***AP Environmental Science Syllabus 2020-2021***

**Teacher information**

Dr. K. Taylor ~ Rm. 205

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Conference hour by appointment.

**Class Hours**: (6th) 8:55am - 10:20am. (7th) 11:01 am – 12:40 pm on BLACK Days.

**Required Text**:

*Environmental Science for AP,* Friedland.A. & Relyea, R. W.H.Freeman and Co. 2015

*Environmental Science:A Global Concern.* Cunningham,W., & Cunningham. M., McGraw Hill, 2008

**Lab Manual:** *Environmental Science:A Global Concern Lab Manual.* Cunningham,W., & Cunningham. M., McGraw Hill, 2008

**Teacher sources:**

*Living in the Environment: Principles, Connections, and Solutions. 15th Ed.* Miller, Tyler G,Thompson, Brooks/Cole, 2007*.*
*Strive for a 5: Preparing for the AP Environmental Science Examination.* Mayer, C., & McCracken, E. W..H.Freeman and Co. 2015

**Resources:**

Internet resources are widely used during this course and their use varies from year to year depending on time and availability. Some websites used regularly are as follows:

* Biology Junction
* Access Excellence
* AP Central
* Nova Online
* PBS.org
* Environmental Literacy Council
* Mrs. Taylor’s SciWorld
* Barron’s AP Environmental Science
 test prep
* Google Classroom

**Course Description:**

The AP Environmental Course (*APES*) is a full year course designed to be the equivalent of a one semester, introductory level college course in environmental studies. Unlike other introductory level college science courses, environmental science is offered from a wide variety of departments, including geology, biology, environmental studies, chemistry, and environmental engineering. The AP Environmental Science course is a rigorous course that stresses scientific principles and analysis and includes a laboratory component. It is intended to enable students to undertake, as first year college students, a more advanced study of topics in environmental science or to fulfill the basic requirements for a laboratory science class, allowing the student freedom to take other courses at the college level. In breadth and depth, the content of this course reflects what is found in many introductory college courses in environmental science.

**Course Goals:**

The goal of this course is to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world. Students will learn to identify and analyze environmental problems both natural and human made, evaluate the relative risks associated with these problems, examine alternative solutions for resolving and/or preventing them, and develop and focus their own political perspectives. The emphasis of this course is a hands-on, inquiry-based approach, which includes labs and cooperative learning experiences to supplement material in class.

**Course themes:**

Environmental science is interdisciplinary; it embraces a wide variety of topics from different areas of study. Yet there are several major unifying constructs, or 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
 ecological processes.
* 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.

**Supplies and Materials:**

Students will be required to keep all handouts, graded work, artifacts, labs, and tests for the purpose of further research and study material. There is a comprehensive final exam in May that covers material from the entire year. The following is a list of necessary materials:

* Chromebook
* black or blue pens and #2 pencils
* Loose Leaf paper
* Princeton Review or 5 Steps to the AP Environmental Science test prep book provided by
 the instructor.

**Important! Periodically, we will conduct labs at home. If the materials needed for the lab are cost prohibitive, please let me know so that I can get materials to you.**

**Assignments/Homework:**

Students are required to complete the warm up activity every day, participate in class discussions, group work, cooperative activities, labs, research, and homework assignments. Composition notebooks and homework will be collected with the aforementioned artifacts at the end of each unit **and** periodically checked throughout the unit period. *It is your responsibility to obtain the class/homework and complete any make up work.* ***Late work will be excepted with a loss of 10% of the total point value per day up to 5 days. After the fifth day an alternative assignment will be assigned to recover some of the missed points.***

Assignments may include *but not limited* to:

* Reading/answering textbook
 questions
* Reviewing/copy lecture notes
* Readings and case studies
* Lab write-ups
* Journal and newspaper summaries
* Essays
* Creating posters/presentations
* Conducting research
* Working in groups

**Classroom rules:**

* Be respectful to yourself, the classroom, fellow students, and to instructors, at all times.
* Be prepared. Enter Google Meet muted and have pens/pencils and paper for every class.
* Be on time. Enter the Google Meet ready to learn from “bell to bell”.

**Virtual Classroom expectations:**

* Come prepared for class with supplies listed below
* Log into Google Meet at least 2 minutes before class begins.
* Be mindful of proper virtual meeting etiquette. Get dressed, eat your meal, get your learning space ready
and take care of any necessary grooming needs prior to logging into class.
* Enter the classroom muted and begin working on the Writing prompt.
* Remain muted unless you have a question or have been instructed to unmute.
* Be respectful and pay attention. (Minimize distractions such as TV, radio, texting, etc.)
* Once class has begun, raise your hand to respond/ask questions or unmute and ask your question.
* Fully participate in class by taking notes, completing practice problems, answering questions, presenting
your work, participating in groups work, completing labs, and working independently.
* All homework reading assignments and summaries should be prepared and completed prior to class.
* No sleeping, head down, or absent from your computer. If I cannot see you or hear you, you will be
marked tardy/truant or absent.
* Use time wisely and work on coursework from beginning of class until Dr. Taylor dismisses.
* Refrain from using the chat for non-coursework related communication.

