

AP Environmental Studies

(Mr Dey's title: "Cultural Ecology: Living In a More Than Human World")

Instructor- Mr. Dey

Email: dey_graham@salkeiz.k12.or.us

Welcome to AP Environmental Science! - You are about to begin a science course that will be thought provoking, relevant, challenging, and fun.

Goals for the year -

- ⊗ To provide you with a positive, challenging, and hands-on experience in science.
- ⊗ To further your understanding and appreciation of our local and global environmental context and your role in it.
- ⊗ To provide you with the intellectual tools to think about things complexly

What will we study?

We will cover fundamentals of ecology, considering Earth as an integrated, historical dynamic system. The really awesome thing is that this demands a cross-disciplinary approach drawing on diverse fields of inquiry – palynology, dendrochronology, cultural ecology/anthropology, animal behavior, archaeology, paleoecology, cybernetics and systems theory just to name a few. Specific topics include coevolution of the biosphere, geosphere, atmosphere and oceans; photosynthesis and respiration; the hydrologic, carbon and nitrogen cycles. We will examine the flow of energy and materials through ecosystems; regulation of the distribution and abundance of organisms; structure and function of ecosystems, including evolution and natural selection; biodiversity; productivity; trophic dynamics; models of population growth, competition, mutualism and predation. This course is predicated on the assumption that the ability to communicate ideas is critical and the class will demand active engagement from all participants.

Room Rules

The central tenet of my classroom is that everyone is unique and has something to say. This means that I want everyone to feel respected and give everyone else that same respect. I have a **NO TOLERANCE** policy for any type of speech or actions that degrade, insult, or hurt anyone in any way. The three policies to live by in class are: **Be respectful, be prepared, be safe.**

Text

Miller's, *Living in the Environment*, will be sparingly used. For the majority of the class we will be drawing on primary documents, articles, chapters of books, news sources, etc. These will be available on my website.

Grades

Folks, at this point you are expert students and this class will be modelled on a college environment which requires your "A" game. I utilize a proficiency schema which looks funny compared to traditional systems, but you will quickly realize it falls to your favor as you have many chances to show that you "get" something. Bottom line: I assume you are here to learn, are honest, and are proud of your work. I would encourage parents/guardians/students to look at the links on my website if you have questions about grading. Final grades represent a synthesis of the journal/field work/projects & exams.

Need Help?

I am available most of the time. I am usually the first person in this building and I often stay late so just let me know when you are coming in and I will be here. I will do all I can to help you be successful in this course.

Everything should be made as simple as possible, but not simpler” - Einstein

Unit1: Introduction to Cultural Ecology & Environmental Science

- 1A) “Why Environmental Science?” Reading/Ted Talk w/Simon Sinek “Start with Why”
- 1B) “Culture” defined. Readings from Constance Classen’s, Clifford Geertz, Marshall Sahlins
Examination of indigenous land-use patterns in the Willamette Valley through historical documents and the archaeological record. Fundamental nature of culture/ecology relationship.
- 1C) Natural systems and ecosystem structure - a scientific description. Introduction ecological footprint models and use of online calculators for footprint analysis.
- 1D) Jared Diamond and the question of why societies fail – reading of chapters on the Anasazi/Easter Island
- 1E) Field study & scientific inquiry/introduction to the school research site and methods for collecting data including transects, quadrats & basic mapping exercises in the field.

