

AP Environmental Science Course Syllabus

Class Description

The purpose of the course is to provide students with the scientific knowledge base that will allow them to better understand the natural world and the interactions that occur within it. Students will focus on the interrelationship between humans and the environment, analyzing and discussing both the positive and negative impacts that humans have had on planet earth at both local and global levels. Within this discussion, students will be asked to investigate environmental problems, their causes and potential solutions to those problems.

Text

Living in the Environment, 16th ed., by G. Tyler Miller, Brooks/Cole, Cengage Learning, 2009

Methods

This class will be taught using a combination of lecture/discussion, hands-on lab activities, demonstrations, simulations, research and writing assignments. Students will be expected to utilize time outside of class to complete all required work. Students will on average be conducting one hands-on lab activity per week. Students will be expected to produce a written lab report or maintain a lab notebook for the majority of labs.

Unit 1: Introduction and Basic Scientific Terms and Concepts

Chapter 1 - Environmental Problems, Their Causes and Sustainability

- ❑ General overview of terms pertaining to environmental problems including: sustainability, developed vs developing countries, ecological footprints, renewable/nonrenewable resources and pollution
- ❑ The Tragedy of the Commons
 - ❑ Lab: Tragedy of the Commons Simulation
- ❑ Environmental History
 - ❑ People and events that shaped the modern environmental movement

Chapter 2 - What is Science?

- ❑ Scientific Method
 - ❑ Alka Seltzer scientific method lab
 - ❑ Activity: Identifying Variables and Controls
 - ❑ Activity: Presenting Experimental Data - Constructing Graphs
- ❑ Basic Chemistry
 - ❑ Atomic structure, chemical compounds and formulas, chemical reactions
- ❑ Energy
 - ❑ Types of energy

- ❑ Laws of thermodynamics
 - ❑ Popcorn relay race activity
- ❑ Systems
 - ❑ Feedback loops

Unit 2: Human Population

Chapter 6 - The Human Population and Its Impact

- ❑ Exponential growth
 - ❑ Lab: The Power of Doubling (Bean Lab)
- ❑ Factors affecting birth and death rates
 - ❑ Population census activity
- ❑ Age structures
- ❑ Slowing human population growth
 - ❑ Activity: Population Games

Test: Units 1 & 2

Unit 3: Biological Principles and Sustainability

Chapter 3 - Ecosystems

- ❑ Levels of organization of matter in nature
- ❑ Ecosystems
 - ❑ Biotic and abiotic factors
 - ❑ Lab: Abiotic Influences on Organisms
 - ❑ Producers and consumers
 - ❑ Food chains and webs (energy)
 - ❑ Activity: Energy Transfer: Counting Calories
 - ❑ Lab: Measuring Primary Productivity
 - ❑ Biogeochemical cycles

Chapter 7 - Climate and Terrestrial Biodiversity

- ❑ Weather versus climate
- ❑ Factors affecting climate
 - ❑ Lab: Ice Cubes, Density, Currents
 - ❑ Lab: Convection in Water
 - ❑ Activity: Identifying Ocean Currents
- ❑ Climate and biomes
 - ❑ Activity: Biomes research and presentation project
 - ❑ Activity: Making Climatograms

Chapter 4 - Biodiversity and Evolution

- ❑ Evolution and natural selection
 - ❑ Lab: Jelly Bean Evolution
- ❑ What is biodiversity

- Lab: Parking Lot Biodiversity

Chapter 5 - Biodiversity, Species Interactions and Population Control

- Biotic Relationships
 - Lab: Intraspecific and Interspecific Competition
- Population changes
 - J-curves and S-curves
 - Carrying capacity and limiting factors
- Ecological succession
 - Primary versus secondary succession

Chapter 9 - Sustaining Biodiversity: The Species Approach

- Human role in extinction
- Mass extinctions
- Value of species diversity
- Invasive species
- U.S. Endangered Species Act
- Protection measures

Chapter 10 - Sustaining Terrestrial Biodiversity: The Ecosystem Approach

- Biodiversity hotspots
 - Activity: Researching Biodiversity Hotspots
- Forest concerns
 - Activity: The Truax
- Grassland concerns

Chapter 8 - Aquatic Biodiversity

- General terms relating to water systems
 - Lab: Nitrates, Phosphates and Eutrophication
- Benefits of aquatic systems
- Estuaries, coasts and reefs

Chapter 11 - Sustaining Aquatic Biodiversity

- Human role in aquatic biodiversity
 - Focus on fishing
 - Activity: Where have all the salmon gone
 - Video: Damnation (netflix)
- Marine concerns
- Wetland concerns
- Freshwater resource concerns