**School and District Rules/Policies:** School and district policies will be enforced in my classroom along with classroom rules and norms. This includes, but is not limited to policies dealing with electronic devices, uniform policy, profanity, fighting, and/or bullying. There will be no exceptions or bargaining. Failure to follow rules and policies will result in disciplinary consequences.

**Assessments:** One to two assessments are given per unit and covers approximately two chapters. Assessments are generally multiple choice, problems, and free response questions. Questions will be drawn from lecture notes, text questions, documentaries, case studies, and lab/activities completed during the unit.

**If you are caught with a cell phone or other materials during an exam or quiz, you will receive a zero for that assessment.**

**Extra Credit (** No extra credit will be excepted if all assigned work is not completed).

* There will be opportunity to earn up to 10% extra credit on each exam that I administer
 (not the College Board AP exam).
* There will be opportunity for other extra credit assignments as the semester progresses in
 the way of reports, video presentations, attending lectures, or an approved student created
 assignment.

**Grading Procedures:**

**Required Work**

* Classwork 30%
* Assessment 70%
* TOTAL 100%
	+ Classwork includes: Writing Prompts, journaling, exit slips, class participation, leadership roles. Independent work, Document analysis, Presentations.
	+ Assessment includes: Labs report, Projects, Essays Unit exams and benchmarks

**Grade Scale**

* 90%-100% A
* 80%-89% B
* 70%-79% C
* 60%-69% D
* 0%-59% F

 **Discipline Policy**

* first offense: verbal warning
* second offense: parent contact
* third offense: call to parent and email to grade level principle
* fourth offense: referral

**(The laboratory experience listed in the syllabus are designed for in-person learning are subject to virtual modification or omission based on whether students are attending virtually or in person)**

**Scope and Sequence of Course**

 **Unit 1 – Introduction to Environmental Science** (5 – 90 minute periods/ 2 weeks)

Text Chapters:

Chapter 1 Humans and Sustainability: an Overview

Chapter 2 & 3 Science, Systems, Matter, and Energy

Chapter 24 Politics, Environment, and Sustainability

Topics:

What is Environmental Science?
A brief history of conservation and environmentalism
Current conditions
Human dimensions of environmental science
Sustainability & Ethics

Labs:

* Tragedy of the Commons Simulation

Activities

* Tragedy of the Commons reading by Garrett Hardin
* Easter Island supplemental reading by Jared Diamond with discussion
* Calculate you ecological footprint [www.myfootprint.org](http://www.myfootprint.org)

Videos:

* Guns, Germs, and Steel by Jared Diamond
* The Lorax

**Unit 2 – The Living World** (10-90 minute class periods/3.5 wks)

Text Chapters

* Chapter 4 Ecosystems: What are they and how do they work?
* Chapter 4 Evolution and Biodiversity
* Chapter 5 Climate and Terrestrial biodiversity
* Chapter 5 Aquatic Biodiversity

Topics:

* Ecosystem structure: Biological populations & communities, ecological niches, interactions among species, keystone species, species diversity & edge effects, major terrestrial and aquatic biomes.
* Energy Flow: Photosynthesis & cellular respiration, food webs & trophic levels, ecological pyramids.
* Ecosystem Diversity: Biodiversity, natural selection, evolution, ecosystem services.
* Natural Ecosystems Change: Climate shifts, species movement, ecological succession.
* Natural Biogeochemical Cycles: Carbon, nitrogen, phosphorous, sulfur, water, conservation or matter.

Labs:

* Carolina ™ Primary Consumer Energy Flow
* Carolina ™ Exploring Biodiversity
* Carolina ™ Inquiries in Science: Population Density and Biomass Study Kit (Field Quadrant Study)
* Laboratory Investigation 16: Eating at a Lower Tropic Level Quantitative Activity (*Molnar, 115)*
* Laboratory Investigation 15: Net Primary Productivity (*Molnar, 119)*
* Lab Aids Natural Selection Experiment Kit

Activities:

* Biome Research Project
* Species Interactions WebQuest “Bats in the Belfy WebQuest

Videos:

* How Ecosystems Work: Energy Flow and Nutrient Cycles (*Great Pacific Media Company).*
* The Web of Life: Producer to Predator (*Great Pacific Media Company)*
* Evolution Series (*PBS*).