Unit 2: Earth Systems and Resources

- 2A) Geology: Processes an Introduction (geologic time scale; plate tectonics, earthquakes, volcanism, rock cycle; formation; composition; physical and chemical properties; main soil types; erosion and other soil problems; soil conservation)
- 2B) Soil and Soil Dynamics
 - Reading Wes Jackson on Soils
 - Soil Labs- Lab Activity
 - Students will learn how to use the soil triangle to determine soil texture using samples from the Willamette Valley. Also, soil cores will be taken at our school research site and analyzed for pH, organic material, and inorganic components.
 - Porosity and Permeability- Lab Activity - Students will evaluate how particle size affects a soils ability to hold water and allow water to flow through.
- 2C) The Atmosphere: Structure, Weather and Climate
 - Background on atmospheric structure, distinction between weather/climate, issues relating to the science of global climate change and modelling (composition; structure; weather and climate; atmospheric circulation and the Coriolis effect; atmosphere-ocean interactions; ENSO).
- 2D) Global Water Resources and Use
 - Topics
 - Freshwater availability
 - Water shortages
 - Damming of rivers – Case study the Columbia River Basin
 - Irrigation and desalinization
 - Watersheds and drainage
 - Activities and Labs
 - Personal Water use log
 - Mapping of the watershed drainage area – Croissan Creek
 - Ground Water Models and Contamination – Lab activity
 - This is an inquiry based lab in which students will work in pairs to explore a question they develop based on groundwater issues and the analysis of local water samples.
- Additional Readings
 - Various readings including Vandana Shiva, Donald Worster, selections from “Western Water Made Simple”

Unit 3: The Living World

- 3A) Ecosystem Structure
- Topics
- Terrestrial Biomes
 - Aquatic Biomes
 - Community Ecology
 - Native and non-native species
 - Indicator and keystone species
 - Relationships
- Activities and Labs
- Predator/ Prey – lab activity. Raptor pellet analysis – Golden Eagle pellets and ecosystem/food web reconstruction.
 - Invasive species survey on school research site.
 - Energy flow in ecosystems
- 3B) Introduction to biodiversity: origins, niches and adaptation
- Activities and labs
- Beaks of finches- lab
 - Students will use tools to model bird beaks and make connections between beak shape and size with ability to gather food.
- Additional Readings
- Selected readings from E.O. Wilson

Unit 4: Population

- 4A) Community ecology
- Topics
- Growth curves (exponential and logistic)
 - Biotic potential
 - R and K strategists
 - Survivorship curves
- Activities and Labs
- Quadrat Surveys- Lab
 - Students will assess the biodiversity of areas within the school research site.areas. They will use statistical analysis to analyze the data that they gather.
- 4B) The Science of Population Ecology and Human Populations
- Topics
- Birth and death rates
 - Immigration and emigration
 - Modelling exponential growth
 - Age structure diagrams
 - Poverty and population
- Hans Rosling Articles and Ted Talks
- Activities and labs
- Gapminder application for population compared to multiple variables
 - Students will simulate exponential population growth and model changing communities via Gapminder software.
- 4C) Population, Pollution and Ecosystem Impact
- Case study: Plastics and the Pacific gyres.
 - Pollution in an industrial context: Theo Colburn and Our Stolen Future.

Unit 5: Unit 5: Land and Water Use

5A) Agriculture

Topics

- Production and nutrition worldwide
- Genetic modified organisms
- Irrigation
- Land use for food production
- Pesticides

Activities and Labs

- How diet affects the environment

- Students will explore how their personal choices affect the environment when it comes to producing their food.

Additional Readings

- Journal Science - Use of corn as a biofuel
- Selected readings from Journal Nature on GMO's

5B) Forests

- Readings from Ancient Forests of the Pacific Northwest

Topics

- Pacific Northwest forest initiatives: science and politics
- Forest sustainability and eco-forestry practices
- Spotted Owl vs Barred Owl and the role of forest habitat

Activities and Labs

- Forest Structure Lab - Students will study forest structure via field studies at the school

5C) Sustaining biodiversity

Topics

- National Parks and Refuges
- Island Biogeography Model
- Cascadia Ecosystem Model
- Restoration work
- Endangered species Act
- Migratory Bird Act

5D) Land Use

Topics

- Sustainable cities/sustainable housing
- City of Salem land use and zoning laws
- State of Oregon Land Use Laws and Processes
- The Commons AAAS Hardin Article 1968

