

AP® Environmental Science Syllabus  
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## Course Description

### **Class Size and Scheduling**

Class size is held to 28 because of outdoor lab safety rules. The class period is 92 minutes long and meets every other day. Each semester consists of three six-week grading periods.

### **Course Prerequisites and Requirements**

AP® Environmental Science is open to students who have successfully completed biology and chemistry along with the math prerequisites that accompany those courses. Students may be concurrently enrolled in other science courses. A strong background in chemistry and algebra is required.

### **Textbook**

Friedland, Andrew and Rick Relyea. *Environmental Science for AP®*. 2nd ed. New York, NY. 2015 W.H. Freeman and Company

### **Summer Assignments**

Students will be expected to complete a multi-part summer assignment to ensure preparedness as we begin the school year. A review of basic math and chemistry as well as introductory lessons on stewardship and environmental policies serve to set the pace and rigor for the year. See my website and Google Classroom for details.

### **Course Format**

The class will consist of lecture, lab, discussion, research, and creative projects. Applicable skills such as chapter outlining, higher-level reasoning and interpretation, succinct response, data analysis, and sound research will be practiced on a daily basis. Students will be given opportunity to develop critical thinking and problem-solving skills, work in collaboration with cohorts, hone their skills of written and verbal communication, and create unique products and effect change in their community. Special attention will be paid to topics in the media, local and global environmental news, and other relevant current events.

## Course Outline

Basic Math and Chemistry Assessment – Week 1

Quiz

### *Projects:*

- *Stewardship Project – Semester-long project that requires planning and implementation of a sustainable project designed to benefit the environment and local community.*
- *Messages in the Media – Students find an example of an environmental message in the media and assess its validity (What topic(s) are addressed? Are the claims scientifically-based?) Students present their findings to the class.*
- *Current Events – Students collect 10 current articles about one environmental topic. Based on these articles, students present on the major topics.*

*Video: The 11<sup>th</sup> Hour*

**Unit 1 – Earth Systems and Resources**

*Test: Chapters 1 & 2*

Chapter 1 – Studying the State of our Earth

Chapter 2 – Environmental Systems

*Projects: Stewardship Project - Proposal Submission*

### *Labs:*

- *Campus Clean-Up and Native Plants Lab: Students will begin to take ownership of the commons as they learn about the native flora and fauna of the area and observe the amount of trash generated by the average American. Students will collect and analyze the trash and compare these numbers to the national averages for MSW.*
- *School-wide Recycling: Students will devise a plan of action and implement the plan to collect recycling from around the school. They will research and create educational materials to share with faculty, staff, and the student body.*
- *Ecological Footprint: Students take a self-index and quantify their impact on the planet. Examine ways in which we could reduce that impact.*

## Unit 2 – The Living World

Test: Chapters 3- 5

Chapter 3 – Ecosystem Ecology

Chapter 4 – Global Climates and Biomes

Chapter 5 – Evolution of Biodiversity

Projects:

- Stewardship Project
- EcoColumns: Repurpose plastic bottles to create a closed system that mimics the earth. The terrestrial chamber includes soil, plants, macroinvertebrates. The aquatic chamber includes a fish, duckweed, elodea, water.
- Biome Booth: Students research a biome and create a tri-fold poster to present to the class.

Labs:

- Biodiversity Assay: Field Assessment, Biodiversity Assay: Aquatic Macroinvertebrates
- Natural Selection of Woolly Worms: Topics of natural selection, survival of the fittest, predator-prey interactions, mimicry, camouflage, chemical defense and aposematic warning coloration are addressed in this lab. Students collect and analyze data, create a graph to represent the concept of phenotypic change in a population over time due to selection pressures, and answer discussion questions based on their experience.

