

Course Title:	Environmental Science
Department:	Science
Course Number:	
Grade Level/s:	11-12
Length of Course:	1 Year
Prerequisite/s:	Successful completion of Biology and Earth Science or Chemistry
UC/CSU (A-G) Req:	(G) Science Elective
Brief Course Description:	The students will gain an understanding of ecological concepts and processes and how they apply to the natural world. The students will learn how to identify present day environmental problems, evaluate the risks associated with these problems and propose possible solutions to prevent or resolve them. During the course, students will gain practical knowledge in the use of scientific tools and instruments used for measurement and experimentation. A minimum of 20% of the class time will be devoted to laboratory experiences.

I. GOALS

The student will:

- A. Demonstrate proper laboratory skills and practice.
- B. Demonstrate an understanding of science as a process.
- C. Design and conduct experiments using proper experimental design.
- D. Distinguish ecosystem types and analyze their function (EEI Principle V).
- E. Analyze human resource use and misuse and understand this is dependent on availability (EEI Principles I, II & III).
- F. Demonstrate an understanding of sustainable resource management that includes water, air, and land (EEI Principle V).
- G. Demonstrate an understanding of human nutritional needs, food production, and distribution (EEI Principle I).
- H. Compare traditional and sustainable agricultural practices and their impact on the environment (EEI Principles II & V).
- I. Describe how electricity is produced from a variety of energy sources (fossil fuels, nuclear, and alternative sources) and analyze the costs and benefits of each energy source to society and the environment (EEI Principles I, II, III, & V).

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- J. Demonstrate an understanding of waste reduction and recycling as opposed to traditional methods of waste production and disposal (EEI Principles II & V).
- K. Analyze how human population growth rates and global population distributions have changed over time and make predictions as to the future population growth patterns and the effect on the environment (EEI Principles II, III, & V).
- L. Describe environmental and socioeconomic problems associated with population growth (EEI Principles II, III, & V).
- M. Demonstrate an understanding of the process involved in making environmental policies on the local, state, national, and international levels (EEI Principle V).

II. OUTLINE OF CONTENT FOR MAJOR AREAS OF STUDY

Semester 1

- A. Environmental Science-an Introduction
 - 1. Describe environmental science
 - 2. Describe major environmental problems
 - a. Resource depletion
 - b. Pollution
 - c. Loss of biodiversity
 - 3. Application of science to the solution of environmental problems
 - a. Science as a process
 - b. Proper experimental design
 - 4. Environmental decisions
- B. Ecosystems
 - 1. Biotic factors in an ecosystem
 - a. Ecosystem structure
 - b. Interaction of species within an ecosystem
 - c. Biodiversity in a complex versus depleted ecosystem
 - d. Species adaptation
 - 2. Abiotic factors in ecosystem function
 - a. Energy flow in an ecosystem
 - b. Material cycling
 - c. Succession as a means of change
 - 3. Types of ecosystems
 - a. Land biomes
 - b. Freshwater
 - c. Marine
- C. Resources
 - 1. Water resources
 - a. Distribution of the Earth's water resources
 - b. Freshwater pollution
 - c. Ocean pollution
 - 2. Atmosphere
 - a. Composition of the atmosphere

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- b. Climate
- c. Causes of air pollution
- d. Effects of air pollution on human health
- e. Acid precipitation

Semester 2

- A. Land-use and waste
 - 1. The “Throwaway” society
 - 2. Waste reduction and recycling
 - 3. Hazardous waste production, management, and prevention
 - 4. Analyze the city
 - 5. Analyze the use of land
 - 6. Public land in the United States

- B. Human population growth
 - 1. Factors impacting population growth rates
 - 2. Historical changes in human population
 - 3. Problems related to population growth

- C. Sustainable future
 - 1. Food and fiber
 - a. Human dietary needs and nutrient deficiencies
 - b. Reason for human hunger
 - c. Agricultural practices (detrimental and sustainable)
 - d. Pest control (chemical and biological)
 - 2. Human energy use
 - a. Electrical production using fossil fuels
 - b. Nuclear energy
 - c. Alternative energy (solar, wind, hydroelectricity, geothermal, biomass, hydrogen)
 - 3. Global cooperation
 - a. Environmental policies within the United States

III. ACCOUNTABILITY DETERMINANTS

- A. Key Assignments
 - 1. Students will select an environmental concern is the focus of a written or oral report. Students will research the history, and the current condition of the concern. They will write a two-page descriptive essay utilizing the claim-evidence-reasoning model and then propose steps to minimize or mitigate the concern (Reading Assignment: Chapter 1, pages 6-26)
 - 2. Students will write a 300 word analytical essay that demonstrates an understanding of the link between biodiversity and health ecosystems. Comparing and contrasting biodiversity in healthy and unhealthy ecosystems will be the backbone for the assignment. Students will show how biodiversity leads to ample energy flow and the cycling of matter (Reading assignments: Chapter 3, pages 50-81; Chapter 10, pages 191-208).

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3. Through the use of 250 word analytical essay in the claim-evidence-reasoning model, students will show evidence for the connection between pollution and a decline in human health. Students will focus on either atmospheric or oceanic pollution. Students will then propose possible actions they can take to reduce a specific local pollution (Reading assignment: Chapters 15, 16, 17, pages 335-416).
4. Students will research the history and of land-use with regard to solid waste management. Students will compose an analytical essay that compares and contrasts the best practices of solid waste management in first world countries to those in second and third world countries. Students will suggest to alternatives to the high cost practices in first world countries that second and third world countries may be able to implement. (Reading assignment: Chapter 13, pages 272-303)
5. Students will research birth rates worldwide and graph the results. Students will use the data to determine which countries are experiencing the highest and lowest birth rates, then research pollution and ecological degradation in the areas with the highest birth rates. Students will find organizations that work to limit or reverse the ecological degradation. With this data, students will write a 250 word opinion essay on whether the birth rate and environmental degradation can be connected.
6. Students will select a topic from the unit and research current and cutting-edge technologies related to the topic. Students will explore the pros and cons of the current technologies and what can be done today to mitigate the negative aspects. For example, industrial food production practices rely heavily on fertilizer use, which makes high-yield crops viable, but also pollutes our waterways. Students will discuss how cultural norms need to change in some cases in order to make positive progress. Students will write an opinion essay utilizing the claim-evidence-reasoning model to discuss their opinion on how either social constructs or the finite resources of the planet will eventually force a limit on the human population (Reading assignment: chapter 18, pages 418-37, and chapter 13, 270-303).

B. Assessment Methods

1. Classwork/Homework
2. Projects
3. Presentations
4. Quizzes
5. Performance-based assessments
6. Claim-Evidence Reasoning
7. End of Unit Exams
8. Semester Final Exams

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IV. INSTRUCTIONAL MATERIALS AND METHODOLOGIES

- A. Required Textbook(s)
 - 1. Title: Living in the Environment
ISBN:
Format: Print
Author: Miller, Tyler
Publisher:
Year: 2007 (15th ed.)
Additional Info: NA

- B. Supplementary Materials
 - 1. None

- C. Instructional Methodologies
 - 1. Teacher lectures/direct instruction
 - 2. Class discussions
 - 3. Cooperative learning
 - 4. Guided Inquiry
 - 5. Simulation activities
 - 6. Collaborative peer review
 - 7. Teacher and student led inquiry
 - 8. Group project/presentations