A.P. Environmental science

August 18, 2014 - May 29, 2015

AP EnviroSci test = May 4th, 2015 @ 8am

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Welcome to Advanced Placement Environmental Science and thank you for choosing to make this course part of your 2014-2015 school year. It's going to be an awesome year together!

Materials Needed:

- Textbook
  - G. Tyler Miller, Jr. & Scott E Spoolman's ***Living in the Environment***, 17th edition, published by Brookes/Cole.
    - You will **not** necessarily need to bring your textbook to class daily. If you are/when you are going to bring it to school, please have a durable and protective recyclable cover on it.
- Lab Notebook /Binder
  - To be used to gather data, jot questions, take notes, etc.
- A number crunching thingy (slide-ruler, calculator, smartphone, abacus)
- Access to after school internet (home, library, school, phone, etc)
  - All reports, questions and out of class written projects will be turned-in digitally.
  - Details to come! We're trying to go paperless!
- I will give you a detailed unit overview along with your assignments, due dates and test dates at the beginning of each unit.

Course Description

In a word, this course is interdisciplinary, involving the fields of geology, ecology, biology, ocean and atmospheric sciences, climatology, chemistry, physics, toxicology, geography, economics, politics, and ethics, to name a few. **This course is designed to be the equivalent of a college introductory environmental science course, both in the wide range of topics studied and in the depth, specificity and detail of course material.**

Course Goals

The goals of the AP Environmental Science course are to

(1) provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships in the natural world
(2) identify and analyze environmental problems or challenges (both natural and human-made),
(3) evaluate the relative risks associated with these problems, and
(4) examine alternative solutions for resolving and/or preventing them.

A Brief History of AP Environmental Science at Turlock High & Globally

You are EXPECTED to take the AP Test on May 4th, 2015. There are scholarships available to take care of costs for qualifying students. Senioritis was a horribly unexpected disease in my AP EnviroSci class of 2012-13. Only 17/36 students took the test. Of those that took the test ten students passed with a 3 or better. Three students scored a 5. Many other could have easily passed had they stayed the course. We did way better than the national average, percentage-wise. So, new for this year:

****Failure to take the actual AP Test on May 4th will result in an in-class AP Simulation Test that will be graded by me and will weigh heavily your second semester grade. ****

The 2014-15 academic year marks the **19th year** that AP Environmental Science has existed as a College Board AP course. This is the second year that Turlock High School has offered this course.

How Can You Succeed in AP Environmental Science?

Perhaps the most important prerequisite is a student's **interest**, **initiative**, and **motivation** in the class. The degree to which a student becomes involved in AP Environmental Science is often indicative of the letter grade that is earned. If you are willing to devote the time, energy, and focus, you will likely do quite well in the course.

Many of the topics & issues explored in the course do not necessarily have "right" or "wrong" answers; there are typically many "shades of gray" and a spectrum of potential options. It is my hope that you will feel sufficiently comfortable in this class to actively participate on a **regular** basis.

Laboratory Experiments and Field Investigations

Labs and other activities are intended to encourage and promote students to:

1. Think critically about environmental systems.
2. Develop and conduct well-designed experiments.
3. Utilize appropriate techniques and instrumentation.
4. Analyze and interpret data, including statistical and graphical presentations.
5. Think analytically and apply concepts to the solution of environmental problems.
6. Form conclusions and to evaluate their quality and validity.
7. Propose further questions for study.
8. Communicate accurately and meaningfully about observations and conclusions.
9. Lab and field investigations/experiments will typically include a lab summary report or other written/typed "deliverable" upon completion of the lab.

Grading:

Students will be evaluated through performance on the following:

- Chapter/topic Exams (1 to 4 chapters; 35-85 M/C and one FRQ)
- Quizzes (several "Big Idea" questions per week)
- Quarter Finals and a Semester Final Exam
- Question-Sets (to be worked on during unit and turned-in before unit test)
- Laboratory and Field Reports
- Written & Oral Presentations, etc.

