4 Unit(s)**

Prerequisite(s): NONE
Recommended Prep: Reading Level IV; English Level IV; Math Level IV
Transfer Status: CSU/UC
51 hours Lecture
51 hours Lab

Introduction to Environmental Science introduces students to the scientific principles and problem solving techniques used to evaluate the effects of human activities on different ecosystems. Topics include the sustainability and stewardship of natural ecosystems, use of natural resources, environmental hazards such as air and water pollution, solid waste disposal, soils and food production, the atmosphere and climate change, as well as population and urbanization. Basic chemistry, physics and biology will be introduced throughout the course to explain and expand on these topics. The concepts will be reinforced with an integrated laboratory program.

II. **OBJECTIVES**

Upon successful completion of this course, the student will be able to:

A. Use the scientific method to investigate and evaluate both local and global environmental issues.
B. Explain how matter and energy change as they cycle through ecosystems and society.
C. Explain the role of biodiversity and population dynamics in ecosystems.
D. Explain the hydrologic cycle and use modern laboratory techniques and equipment to analyze water sources.
E. Describe soils and their role in food production and use laboratory methods to characterize their physical and biological properties.
F. Apply objective problem-solving techniques and principles of sustainability to evaluate various environmental issues as they relate to politics, society, and the economy.
G. Critically evaluate the use of both renewable and nonrenewable energy resources.
H. Use quantitative analysis in the laboratory environment to model population growth trends, the energy requirements for photosynthesis and energy efficiency in homes.

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lecture

Topics	Hours
1. Introduction to the Environment and the Scientific Method	2.00
2. Matter and Energy	3.00
3. Description and Structure of Ecosystems	3.00
4. Biodiversity and Evolution	2.00
5. Species Interactions and Population Dynamics	3.00
6. Human Population	4.00
7. Water Resources a. Hydrologic Cycle b. Groundwater c. Surface Water d. Water Conservation	6.00

8. Water Pollution, Treatment and Management	3.00
9. Soils and Food Production	4.00
10. Fossil Fuels and Nuclear Energy	6.00
11. Renewable Energy a. Solar and Wind b. Biofuels c. Hydrogen Fuel Cells d. Geothermal	6.00
12. The Atmosphere and Climate Change	6.00
13. Municipal Solid Waste	3.00
Total Hours	51.00

Lab

Topics	Hours
1. Introduction to the Scientific Method	2.00
2. Measuring Techniques and Quantitative Analysis	3.00
3. Conservation of Energy	3.00
4. Photosynthesis	4.00
5. Field Trip: Characterizing Ecosystems (Riparian Woodland)	3.00
6. Modeling Human Population Growth	3.00
7. Analyzing Human Population Growth	3.00
8. Groundwater Study	3.00
9. Water Analysis Part I a. Total Dissolved Solids b. Dissolved Oxygen c. pH d. Fecal Coliform	3.00
10. Water Analysis Part II a. Total Phosphate b. Total Nitrate c. Amonium Nitrogen	3.00
11. Water Analysis Part III a. Data Analysis and Discussion	3.00
12. Soil Analysis	4.00
13. Nuclear Chemistry	3.00
14. Measuring Solar Energy using Photovoltaics	3.00
15. Home Energy Consumption and Efficiency	3.00
16. Atmospheric Variables	3.00
17. Field Trip: Sustainability Tour, Sierra Nevada Brewery	2.00
Total Hours	51.00

IV. **METHODS OF INSTRUCTION**

A. Lecture
B. Instructor Demonstrations
C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
D. Discussion
E. Multimedia Presentations
F. Laboratory Experiments

V. **METHODS OF EVALUATION**

A. Exams/Tests
B. Quizzes
C. Homework
D. Lab Projects
E. Written Assignments
F. Essays and research papers

VI. **EXAMPLES OF ASSIGNMENTS**

A. Reading Assignments
1. Read the chapter on matter and energy in your text and complete the corresponding homework assignment. Be prepared for an in class discussion on the following:
   a. The building blocks of matter: atoms and atomic structure, ions and molecules.
   b. A detailed discussion on the law of conservation of matter, energy and the 2nd law of thermodynamics.
   c. Examples of how these laws impact ecosystems and our way of life.
2. Read about a current event in environmental science such as a recent article involving alternative energy, new green technology, or an environmental issue published either in the news or an environmental science journal and verbally present your findings to the class.

B. Writing Assignments
1. Carefully read the USGS San Joaquin Delta article and write a 3-4 page paper characterizing the environmental issues related to the Delta. Each paper must include:
   a. A detailed explanation of the cause of subsidence in the Delta.
   b. An explanation of the different flood control methods used in that area.
   c. A description of the consequences of alteration of the Delta.
   d. Recommendations on sustainable solutions that you think might mitigate the problems described above.
2. Write a 5-6-page paper on the environmental topic of your choice. These topics may include but are not limited to: Climate Change, Pollution issues, Agriculture and food production, water issues and alternative energy. Papers must include: a title, thesis statement, a detailed description of the problem, a description of the consequences of the problem and a proposal for solving the problem that is sustainable and based on sound science. Papers must also include at least 3 references from credible peer-reviewed journals.

C. Out-of-Class Assignments
1. Collect a water sample from one of the local natural water bodies listed in the lab manual. Collect 500ml in one of the sterile containers provided in class. Be sure to record the temperature, date and time of collection and the exact location the sample was taken. We will perform a variety of water quality tests on these samples in lab.
2. Attend one of the science seminar lectures held in the Physical Sciences building at CSU Chico. Take detailed notes during the seminar and write a one page summery of the

lecture. Be be prepared for a class discussion on the topic.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

A. Sincoff, S., Ferguson, C.B. Environmental Science Laboratory Manual. Butte College, 2015.

B. Miller, G.T., Spoolman, S.E. Environmental Science. 14th Edition. Brooks/Cole, Belmont, CA, 2013.

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