Test: Unit 3

Unit 4: Water and Soil

Chapter 13 - Water Resources

- Freshwater: Sources and availability
- Droughts
- Groundwater and aquifers

- Dams and reservoirs
- Transferring water
- Sustainable water use
- Floods

Chapter 20 - Water Pollution

- Point and nonpoint sources: types and sources
 - Lab: Biodegradable Materials and Their Effect on Dissolved Oxygen Levels
- Freshwater pollution problems
- Groundwater pollution problems
 - Lab: Parts Per Million
- Marine pollution problems
- Potential solutions
- Wastewater treatment

Chapter 14 - Geology and Nonrenewable Minerals

- Earth's major geological processes
 - Plate tectonics
 - Activity: snack (graham cracker) tectonics
- Rock types
- Mineral resources and mining
 - Types of mining
 - Activity: Frac sand mining scavenger hunt
 - Impacts of mining
 - Lab: Cookie Mining
 - Supplies of mineral resources
 - Sustainable use of mineral resources

Chapter 12 - Food, Soil and Pest Management

- Nutrition
- Food production
 - Plant, meat and seafood
- Environmental impact of food production
 - Lab: Salinization Lab
- Pest control
 - Pesticides: effects, protections and alternatives
 - Rachel Carson
- Soil
 - Types
 - Soil particle size and soil horizons
 - Lab: Using the soil triangle
 - Lab: Measuring soil density
 - Lab: Measuring soil permeability

- Lab: Measuring soil porosity
- Lab: Demonstration of particle size fractionation
- Lab: Determining soil texture by feel
- Lab: Soil nutrients and pH
- Erosion: causes and solutions

Test: Unit 4

Unit 5: Sustaining Environmental Quality

Chapter 15 - Nonrenewable Energy

- Lab: Fossil Fuel Use
- Oil: production, advantages and disadvantages
- Natural gas: production, advantages and disadvantages
- Coal: production, advantages and disadvantages
- Nuclear energy: production, advantages and disadvantages
 - Lab: Disposal of Nuclear Waste
 - Lab: The Effects of Radiation on the Germination and Growth of Radish Seeds

Chapter 16 - Energy Efficiency and Renewable Energy

- What is efficiency?
 - Activity: Home Energy Audit: Electricity Use
- Energy waste reduction
 - Activity: Economics of Energy Consumption
- Solar energy: advantages and disadvantages
- Hydropower energy: advantages and disadvantages
- Wind energy: advantages and disadvantages
- Biomass energy: advantages and disadvantages
- Geothermal energy: advantages and disadvantages
- Hydrogen energy: advantages and disadvantages
 - Activity: Alternative Energy Research Project

Chapter 17 - Environmental Health Hazards and Human Health

- Types of hazards
 - Biological
 - Chemical
 - Lab: Toxic Tea: Determining LC50 of Herbal Tea
- Causes and solutions

Chapter 18 - Air Pollution

- Composition of the atmosphere
 - Lab: How much Oxygen is in the Atmosphere?
 - Activity: Layers of the Atmosphere
- Outdoor air pollution: types, sources and problems
- Acid deposition: sources and problems
- Indoor air pollution: types, sources and problems

- Health problems due to air pollution
- Potential solutions

Chapter 19 - Climate Change and Ozone Depletion

- Greenhouse effect
 - Lab: Simulating Earth's Greenhouse Effect
 - Lab: Measurement of CO₂ from Car Exhaust
- Evidence of warming atmosphere
- Effects of warmer atmosphere
- Potential solutions
- Ozone depletion: causes and solutions
 - Lab: Tropospheric Ozone Lab

Chapter 21 - Solid and Hazardous Waste

- Types of waste
- Solid waste: sources, disposal, and reduction
 - Activity: Things to do in Recycle City
- Hazardous waste: sources, disposal, and reduction

Test: Unit 5

Unit 6: Sustaining Human Societies

Chapter 22 - Sustainable Cities

- Urbanization
 - Urban sprawl
 - Advantages and disadvantages
- Transportation issues
- Urban planning and sustainability

Chapter 23 - Economics, Environment and Sustainability

- Basic economic principles
- Natural capital
 - Economic tools to deal with environmental problems
- Effect of poverty on environmental problems
 - Activity: You Decide the Fate of a Country
- Shift to environmentally sustainable economies

Chapter 24 - Politics, Environment and Sustainability

- Government's role in sustainable societies
- Developing and implementing environmental policy
- Role of environmental laws
- Role of environmental groups
- Improving global environmental security

Chapter 25 - Environmental Worldviews, Ethics, and Sustainability

- What is an environmental worldview?
- Education's role in environmental sustainability
- Living a sustainable life

Test: Unit 6

Grading Policies

Your grade will be based on total points accumulated throughout the trimester. Your grade will consist of assignments, lab reports, current events, vocabulary quizzes, unit tests and other items. We will be using the following grading scale:

A = 93 – 100%
A- = 90 – 92%
B+ = 88 – 89%
B = 83 – 87%
B- = 80 – 82%
C+ = 78 – 79%
C = 73 – 77%
C- = 70 – 72%
D+ = 68 – 69%
D = 63 – 67%
D- = 60 – 62%
F = 59% and below