Letter grades --- scale: |A = 90- 100%| |B = 80-89%| |C = 70-79%| |D = 60-69%| |F = 59%|

Homework, Taking Notes, Being Present & The Approach

As will be the case in many of the science (and other) courses that you will take in college, "homework" is primarily READING (and thinking about what is read) in AP Environmental Science. A "typical" reading assignment for a given day is 6 to 9 pages in our text or current event articles. While our text is quite comprehensive and generally viewed as one of the best textbooks available on the market, all course & exam content of significance is **NOT necessarily** in the textbook. You **will** see information on exams and quizzes which is **NOT** from the text. **In the event that you are not able to be in class due to illness, an appointment or other reason, it may be helpful to have several friends in the course whom you could easily contact to touch base with regarding class notes and other material that you might have missed.**

Being attentive, listening, contributing, asking questions, sharing your perspective and opinion on topics and issues, offering comments, observing, thinking, pondering, weighing and taking notes is definitely recommended. By taking notes on text readings, class lectures and discussions, videos, and other sources, you will be creating what should be a very valuable STUDY GUIDE to prepare for all exams and quizzes, including the International May AP Exam on Monday, May 4th, 2015.

– **Taking Notes is definitely recommended**.

Expectations & Noteworthy Qualities

1. Please be Courteous: it is contagious, it's free, and the difference that it can make in this world can be truly amazing!
2. Display honesty, integrity, responsibility, and initiative.
3. Actively contribute and participate in the course on a regular basis.
4. Be prepared for class. Ask Questions; Offer Comments; Share Your Perspective, Insights, Thoughts, & Opinions.
5. Requests to turn in "Late Work" should be avoided. –Thank you.
6. Please do not work on coursework from your other subjects while in AP EnviroSci.
7. Thank you for not **eating** during class (lunch just ended!). This policy tends to curb the volume of smashed Doritos and Cheetos that we find on the floor throughout the day. - Thank You.
8. "Restrooms, Fact-Finding Missions & Networking Opportunities":
   -Gotta go? -Gotta go! Enough said. Please ask first, instead of just walking out.

The May AP Exam: Monday, May 4, 2015 - Morning Exam
It is my hope and expectation that students enrolled in AP Environmental Science will take this exam. If you are willing to put forth the effort and devote the necessary time, you will be putting yourself in a great position in terms of being very successful on the May AP Exam. I am giving my all to help you succeed, and I hope you'll return the favor.

The AP Environmental Science Exam is three hours in length and consists of two parts:
Part I: 100 Multiple-Choice Questions in 90 minutes = 60% of score
Part II: 4 Free-Response Questions in 90 minutes = 40% of score

Part I. Multiple-Choice Questions: The number of M/C questions taken from each of the 7 major topic areas in the course outline is reflected in the percentage next to each topic. For example, you can expect to see 10-15 M/C questions dealing with Topic I, Earth Systems and Resources. You will

see “Question Sets” (2-5 questions which draw upon the same set of 5 choices), “stand alone questions”, as well as a few “Roman Numeral” format questions.

PART II. Free-Response Questions: The FRQ section emphasizes the application of principles in more depth than a M/C question can involve. You will need to organize answers to questions, demonstrating reasoning and analytical skills, as well as the ability to synthesize material from several sources into cogent and coherent written responses. You should note that Environmental Science AP FRQs are best described as written responses in which the student specifically and comprehensively addresses the question stems. **Environmental Science FRQs are NOT five paragraph “classic” essays. Unless specifically called for in the question, there is no need for an introductory paragraph, concluding paragraph, or restatement of the questions**.

There are 3 types of FRQs:

1. Data analysis/Calculation-based/Lab-based or Lab-design: (1 FRQ)
2. Document-based (could involve a Lab-design and/or a Calculation): (1 FRQ)
3. Synthesis and Evaluation: (2 FRQs)

The Course will take care of the Exam.

Again, thanks for choosing to be a part of AP Environmental Science. I am very glad that you are going to be with us and hope that this course proves relevant, meaningful, practical, and applicable this year and for the rest of your life.

ROCK ON!