Unit 6: Pollution

6A) Air Pollution

Topics

- Indoor air pollution
- Outdoor air pollution
- Tropospheric pollution issues
 - NO₂
 - Acid Deposition
 - Ozone
 - Particulates
 - Smog
- Stratospheric Ozone
- Air quality monitoring

Activities and Labs

How clean is the Air? Air quality sampling experiment using particulate traps.
Lichen Inquiry using lichens as bio-indicators of air quality in the Salem area
Acid Rain Lab - Students will measure the effects of acid rain on plant growth
Ozone Monitoring - students will create Schoenbein strips to measure the level of ozone present in the troposphere.
Indoor Air Quality lab - students will use a kit from Environmental Protection Agency to measure the quality of indoor air within our school building.

6B) Water Pollution

Topics

Types of pollution
Rachael Carson/Silent Spring/Birds
Point and non-point pollution
Ground water contamination
Wastewater treatment
Algal blooming in Klamath Lake

Activities and Lab

Wastewater treatment lab
Eggshell titration for % of Ca lab
Phosphate examination through gravimetric analysis lab.

Case Study: BP and the Gulf of Mexico

6C) Solid and Hazardous Waste

Topics

History of Love canal
EPA
Landfills and concept of "Peak Trash"
Landfill design and leachate options
Bioremediation
Disposal of hazardous wastes
Recycling

Activities and Labs

Landfill lab

Unit 7: Energy Uses and Resources

7A) Non-renewable energy (fossil fuels)

Topics

Mining
Use of coal, natural gas and oil
Hydraulic Fracturing

7B) Nuclear Energy

Topics

Types of radiation
Belt of stability
Half-life calculations
Case Study Fukushima
Ishikawa fishbone analysis of Fukushima
Legacy of Chernobyl
Lab: Vernier Exp w/radiation monitors/source materials

7C) Energy Efficiency and Renewable energy use

Activities and Labs

Personal energy audit

Students will compete with each other to see who can reduce their energy consumption by the greatest percentage

Can You Catch the Sun?

Students will model, design and build solar cookers to harness the power of the sun. They will calculate the amount of heat energy that can be generated and develop possible uses for this energy.

Unit 8: Climate Change and Our Future

8A) Global Warming

Topics

Greenhouse effect

What happens with increased carbon dioxide

Greenhouse gases

Activities and Labs

Personal CO₂ Emissions

Students will use handheld GHG calculators to determine how much CO₂ they emit on an average week.

CO₂ and Cars

Students will use Vernier lab equipment to measure the ppm of CO₂ emissions from their vehicles.

Dear Parent or Guardian –

My name is Graham Dey and I am your student’s AP Environmental Studies teacher. Prior to teaching I worked for a number of years as an environmental photographer and at OSU’s School of Forestry and I really like bringing those experiences into the classroom. I enjoy teaching this class and am excited for this year.

To make this course more relevant and interesting to your student I will be including as many opportunities as possible to be outside doing hands-on learning. Sprague is fortunate in that there is large parcel of city land that borders the school and contains Croissan Creek. Last year a 0.5 mile trail was created through this area that begins and ends on the school grounds. It is a short 15 minute walk to complete the trail and this will provide the opportunity for outdoor research opportunities during the year. I plan to incorporate these outings periodically as weather permits.

I want to communicate that while I do not expect any problems to occur during these outings there are always potential hazards associated with working outdoors. The types of issues that are possible for our class include slipping, tripping, being stung by insects, getting wet, or ignoring the warnings of the teacher and encountering poison oak. By signing and returning this letter you are acknowledging that you understand these risks and give your student permission to participate. This is the only permission slip you will receive for these outings.

I welcome communication with you about your student. If you have questions during the school year please feel free to call the school at (503) 399-3261 and leave me a message. I will return your call as soon as possible. An easier way to reach me is through email at dey_graham@salkeiz.k12.or.us.

I look forward to working with you to ensure your student has a successful school year. Please sign below to indicate that you have reviewed both the syllabus and this letter.

Student’s name - _____

Parent/Guardian signature - _____