AP Environmental Science Syllabus
North High School 2017-2018

Instructor Information:
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Course Description:
The goal of AP Environmental Science is to provide students with the science principles, concepts and methodologies required to understand the interrelationships to the natural work, to identify and analyze environmental problems both natural and man-made, to evaluate the relative risks associated with these problems, and to examine different solutions for resolving or preventing them.

AP Environmental Science is a college level, interdisciplinary course; it embraces a wide variety of topics from different areas of study. There are several major unifying themes that cut across the many topics included in the study of environmental science. The following themes provide a foundation for the structure of the AP Environmental Science course:

- Science is a process
- Energy conversions underlie all
- The Earth itself is one interconnected system
- Humans alter natural systems
- Environmental problems have a cultural and social context
- Human survival depends on developing practices that will achieve sustainable systems

This course aligns to the standards instituted by the College Board for all AP courses and covers all topics in the *AP Environmental Science Course Description*. These include:

- Earth Systems
- Earth Resources
- The Living World
- Population
- Land Use
- Water Use
- Energy Resources
- Energy Consumption
- Pollution
- Global Change

The Exam:
The AP Environmental Science Exam is 3 hours long and is divided equally in time between a multiple-choice section and a free-response section. The multiple-choice section, which constitutes 60 percent of the final grade, consists of 100 multiple-choice

questions that re designed to cover the breadth of the students' knowledge and understanding of environmental science. The number of multiple-choice questions taken from each major topic are is reflected in the percentage of the course as designated in the outline above.
The free-response section emphasize the application of principles in greater depth. In this section, students must organize answers to broad questions, thereby demonstrating reasoning and analytical skills, as well as the ability to synthesize material from several sources into coherent essays. Four free-response questions are included in this section, which constitutes 30 percent of the final grade: 1 data-set question, 1 document-based question, and 2 synthesis and evaluation questions. The 201 AP Environmental Science Exam is scheduled for **Thursday May 10, 2018**.

Textbook: Living in the Environment: Principles, Connections, and Solutions, 15th Edition. G. Tyler Miller

Companion Website:
http://www.cengage.com/cgi-wadsworth/course_products_wp.pl?fid=M20b&product_isbn_issn=9780495015987&discipline_number=22

Materials Needed:

- Three ring binder
- Tabs for binder
- Filler paper for binder
- Pencil/pen
- Index cards for flash cards

Classroom culture:
The culture in our classroom will be one of respect – students, thoughts and questions. You as a student have the right to learn, you do not have the right to deny that opportunity for others. We will use cell phones occasionally for class, and during other times it must be off and put away, be prompt, prepared, and polite.

Make up policy (test and labs):
All assignments missed due to an excused absence from class must be completed within one day of the students return to class. It is the responsibility of the students to request all make up work. Tests and quizzes are to be made up within one day of returning. Credit for make-up work will not be given for unexcused absences.

Academic Misconduct:
Cheating and/or plagiarizing will not be tolerated. Instead of turning in work that is not yours, please see me if you need help. Any person found to be part of this behavior will receive a zero on the assignment and a consequence.

Grade Breakdown:
Students will be assessed using a variety of methods, including chapter assignments, quizzes, unit tests, Free Response Questions (FRQ's), lab reports and activities, projects, career research and current events. Standing homework assignment is to read the current unit content in the textbook, review notes and other information given to you nightly.

- **Chapter Assignments**- For each chapter, students will be required to read the textbook and answer the practice questions associated with that chapter. Reading quizzes may be given to ensure this work is completed. Students will learn approximately 700 vocabulary words related to Environmental Science. Vocabulary is very important to fully understand science. Students are required to make their own flash cards (tangible not electronic).
- **Lab Reports/Activities/Projects/Career Research/Current Events**- There will be many activities for each unit. Some activities will be relatively short, while others will last for many weeks. Each activity has different point values based on the length and complexity. Lab write-ups will be in lab format (explained later) and generally carry a higher point value.
- **Unit Summative Assessments/Quizzes**- Unit tests will be comprised of several chapters from the text. Exams consist of multiple choice and extended response questions. Retake/credit recovery opportunities are available to students who earn less than 79% on the multiple choice part of the exam and have all homework and review materials completed for the unit. There will be quizzes on a regular basis. The quizzes will focus on vocabulary, chapter readings, lectures and activities for the week.

Extra Help: I am available for extra help. See me to set up a time.

