

Advanced Placement Environmental Science Syllabus

Mrs. Meredith

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Room 124

Welcome to Advanced Placement Environmental Science! The Advanced Placement Environmental Science (APES) course is designed to be the equivalent of a one semester, introductory college course in environmental science. APES encompasses a number of different fields including geology, biology, meteorology, oceanography, physics, chemistry, and geography. It is a rigorous laboratory science course that stresses scientific methodology, principles, analysis, and discussion of the various topics and issues in environmental science and examines alternative solutions for the prevention, mitigation, or remediation of those issues.

By the very nature of the topics and their relevance to current events, this course lends itself to lively discussions, empowering you with scientific knowledge about the environment and encouraging you to believe that one person truly can make a difference.

Course Prerequisites:

The course is designed for students who have successfully completed biology and chemistry (or equivalent). It is strongly recommended, in addition, that students have successfully completed at least one year of algebra. A strong will to learn more about the environment as well as participate in field work outside is a plus!

Expectations:

In order to take responsibility of your own education and future, it is important that you attend class regularly, ready to learn, with everything necessary including *your textbook, a notebook, folder and writing utensil.*

Behavior:

Education is an important part of your future and you will be expected to act professionally in the classroom. The classroom is a learning environment in which everyone should feel comfortable. You will also be considered late to class if you are not in your seat when the bell rings. All school rules apply to the use of electronic devices and will be enforced. It is your job to come to class, sit down, and begin work as soon as the bell rings. Each day I will have the day's objectives and bell work question written on the board.

Late Work Policy:

As this course is designed to prepare you for success in college late work will not be accepted. If you are absent you will have 2 days to make up your work as per the DCHS school handbook. It is imperative that you keep up with all assignments that are given.

Evaluation:

Each student's grade will be based on the total number of weighted points accumulated from the successful completion of **Learning Objectives- tests and quizzes 40%, projects and labs 35%, in-class activities 10%, and your final exam/major project which is 15% of your grade.**

I will give you all the tools necessary to be successful in my class, but you need to be an *active* participant in your learning. If you are confused about anything or need any help, you need to communicate that to me. I am always here to help you before and after school in Room 124 or in the science office 202a.

I am looking forward to a great year with you.

Sincerely,

Mrs. Meredith - Environmental Science

Textbook: Environmental Science: Earth as a Living Planet 7th Edition, Botkin and Keller

Recommended Text: Visualizing Environmental Science 4th Edition, Wiley Visualizing, Hassenzahl, Hagar and Berg
(can be found on Chegg.com and Amazon)

AP Test PrepBook - Barrons AP Environmental Science, 6th edition or McGraw Hill 5 steps to a 5 Environmental Science 2016 or Kaplan AP Environmental Science 2016

Push the Pride: be responsible. be respectful. be positive!

AP Environmental Science Course Pacing Guide 2015-2016

Week #	Topic/ Learning Objective	Text /Readings
Week 1	Introduction to the Environment and Humanities place in it Environmental History and current issues The Lorax Movie – Dr. Seuss Population Connections poster timelines Hardin’s “Tragedy of the Commons” – reading Lab: Too many bears and Tragedy of the commons	Hassenzahl ch. 1&3 Botkin &Keller ch. 1&2
Week 2 &3	Solving Environmental Problems Activity: Analysis of an Environmental Problem an activity used to familiarize students with the various stages involved in successfully solving environmental problems. Video: “Let the Environment Guide Our Development” – TEDtalks – Johan Rockstrom Video: “ Population Box by Box” – TEDtalks – Hans Rosling Reading: Hardin’s Carrying Capacity article	Botkin & Keller ch. 2 Hassenzahl ch.1
<u>Exam 1 & Timed Writing</u>		
Week 4&5	Human Population Dynamics Too Many People? Activity Power of the Pyramids: World population pyramid comparison developed vs. undeveloped Lab: Bubble Survivorship Lab – survivorship curves using lifespan data from bubbles Demographics Lab: The Habitable planet series online Video: <i>World Population and Do We Really Want to Live This Way?</i> From Race to Save the Planet Series	Hassenzahl ch.7 Botkin & Keller ch. 1&4
Week 6	Population Dynamics in Ecosystems Field Lab: Ecosystem population Grids & Habitat Loss Activity: Tagging beans methods Lab: Oh DEER oh MY? - K and r species graphing lab	Botkin &Keller ch.10
<u>Exam #2 and Timed Writing 2</u>		
Week 7	How Nature Works Cycling of Matter and Energy within Ecosystems Ecosystem/biomes “Tours” Biogeochemical cycles mapping Lab: Phosphorous and Nitrogen Vernier testing inquiry lab Experimental Design Lab type- Eutrophication Lab: Habitable Planet Carbon Cycle Interactive	Hassenzahl ch. 5 & 6 Botkin & Keller ch. 5&8

