

AP Environmental Science

UC/CSU "d" approved/NCAA approved

Grade Level: 11-12

Estimated Work Outside of Class: 4-5 hrs per week

Course Description:

AP Environmental Science is an introductory college-level course. Students will identify and analyze environmental problems, both natural and man-made, and evaluate the relative risks associated with these problems. This course has been aligned to College Board Guidelines for Advanced Placement Environmental Science. Topics of study include the essentials of ecology and biodiversity, population issues, climate disruption, soil and water pollution, along with economics and politics of sustainability. Big ideas throughout the course in unison with the College Board, include: Energy Transfer (Units 1, 4, & 6), Interactions Between Earth Systems (Units 1-4), Interactions Between Different Species and the Environment (Units 3, 5, 8, & 9), and Sustainability (Unit 5, 7, 8, & 9).

Students are strongly encouraged to take the AP Exam in May.

Prerequisite:

Completion of Chemistry or Chemistry H with a grade of "B" or higher in both semesters

Recommended Prerequisite Skills:

None

Course Grade Categories:

- Assessments: 45%
- Lab/Projects: 35%
- Independent Practice 20%

Major Assessments/Units/Topics:

Independent practice assignments will be given weekly. Assessments include at least one Quiz, one Lab, and one Unit Exam per unit. Labs and projects will be assigned by unit. Exams are scheduled at the end of each unit. A cumulative final exam will be given at the end of each semester. Additionally, in the second semester, students will explore technical/research writing/project.

Unit Descriptions:

Unit 1 – Ecosystems and Energy Flow

In this unit, students explore the foundational principles of ecology, examining the structure and function of ecosystems, the characteristics of terrestrial and aquatic biomes, and the essential biogeochemical cycles that sustain life. Through an in-depth look at energy transfer, primary productivity, and trophic levels, students analyze how organisms interact within food chains and food webs, applying the 10% Rule to understand the efficiency of energy flow in ecosystems. Highlighted lab – The Carbon Cycle Lab; Algal Beads Lab, Dissolved Oxygen Lab

Unit 2 – Biodiversity

This unit explores the richness of life on Earth, examining the importance of biodiversity and the essential ecosystem services it provides. Students investigate ecological concepts such as island biogeography, ecological tolerance, and succession while analyzing how species adapt to environmental changes. The unit also explores both natural and human-induced disruptions to ecosystems, highlighting the impact of human activities on biodiversity and ecological stability. Highlighted Lab: Island Biogeography Lab; Parking Lot Biodiversity; Primary and Secondary Succession(virtual)

Unit 3 – Populations

In this unit, students examine population ecology, exploring the differences between generalist and specialist species, K-selected and r-selected reproductive strategies, and survivorship curves. They analyze factors influencing population growth, including carrying capacity, resource availability, and the total fertility rate. Using age-structure diagrams and the demographic transition model, students assess human population dynamics and the challenges of sustainability. The unit also investigates the impact of invasive species on ecosystems and biodiversity. Highlighted Lab: Survivorship Curve Bubble Lab and Population Dynamics Lego Models

Unit 4 – Earth Systems and Resources

This unit examines the dynamic processes that shape Earth's surface and atmosphere, ranging from plate tectonics and soil formation to global wind patterns and climate systems. Students investigate how solar radiation drives Earth's seasons, how geography influences climate, and how phenomena like El Niño and La Niña impact weather patterns. Through hands-on activities, including a graham cracker plate tectonics exploration, students deepen their understanding of Earth's structure and the interconnected systems that sustain life. The unit also examines watersheds and their human impacts, including ozone depletion. Highlighted Lab: Graham Cracker Plate Tectonics, Soil Texture/Soil Triangle; pH level of soil sample.

Unit 5 – Land and Water Use

In this unit, students explore how human activities shape land and water resources, with a focus on agriculture, urbanization, and sustainability. They examine the environmental impacts of overfishing, mining, clear-cutting, and industrial farming while analyzing solutions such as sustainable agriculture, integrated pest management, and aquaculture. Students also investigate irrigation and meat production methods, the Green Revolution, and the concept of ecological footprints. Through discussions on urban runoff, forestry, and the Tragedy of the Commons, students evaluate strategies to balance resource use with environmental conservation. Highlighted Lab: Tragedy of the Commons Simulation, Cookie Mining Lab, and the Soil Salinization Lab

Unit 6 – Energy Resources and Consumption

This unit examines the ways society generates and consumes energy, comparing renewable and nonrenewable resources to determine their environmental and economic impacts. Students analyze fossil fuels, nuclear power, and alternative energy sources such as solar, wind, hydroelectric, geothermal, biomass, and hydrogen fuel cells. Through a class debate, they critically evaluate the pros and cons of different energy sources and explore strategies

for energy conservation and sustainability, considering the best choices for future energy generation. Highlighted Lab: Nova Labs Virtual Energy Lab or Exhaust Gas Lab

Unit 7 – Air Pollution

In this unit, students investigate the causes and consequences of air pollution, from photochemical smog and acid rain to indoor air pollutants and noise pollution. They explore the effects of atmospheric CO₂ and particulates on human health and the environment, as well as the role of thermal inversions in trapping pollutants. The unit also examines strategies for reducing air pollution and mitigating its effects, highlighting the importance of sustainable solutions for cleaner air. Highlighted Lab:

Unit 8 – Land and Water Pollution

This unit explores the sources and consequences of pollution on ecosystems, wildlife, and human health. Students examine how human activities impact wetlands and mangroves, contributing to issues like eutrophication, thermal pollution, and the spread of persistent organic pollutants. They analyze concepts such as bioaccumulation, biomagnification, endocrine disruptors, and the effects of solid waste disposal. The unit also covers sewage treatment, waste reduction methods, and the relationship between pollution and human health, including pathogens, infectious diseases, and toxicology through dose-response curves and lethal dose analysis. Highlighted Lab: Oil Spill Cleanup

Unit 9 – Global Climate Change

This unit is covered throughout the year. Students will learn how global change is reshaping the earth's systems: rising temperatures, shifting weather patterns, etc. They will learn about how these changes are created by human activities and understand the causes, impacts, and potential solutions. Students will take part in activities that help reinforce their understanding of the larger global concepts.