Videos: Planet Earth: Pole to Pole, The End of the Line

Field Trip: DSHS campus and The Dripping Springs – biodiversity assays

## Unit 3 – Biological and Human Populations

Test: Chapters 6 & 7

Chapter 6 – Population and Community Ecology

Chapter 7 – The Human Population

Projects: Stewardship Project

- Green Halloween Costume Contest – Students will create Green Halloween Costumes and assess materials lifespan (cradle to grave) while devising several ways to reduce waste and single-use Halloween products. Students wear costumes on Halloween and judge each other's project based on given criteria.
- Labs: Demographic Transition Activity – Students individually research a country and identify its demographic information (create age diagrams, assess the demographic transition) and answer several critical thinking questions based on the CBR, CDR, and cultural norms for that country. Students discuss the implications of social issues such as the use of technology in reducing the environmental impact of developing countries as they transition, and the role of developed countries in providing world aid.
- Molinar 16 (Eating at a Lower Trophic Level): Students practice dimensional analysis while studying the concepts of biomass pyramids, energy flow through ecosystems as a linear, nonrenewable process, bioaccumulation and biomagnification, and the economic and environmental benefits of feeding our growing populations on a plant-based diet.
- Human Population Growth Rate Activity: Students practice calculating growth rate and examine the factors affecting populations.

## Unit 4 – Earth Systems and Resources

Test: Chapters 8 & 9

Chapter 8 – Earth Systems

Chapter 9 – Water Resources

Projects: Stewardship Project, Analysis and Opinion: Texas Water Laws Debate

Labs: History of Earth (Geologic Time Scale Activity), Plate tectonics, Soil Physical/ Chemical Analyses, Soil erosion models (plastic bottles with and without plants), Water chemical analysis (LaMotte kits)

Videos: Last Call at the Oasis, Dirt

Field Trip: Enchanted Rock State Natural Area

Guest Speaker: Texas Water Development Board Member, Agricultural Water Conservation Specialist

## Unit 5 – Land Use

Test: Chapters 10 & 11

Chapter 10 – Land, Public and Private

Chapter 11 – Feeding the World

Projects: Urban Sustainability Assessment: Each student chooses a major city to assess in terms of resource use and availability, Debate: How do we feed a growing population? Organic, GMO, Large-scale vs. small-scale farming, aquaculture, urban gardens, green roofs...

Labs: Tragedy of the Commons

Video: Fresh

**Unit 6 – Energy Resources and Consumption**  
Chapter 12 – Nonrenewable Resources  
Chapter 13 – Achieving Energy Sustainability

Test: Chapters 12 & 13

Projects: Flat Lorax – Long-term project that encourages environmental awareness, Energy Debate

Labs: Mining Lab

**Unit 7 – Pollution**  
Chapter 14 – Water Pollution  
Chapter 15 – Air Pollution and Stratospheric Ozone Depletion  
Chapter 16 – Waste Generation and Waste Disposal  
Chapter 17 – Human Health and Environmental Risk

Test: Chapters 14-17

Projects: Flat Lorax, Water Quality Case Study: Flinn, MI

- Labs: Tail Pipe Emissions, Indoor Air Quality Assessment, Thermal Pollution, Oil-Eating Bacteria: In this lab, students examine bioremediation by culturing bacteria that digest oil. Students will record quantitative and qualitative data in regards to bacterial populations reproducing in “the water” (petri dishes) and on “the beach” (various textures of sand). This lab illustrates the benefit of understanding the ecology of this planet and modeling our own efforts after successful natural processes. The lab also educates students about the lengthy and difficult process of cleaning up after an environmental disaster such as oil spills), Landfill Decomposition

Guest Speaker: Construction and Demolition Recycling Center Owner

**Unit 8– Global Change and a Sustainable Future**  
Chapter 18 – Conservation of Biodiversity  
Chapter 19 – Global Change  
Chapter 20 – Sustainability, Economics, Equity

Test: Chapters 18-20

Projects: Flat Lorax

- Sustainable Island Design – Based on lessons from Easter Island, students design a fictitious island with sustainability in mind (including source of freshwater and food, population size, type of societal structure/ government, ecosystem capital, trading/ export/ import, etc).
- Endangered & Invasive Species Research and Gallery Walk

Labs: Global Climate Change Data Analysis (web-based), Recycled Paper

**Long-term Projects, Laboratory and Field Work**

**Lab Journal**

Students will maintain proper scientific field journals including vocabulary, observations, hypotheses, data, graphs and figures, calculations, conclusion, and analyses. Instructions on how to keep a proper lab notebook will be given in class on week 1. **Students MUST have a composition notebook by the first day of school.**