Possible Duration (based on class need)	Topic	Subtopics	Possible Activities and Labs
1 week	Economics and Law	**Global Economies (Ch. 24)** -Globalization; World Bank; Tragedy of the Commons; relevant laws and treaties **Economic Impacts (Ch. 24 & 25)** -cost-benefit analysis; externalities; marginal costs; sustainability	**Activity**: Legislation timeline- students will create a descriptive, to-scale timeline of important environmental legislation **Activity**: Environmental Laws -students will create posters explaining 2 US or international laws or treaties that pertain to the topics we will be studying this year **Activity**: Tragedy of the Commons **Article**: Tragedy of the Commons **Video**: The Lorax
1 week	Earth Systems	**Earth Systems (Ch. 3) -** Interactions between Earth's spheres.	**Activity**: Students will create models or posters of the Earths spheres.
4 weeks	Popuation	**Population Biology Concepts (Ch. 8)** -Population ecology; carrying capacity; reproductive strategies; survivorship **Human Population (Ch 9)** Human Population dynamics -Historical population sizes; distribution; fertility rates; growth rates and doubling times; demographic transition; age-structure diagrams **Population size** -Strategies for sustainability; case studies; national policies **Impacts of population growth** -Hunger; disease; economic effects; resource use; habitat destruction	**Lab**: Population Growth with Lemna minor -students will conduct investigations into population growth and carrying capacity **Lab**: Let's Go Fishing - mark/recapture simulation - students sample, mark and resample in order to use the Petersen Method to determine the fish population in a pond **Field trip**: Students collect and identify macroinvertebates at Gully Brook Park as part of a long-term population study **Lab**: Exponential Growth- A Toss of the Dice -students use random throws of the dice to simulate population growth of a species

			Activity: Human Population Dynamics -students use the census website to compare a variety of important demographic information for different countries **Activity**: Human Population Growth: The Power of the Pyramids -students will discover how population distribution differs by country **Video**: NOVA Population Paradox **Video**: World Population **Field trip**: Landfill/Recycling Facility
4.5weeks	Land	**Earth Science Concepts (Ch. 15)** -Plate tectonics; earthquakes; volcanism; seasons; solar intensity and latitude **Soil and Soil Dynamics (Ch. 13)** -Rock cycle; formation; composition; physical and chemical properties; soil types; erosion and other soil problems; soil conservation **Agriculture (Ch 13)** Feeding a growing population -human nutritional requirements; types of agriculture; Green Revolution; genetic engineering and crop production; deforestation; irrigation; sustainable agriculture; GMOs Controlling Pests -types of pesticides; cost and benefits of pesticide use; IPM; relevant laws **Pollution (Ch 22)** Noise Pollution -Sources; effects; control measures	**Lab**: Micrometeorology- students will observe plants growing under various conditions **Lab**: Soil Formation and Properties - students analyze soil composition and structure **Lab**: Soil Productivity - students will test and compare different types of soil for farming purposes **Lab**: Agriculture and Feeding a Growing Population- students evaluate the trade-offs between agricultural production and the environment **Activity**: Ring of Fire- students plot earthquakes of a determined magnitude to demonstrate plate tectonics **Activity**-Carbon Footprint- students will calculate their carbon footprint **Video**: Harvest of Fear **Video**: Food Inc

		Solid Waste -Types; disposal; reduction	
4.5 weeks	Water	**Global Water Resources and use (Ch 14)** - Freshwater/Saltwater; ocean circulation; agricultural, industrial and domestic use; surface and groundwater issues; global problems; conservation Fishing - Fishing techniques; overfishing; aquaculture; relevant laws and treaties **Water Pollution (Ch 21)** - types; sources, causes and effects; cultural eutrophication; groundwater; maintaining water quality; water purification; sewage treatment/septic systems; Clean Water Act and other relevant laws	**Lab**: Quality of Natural Waters- Biological Factors - students monitor water quality of the school pond and Gully Brook throughout the year **Lab**: Physical and Chemical Factors of Water- students monitor the water quality using chemical tests of various parameters **Lab**: Ecosystem Column Lab -students will explore the conditions necessary for sustainability for several different types of ecosystems **Activity**: Water, water Everywhere -students will examine information for different countries regarding access to clean water **Activity**: Personal Water Use Inventory- students will gather data about their personal water use **Lab**: Eutrophication and biodegradable waste- students examine eutrophication and its effects on water quality
4.5 weeks	Atmosphere	**Atmosphere (Ch 19)** -Composition; structure; weather and climate; atmospheric circulation and the Coriolis Effect; atmosphere-ocean interactions; ENSO **Stratospheric Ozone (Ch 19**) - Formation of stratospheric ozone; ultraviolet radiation; causes and effects of ozone depletion; strategies for reducing ozone depletion; relevant laws and treaties **Air Pollution (Ch 19)** -	**Lab**: Acid Rain Lab- students will explain how acid rain forms and observe the pH of unpolluted and acid rain. Students will explain the effects of acid rain on man-made structures **Lab**: Tropospheric Ozone - students will measure the concentration of tropospheric ozone at the ground level near their home over an extended period of time **Lab**: Airborne Particulates