Week 8	Ecosystem Structure: Energy Flow and Ecological Interactions Activity: Construction of Food webs Lab: Owl Pellet Analysis – dissect owl pellets to identify dietary intake and food chain. Activity: Food Chain Computer Simulation Lab: M&M feeding interactions- Inquiry lab	Hassenzahl ch. 5 Botkin & Keller ch. 6&9
Week 9	Biodiversity and Evolution Lab: Bird Island Diversity Invasive and endangered debate- Which one should ecologists pay more attention to? Case study: Cane Toads and Unnatural History Sucession senarios Video: Rock Pocket Mouse HHMI Biointeractive Lab : Biodiversity Transect of the Fox River	Hassenzahl ch.15 &10
<u>Exam #3 and Timed Writing</u> <u>End of 1st Quarter</u>		
Week 10&11	Land use Lab/Activity: Soil Degradation and Erosion Project: Land needed to sustain/feed you report Field Trip to: Angelic organics or Windy City Harvest Agriculture Debate: Organic vs. Conventional Land use Planning project/ Sustainable Cities The meaning of Natural and Nature : National Parks and National Forest discussion	Hassenzahl ch. 13&14 Botkin and Keller ch. 11&12
Week 12	Soil and Soil Dynamics Lab: Soil analysis and Fertility Comparison Video: Dirt Soil Concept Map Research Project Preventing Interstellar Writing Prompt Mineral Exploitation Article and study	Botkin & Keller ch.12 &26
<u>Exam #4 and timed writing</u>		
Week 13	Thanksgiving Break	
Week 14 &15 &16	The Water Cycle It's Overuse and Pollution Local Fox River Watershed Analysis Lab: Fox River Water quality testing Lab Eutrophication Lab Field Trip : Stickney Water Plant Activity: Personal Water Audit and reflection Project: World water Crisis Video: "Blue Gold"- Sam Bozzo Readings from <i>Blue Covenant</i> – Maude Barlow Video: Cadillac Dessert The water bottle industry – reading The Story of Stuff – Water bottles- video Water wars- online discussion	Hassenzahl ch 10 &11. Botkin & Keller ch.21&22

Semester 1 Exam (modeled after AP Exam) and timed writing

Week 17&18&19	Energy Resources and Energy use Fossil Fuel lab: calculate driving habits Video: Gasland Article Reviews: Illinois Fracking Policies Fossil fuel use paper – inadvertent ways students use fossil fuels Renewable energy gallery walk: pros and cons EnergyVille Internet activity Renewable energy sources project and concept map Field trip: to Sherman Hospital – green technology, building LEED certified	Hassenzahl ch 17 &18. Botkin & Keller ch.17-20
Week 20&21&22	Air Pollution and Climate Change Lab: Airborne Particles inside and outside Air quality investigation Video: A year of extremes: Did climate just hit home? – NBC investigation Lab: Greenhouse effect with Vernier probes	Hassenzahl ch 8 & 9 Botkin & Keller ch.23 -25
Week 23&24	Solid and Hazardous Wastes Building Landfill model Video: The Story of Stuff Article: The consumption Treadmill E-waste project Lab: Daphnia and pollution	Hassenzahl ch 16. Botkin & Keller ch.29 &15
Week 25&26	Today and Tomorrow Society views and The environment The way forward : looking towards the future Article Analysis Project: How are we Greening our Nation? Video: YERT	Hassenzahl ch 3&7. Botkin & Keller ch.27

Laboratory and Field Work

Semester 1 project- Community Study and Action Plan:

You will submit an essay describing a lesser known environmental issue that your state or community faces, you will need to explain this issue using articles, interviews, and general background research on your topic. In your paper you are writing should be written as a proposal with the background information on the issue and why it is an issue worthy of notice. With that information you collected you will develop an action plan on how you would manage such a situation. The management will be comprehensive and follow standard Environmental processes with evaluation, community involvement, government policy and long term management of the issue.