**Stewardship Project**

Students will spend the first semester providing a service, raising awareness for a cause, or in some way positively impacting the environment and their community. Each student is responsible for coming up with and executing a plan. The idea must be approved by the instructor within the first six-week grading period. There will be periodic grade-checks and progress reports (e.g. logged, certified hours, photographic documentation of efforts, etc.). A minimum of 10 hours must be logged and approved by an advisor. The first 5 hours should be completed by October. The final presentation will occur during fall semester exams and will count as the Fall Final Exam grade for the course. The final grade will comprise 20% of the fall semester average. Some examples of acceptable projects include park/ recreational area clean-up, reading to/ designing environmentally-themed activities for local elementary school students, researching and presenting a plan for rainwater harvesting district-wide, growing and planting native trees from seedlings, implementing a reusable water bottle campaign for school sports, neighborhood recycling, etc.

All students will be expected to complete this year-long project.

**Flat Lorax**

For the duration of the spring semester, students will take 1 photograph per week of their Flat Lorax engaged in environmental science. They will include a description of the activity/ event and relate it to environmental science. Each picture will be unique- no repeats. Examples include environmentally friendly events such as recycling or use of biofuels as well as any environmentally unfriendly practices like finding trash on the ground or an oligotrophic body of water.

## Class Projects

The students will create several collaborative and individual projects throughout the year.

## Laboratory Experiences

APES students will spend a significant amount of time in either an investigatory or exemplary LAB setting. Therefore, quizzes and exams will contain material covered in lab. A bound composition notebook will serve as a lab journal and will be precisely maintained.

Resources for Laboratory Experiences:

Carolina Biological Supply: *Advanced Placement Environmental Science Resource Manual*.

Molnar, William. *Laboratory Investigations: AP<sup>®</sup> Environmental Science*. Peoples Publishing, 2005.

## Grading Policy

Six-weeks grading period average for all classes of AP Environmental Science is based upon:

70% Summative Grades in this category per six-weeks.

These are assessments designed to provide information to be used in making judgment about a students' mastery of the curriculum and critical thinking skills at the end of a sequence of instruction; e.g. major labs, unit exams, midterm and final exams, projects, long-term assignments, etc. Information will be provided via the instructor and will be posted on teacher websites. Review sheets, rubrics, and other tools will be disseminated in class and on my website. It is to the advantage of the student to utilize these resources.

30% Formative Grades in this category per six weeks.

Daily grades may include textbook assignments, worksheets, vocabulary exercises, laboratory investigations, quizzes, class activities, notebook checks, article summaries, small projects, etc. These are assessments designed to provide direction for both student and teacher while a student is still learning the material.

### Midterm Exam

The fall semester stewardship project will account for 20% of the fall semester average.

### Final Exam

Students will prepare and present a 15-20 minute summary of their personal growth in regards to environmental science. This presentation will account for 20% of the spring semester average.

## Late Work/ Make-up Work

Students will not be given an opportunity to makeup or redo a failing daily or major assignment. Due to the rigorous nature of advanced classes, late work is not accepted and retesting is not offered in AP Science classes.

**Missing work due to absence:** Students have a period of time equal to the length of the absence to turn in makeup work for full credit, according to student handbook policy. Students should plan to make up any missed labs, test, or quizzes outside of class time. It is the responsibility of the students to know what they missed (see my website) and make the proper arrangements to complete any missed assignments on time. In the event of a planned absence, a student should come back to class as if they had been there the previous day. Major project due dates hold true regardless of school-related absences (i.e. If a project is due on Tuesday and you are absent for a baseball game, you must turn the project in early or on time or risk losing points for late work).

## Tips for success in APES

- Expect to have homework every night: reading and outlining the chapters is an essential assignment, not a suggestion.
- Stay organized. There are several ongoing projects (Stewardship, Flat Lorax) with check points you need to be aware of.
- Check my website/ Google Classroom for updates and daily agendas.
- KEEP YOUR OUTLINES AND PRACTICE EXAM QUESTIONS AND ANSWERS. These will be invaluable come spring as we prepare for the AP Exam.