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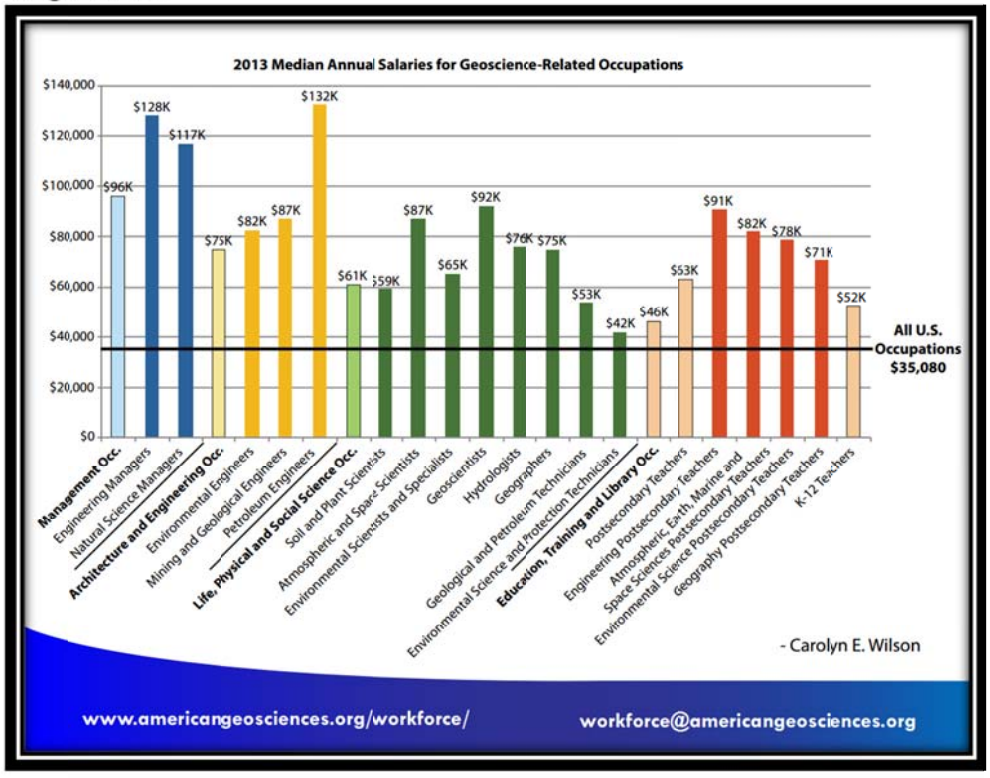
August 2014



Syllabus – AP Environmental Science

Text:
Miller, *Living in the Environment,*
Other supplemental readings are used as listed in the "Resources" section for each unit below. The following are always open to change, but should give you a clear vision of where the class is headed. Field trips are still being arranged, so places dates and times will be announced within the coming weeks.

Semester 1

Unit 1: Introduction to Environmental Science (approximately 2 weeks) The first unit of the course will acquaint students with environmental science; it introduces much of the important theory, philosophy, rhetoric, and terminology, which will be used throughout the course. The study of human population dynamics and how humans cause environmental change is also included in the first unit of the school year.

Activities:

- *Tragedy of the Commons Activity (1 hour) A hands-on activity designed to simulate the tragedy of the commons.*
- *Risk Lab (3 hours) A laboratory activity designed to provide students with insight into the psychology of risk assessment.*
- *Introduction to Plotly, Google Docs and Weebly.*
- *Trash Burial – To be revisited at end of year.*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exam – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 1 & 9
- Klein, "How Politics Makes Us Stupid," Vox.com, April 6, 2014
- Hardin, "The Tragedy of the Commons," Science, v163. December 13, 1968
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: CNN Special Reports, "The People Bomb"

Unit 2: Systems Thinking: Global Warming and Ozone Depletion (approximately 2 weeks) The second unit of APES begins with a review of the scientific method and an introduction to systems thinking; you will learn that "systems thinking" is essential to evaluating and understanding environmental change. You will then apply what you learned about systems to two significant global environmental issues that are consequences of human activity – global warming and ozone depletion.