Pond/River Analysis The students will collect water samples from the on campus stream and from Woods Creek one half mile to the west. By sampling both sites, students will document the differing ecologies and chemistry at both sites. A comparison of macro-invertebrates and chemical levels will be made over time.

The following equipment will be used:

Water sampling bottles

Seine

Secchi disc

Screen sorters

Hip waders

D-frame net

Dredges

Keys for aquatic organisms, birds, insects, fish plants, etc.

LaMotte Test Kits

Sorting trays

Measuring tapes

Buckets

Once the samples are obtained and labeled, the students will study the samples. The water chemistry will be done using LaMotte Water Testing Kits. Students will be testing levels of nitrates, phosphates, pH, dissolved oxygen, turbidity, coliform bacteria, and temperature change. They will also identify the micro invertebrates and the macro invertebrates.

Fox River Water Quality data from online sources will be used to compare with student results.

Each student will write a lab report, included in the reports will be the student's research into other ways of preventing and alleviating pollutants in surface water.

Semester 2 Project: Urban Sustainability Plan

To Explore a your community and design a sustainable city by taking advantage of the resources available to that area while applying your learning about Eco-Cities.

Rules for Project:

- You must either draw or take a picture of the current area to be redesigned
- You must create a 2 or 3D image of the "green city" that you will design (extra credit for 3D diorama)
- You must include a written document describing the current conditions of the area and what "green" improvements your design firm made to the existing community.
- Your paper should discuss whether your proposed changes are feasible or simply too hard to accomplish • What will your improvements bring to your community? (in terms of events on environment, people and ecosystems)
- Your project must address the following:
 - o Climate of the area
 - o Population/Demographics of the Area
 - o Geographic Features
 - o How will the needs for: energy, transportation, food and water supplies be met?
 - o Discuss commercial design (businesses)
 - o Discuss residential design (homes)
 - o How to use the geography of the area
 - o Is it sustainable?
- The written paper should include a before versus after checklist concerning the above topics • The paper must be at least 4 pages, typed, double spaced, 12 font.

Other labs that may be performed by the students during the course.

1. **Quadrant Studies.** On school grounds, students learn how to mark off a quadrant and identify the large plants in the area. They will then graph the area and .
2. **Biodiversity lab.** Using our school rain garden / wetland, students will identify species evenness and richness of several common insect and plant species.
3. **Bubble Survivorship Lab.** Student graph the life of bubbles while changing their conditions after blowing them.

4. **Ecological succession.** The students will do a transect study of ecological succession in the Rain Garden / Wetland of the school. Plants will be identified and their root depth noted.
5. **Soil texture and diversity.** Students will collect soil during the ecological succession lab. The soils will be examined using Berlese funnels and arthropod identification keys to identify organisms found in the soil. The soil texture will also be studied by separating the soil particle size by mixing with water and letting soil settle in layers. Students will then compare this soil with organic farming soil and conventional farming soil.
6. **Thermal pollution.** This is a timed experiment using yeast cells, heat, stain and microscopes to see the effects of thermal pollution on yeast cells.
7. **Acid Rain and Seed Germination.** This lab will use acids of varying strength to determine the effect acid rain on plant germination and growth.
8. **Lead Lab.** Using samples of dishes and pottery from home. Students will attempt to determine the presence of lead through a chemical change.
9. **Oxygen cycle lab—with snails and Elodea.** The students determine whether there was a chemical change overtime by using indicator solutions in test tubes.
10. **Eutrophication Lab-** Local pond water is collected and treated with fertilizers with varying levels of Nitrogen, Phosphorous and Sulfur.
11. **Amount of land needed to grow food.** Students calculate the amount of land required for different kinds of food.

Specialized Teaching Strategies

- Once a term groups will prepare a cooperative assignment dealing with a specific chapter.
- Lab grouping will be done on a rotating basis as so different student groupings can be encountered.
- Twice in a semester students will design their own Experiment to test based on our current topics with full lab write ups (with figures, charts, graphs, statistics and research)
- Assessments will be given at the end of each unit (Bi-weekly)and include two or more chapters and will use questions from past AP exams.
- Every Unit will include an online discussion about a current environmental issue in which students can discuss and argue research findings.
- Periodic essay assignments based on videos, articles or case studies will be given to aid writing skills as well as critical analysis of data and evidence.

Environmental Science Curricular Requirements

The course provides instruction in each of the seven content areas outlined in the *AP Environmental Science Course Description*.