		Sources-primary and secondary; major air pollutants; measurement units; smog; acid deposition-causes and effects; heat islands and temperature inversions; indoor air pollution; remediation and reduction strategies; Clean Air Act and other relevant laws	**Examination** - students will examine particulates collected from their bedroom and compare the deposition rate with other students **Lab**: Air Pollution and Vehicle Emissions - students investigate the relationship between air pollution and the burning of fossil fuels **Activity**: students research different cars of their choice and compare average emissions **Activity**: Air Pollution Data- students will select various first and second pollutants and compare values for different US cities **Video**: What's Up with the Weather?
4.5 weeks	Energy	**Energy Concepts (Ch 2)** -Forms; power; units; conversions; Law of Thermodynamics **Energy Consumption (Ch 2**) -History; industrial revolution; exponential growth; energy crisis; present global energy use; future energy needs **Fossil Fuel Resources and Use (Ch 16)** -Formation of coal, oil and natural gas; extraction/purification methods; world reserves and global demand; synfuels; environmental advantages/disadvantages of sources **Nuclear Energy (Ch 16)** -Nuclear fission process; nuclear fuel; electricity production; nuclear reactor types; environmental advantages/disadvantages; safety issues; radiation and human	**Lab**:Oil Slick Degredation - students will investigate the use of bacteria for the biodegradation of oil spills **Activity**: Alternative Energy Solution Presentation - students will research a specific field in the alternative energy sector **Activity**: students will create a cost/benefit analysis of replacing the school district's vehicles with natural gas vehicles **Activity**: Personal Energy Consumption- students will calculate their annual energy use and propose how energy could be saved by a variety of changes in the way we live every day **Activity**: Cookie Mining Simulation- students will simulate mining of the earth's surface and underground

		health; radioactive wastes; nuclear fusion **Hydroelectric Power (Ch 17)** - Dams; flood control; salmon; silting; other impacts Energy Conservation -Energy efficiency; CAFE standards; hybrid electric vehicles; mass transit **Renewable Energy (Ch 17)** -Solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages **Mining (Ch 15)** -Mineral formation; extraction; global reserves; relevant laws and treaties	**Video**: The Manhattan Project
3 weeks	Land and Water Use	**Other Land Use (Ch23)** Urban land development -Planned development; suburban sprawl; urbanization Transportation infrastructure -Federal highway system; canals and channels; roadless areas; ecosystem impacts **Public and federal lands (Ch10)** -Management; wilderness area; national parks; wildlife refuges; forests; wetlands Land conservation options - Preservation; remediation; mitigation; restoration **Forestry (Ch 10)** - Tree plantations; old growth forests; forest fires; forest management; national forests; riparian zone **Range Lands (Ch10)** - Overgrazing; deforestation; desertification; rangeland management; federal rangelands	**Activity**: Management of Reneweable Resources- students will make decisions in scenarios regarding the use of natural resources **Activity**: Land Use Planning project- student will have specific constraints when planning a county with a given population **Video**: The Two Sides of Fire **Video**: Yellowstone Fires

6 weeks	Ecology and Human Impact	**Ecosystem Structure (Ch 3,7)** -Biological population and communities; ecological niche; interactions among species; keystone species; species diversity and edge effects; major terrestrial and aquatic biomes **Energy Flow (Ch 3)** -Photosynthesis and cellular respiration; food webs and trophic levels; ecological pyramids Ecosystem **Diversity (Ch 3)** - Biodiversity; natural selection' evolution; ecosystem services **Natural Ecosystem Change (Ch 3 & 4)** Climate shifts; species movement; ecological succession **Natural Biogeochemical Change (Ch 3)** -Carbon; nitrogen; phosphorus; sulfur; water; conservation of matter **Loss of Biodiversity (Ch11)** -Habitat loss; overuse; pollution; introduced species; endangered and extinct species; maintenance through conservation; relevant laws and treaties **Impacts on the Environment and Human Health (Ch 18)** Hazards to Human Health - Environmental risk analysis; acute and chronic effects; dose-response relationships; air pollutants; smoking and other risks Hazardous chemicals in the environment -Types of hazardous waste; treatment/disposal; cleanup of contaminated sites; biomagnifications; relevant laws **Global warming/Greenhouse Effect (Ch 20)**	**Lab**:The Effects of Radiation on the Germination and Growth of Radish Seeds- students will observe growth in radish seeds that have been exposed to different levels of radiation **Lab**: No Water off a Duck's Back -students will determine what happens to waterfowl when they are involved in an oil spill **Lab**: What is in an Owl Pellet? - students gain insight into the food web of an apex predator through identifying species found in an owl pellet **Activity**: Toxics in your Home Scavenger Hunt- students will identify various toxic or hazardous materials around their homes **Video**: Cane Toads **Activity**: Car Biodiversity - students will conduct a parking lot survey and categorize cars by make and model **Activity**:Food Webbing -students will create a food web for a specific biome and identify the role of each species **Video**: Can Buildings Make You Sick?

		-Greenhouse gases and the greenhouse effect; impacts and consequences of global warming; reducing climate change; relevant laws and treaties	