Activities:

- *Ecocolumn Lab (>3 hours) A laboratory activity in which students design and populate an ecosystem contained within stacked, 2-liter bottles. Students will monitor the physical properties and water quality in the ecocolumn throughout the school year.*
- *C02 and Water Vapor Effects on Temperature Lab*
- *Interactive Carbon Cycle Lab: Learn the steps and time frames of carbon cycle*
- *Climate Data Maps and Glacial Responses analysis*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exams – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 2 & 20
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Strange Days on Planet Earth, "The One-Degree Factor" (MAYBE)
- Video: clips from NASA / NOAA visualizations
- Website: www.climate.gov

Units 3: Life on Earth (approximately 2 weeks) The third unit of the course comprise a comprehensive overview of basic ecological principles. The units include the study of how living organisms interact with one another and with their surroundings, as well as the study of biogeochemical cycles, evolution and succession.

Activities:

- *Ecocolumn Lab, continued (>3 hours) A laboratory activity in which students design and populate an ecosystem contained within stacked, 2-liter bottles. Students will monitor the physical properties and water quality in the ecocolumn throughout the school year.*
- *Geologic Relationship Principles Lab (1hr)*
- *Radiometric Dating Lab (1hr) – Investigate how scientists determine ages of rocks and fossils.*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exams – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 3 & 4
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Planet Earth, various clips

Unit 4: Biomes (approximately 2 weeks) The fourth unit of includes the study of many of the Earth's terrestrial and aquatic biomes.

Activities:

- *Tagging Lab (1 hour) A laboratory activity designed to allow students to estimate a population size using the capture, tag and release method of estimating population size.*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exams – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 5 & 6
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Planet Earth, various clips

Units 5: Populations (approximately 2 weeks) The fifth unit of the course includes the study of how species diversity, reproductive strategies and succession.

Activities:

- *Species Diversity Lab (2 hours) A laboratory activity designed to provide students with the opportunity to measure species diversity.*
- *Oh Deer! (1 hour) An outdoor activity in which students simulate a predator/prey species interaction then analyze data collected during the activity.*
- *A Grave Calculation Lab – Determine historical population characteristics of Turlock based on tombstone data. Either online or in person to cemetery.*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exams – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 7 & 8
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Planet Earth, various clips

Unit 6: Biodiversity (approximately 2 weeks) This unit includes the study of wildlife management and land use, as well as factors that contribute to the protection and preservation of threatened and endangered species.

Activities:

- *Habitat Loss Lab (2 hours) A laboratory activity designed to allow students to evaluate the effect of habitat loss on species diversity.*
- *A Quandary in Ponder (2 hours) A role-play activity in which students invent a character and take part in a public debate over pesticide use.*
- *California Invasive Species Awareness Poster*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exam – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 10-12
- Muir, "A Paradise of Birds," *The Wilderness World of John Muir*.
- Witze, "Native Ecosystems Blitzed By Drought," *Nature.com* August 12, 2014
- Earth Engine by Google: https://earthengine.google.org/#intro
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Cane Toads: The Conquest
- Extra Video: The Lorax
- Video: Planet Earth, various clips

Unit 7: Food & Agriculture (approximately 2 weeks) This unit includes the study of nutrition and food production, including the green revolution, soil conservation, pesticide use and irrigation practices.

Activities:

- *Dilution Lab (3 hours) A laboratory activity designed to familiarize students with the laboratory skills required to prepare a series of different concentrations of a solution.*

- *Salinization Lab (3 hours) A laboratory activity designed to assess the student's ability to design and perform an experiment.*
- *Soil Lab (1 hour) A laboratory activity in which students measure the physical and chemical properties of soil.*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exam – A 45-minute exam designed to assess each student's mastery of the unit content.*
- *Final Examination – A 90-minute exam designed to assess each student's mastery of the material studied during the first semester*.

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapter 13
- Diamond, "The Worst Mistake in the History of the Human Race," *Discover*. May, 1987.
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.

Semester 2

Unit 8: Water Resources & Water Pollution (approximately 3 weeks) The first unit of the second semester includes the study of water resources and distribution systems. The unit also includes the study of water quality and specific water pollutants.

Activities:

- *Water-Use Audit (2 hours) An activity in which students measure, record, and analyze the use of water in and around their home.*
- *Water table and Groundwater Lab: Investigating the hydrology of water systems.*
- *Hollister Cheese Co Groundwater Lab.*
- *Your World Project (20-?? hours) A class community service project in which the class organizes itself into a non-governmental or corporate structure (with a CEO, department heads, etc.) then selects and champions an underserved, but important environmental cause. Work continues through the end of the school year*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exam – A 45-minute exam designed to assess each student's mastery of the unit content.*
- ***Field Trip to Turlock Municipal Wastewater Treatment Plant DATE TBA***

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 14 & 21
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Damnation
- Video: Tales of the San Joaquin
- Video: Plastic Paradise
- ExtraVideo: Cadillac Desert
- Extra Video: TID 125th Anniversary

Unit 9: Nonrenewable Resource (approximately 2 weeks) This unit includes the study of plate tectonics, the Earths' crust, minerals and mining, fossil fuel use and nuclear energy.

Activities:

- *Personal Energy Audit (2 hours) An activity in which students record and analyze their personal use of energy.*
- *Convection Lab: Investigate how Earth's internal heat shapes crustal movements*
- *Cookie Mining: Simulation of real mining practices.*
- *Rock Cycle Lab:*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exam – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 15 & 16
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Modern Marvels, "Coal"
- Video: Switch Energy Project - Various

Unit 10: Renewable Energy Sources (approximately 1 week) This unit includes the study of solar and wind energy, hydropower, biofuels and geothermal energy.

Activities:

- *Solar Oven Competition: Create a cheap and effective solar oven for less than $30 using reclaimed materials. Competition to be held on sunny day.*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*

- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exam – A 45-minute exam designed to assess each student's mastery of the unit content.*
- *Extra Credit: Create working wind turbine or photovoltaic project.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapter 17
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Switch Energy Project – Various

Unit 11: Human Health & Air Pollution (approximately 2 weeks) This unit includes the effects environmental hazards have on human health, as well as on the health of the environment, followed by the study of air pollution including photochemical smog and the effects of specific air pollutants.

Activities:

- *Ozone Lab (2 hours) A laboratory activity in which students measure the ozone concentration in the air in and around their home using paper indicator strips they make in the lab.*
- *Particulate Lab (2 hours) A laboratory activity in which students qualitatively monitor particulates in and around their home.*
- *In-Class Essay – An AP-like practice essay to assist student's as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exam – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapters 15 & 16
- CalEnviroScreen Online Tool: http://oehha.ca.gov/ej/ces2.html
- American Lung Association State of the Air: http://www.stateoftheair.org/
- San Joaquin Valley Air Quality Control Board: http://www.valleyair.org/
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.

Unit 12: Solid and Hazardous Waste (approximately 2 weeks) This unit includes the study of solid and hazardous wastes, the common methods of their disposal and the legislation surrounding waste disposal.

Activities:

- *SWAG Bags – Solid Waste Awareness Generation project.*
- *Buried Trash Reclamation and Write-up: Analysis of trash that had been buried for school year.*
- *In-Class Essay – An AP-like practice essay to assist students as they prepare for their examination.*
- *Quizzes – Short (2-5 minute) quizzes administered 2-3 times each week throughout the unit.*
- *End-of-Unit Exam – A 45-minute exam designed to assess each student's mastery of the unit content.*

Resources:

- Miller, *Living in the Environment*, 15th edition: Chapter 22
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Modern Marvels, "Garbage"

Unit 13: APES Review (approximately 3 weeks) This unit is a review of the topics studied during the course in preparation for the AP Environmental Science Examination.

Unit 14: Your World Project Completion (approximately 3 weeks) Following the AP Environmental Science Exam the students will complete their Your World Project.