Possible Field Trip or guest speaker:

* Tyson Research Center at Washington University <http://www.tyson.wustl.edu/>
* Guest speaker Susan Flowers, associate professor at Washington University Saint Louis

**Unit 3 – Population** (8 90-minute class periods/3 wks)

Text Chapters

* Chapter 6 Population Ecology
* Chapter 7 Applying Population Ecology: The Human Population and Its Impact

Topics:

* Population Biology Concepts: Population ecology, carrying capacity, reproductive strategies, survivorship.
* Human Population: Human population dynamics-Historical populations sizes, distribution, fertility rates, growth rates/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.

Labs:

* Laboratory Investigation 17: Predator-Prey Simulation (*Molnar, 119*).
* Carolina ™ Population Growth in *Lemma minor*
* Laboratory Investigation 22: Population Distribution and Survivorship (*Molnar, 133)*
* Cemetery Lab
* Lab: Population Estimation through Mark and Recapture

Activities:

* World Population Growth Quantitative Activity (*Molnar, 133*)
* Global Population Trends Project (*Molnar, 145*)
* Doubling Time in Exponential Growth Quantitative Activity (*Molnar, 139)*
* Population Reference Bureau data analysis activity

Videos

* Wolves: A Legend Returns to Yellowstone (*National Geographic*)
* Alien Invaders (*PBS*)
* World in the Balance: The People Paradox (*NOVA*)
* World in the Balance: China Revs Up (*NOVA*)
* The People Bomb (*CNN*)

Possible Field Trip:

* Wild Canid Center <http://www.wildcanidcenter.org/>

**Unit 4 – Land & Water Use** (12 90-minute class periods/ 4 wks)

Text Chapters:

* Chapter9, 12 & 13 Sustaining Terrestrial Biodiversity: The Ecosystem Approach
* Chapter 9 & 10 Food, Soil Conservation, and Pest Management
* Chapter 17 & 18 Water

Topics:

* Agriculture: Feeding a growing population-Human nutritional requirements, types of agriculture, Green Revolution, genetic engineering/crop production, deforestation, irrigation, sustainable agriculture.
* Controlling pests: Types of pesticides, costs/benefits of pesticide use, integrated pest management, relevant laws.
* Forestry: tree plantations, old growth forests, forest fires, forest management, national forests.
* Rangelands: Overgrazing, deforestation, desertification, rangeland management, federal rangelands.
* Other Land Use: Urban land development-Planned development, suburban sprawl, urbanization.
* Transportation infrastructure-Federal highway system, canals/channels, road less areas, ecosystem impacts.
* Public & Federal Lands-Management, wilderness areas, national parks, wildlife refuges, forests, wetlands.
* Land Conservation Options-Preservation, remediation, mitigation, restoration,
* Sustainable Land-use Strategies
* Mining: Mineral formation, extraction, global reserves, relevant laws & treaties.
* Fishing: Fishing techniques, overfishing, aquaculture, relevant laws & treaties.
* Global Economics: Globalization, World Bank, Tragedy of the Commons, relevant laws & treaties.

Labs:

* Laboratory Investigation 7: Copper Extraction (*Molnar, 59*).
* Designing a sustainable garden (<http://www.sustainable-gardening-tips.com/> )
* Toxicity and LD50and LC50 Lab Design from <http://teachers.sduhsd.k12.ca.us/bbodas/welcome_to_ap_environmental_scie.htm>
* Cookie Mining Lab

Activities:

* National and Local Water Use Project (*Molnar, 79*)
* Toxins in the Environment Scavenger Hunt
* APES Forestry Practices Harvesting and Sustainable Forestry Practices Internet Activity
* Biomagnification Case Study <http://ublib.buffalo.edu/libraries/projects/cases/case.html>
* Ecotourism Case Study <http://ublib.buffalo.edu/libraries/projects/cases/case.html>
* Harvest of Fear RAFT activity (*PBS*)

**UNIT 5 – Earth Systems & Resources** (4 90-minute class periods 2 wks)

Text Chapters:

* Chapter 9, 10, 1213 Food, Soil Conservation, and Pest Management
* Chapter 19 & 20 Geology and Nonrenewable Mineral Resources (Introduction)
* Chapter 15 & 16 Air Pollution

Topics:

* Soil & Soil Dynamics: Rock cycle, formation, composition, physical/chemical properties, main soil types, erosion & other soil problems, soil conservation.
* Global Water Resources & Use: Freshwater/saltwater, ocean circulation, agriculture, industrial, & domestic use, surface/groundwater issues, global problems, conservation.
* Earth Science Concepts: Geologic time scale, plate tectonics, earthquakes, volcanism, seasons, solar intensity & latitude.
* The Atmosphere: Composisiton, structure, weather/climate, atmospheric circulation/Coriolis Effect, atmosphere-ocean interactions, ENSO

Labs:

* Carolina ™Soil Formation & properties
* Carolina ™ Testing soil productivity
* Carolina ™ Coriolis Effect & Atmospheric Circulation
* Comperison of Daily Weather and Microclimate Data Field Study (*Molnar, 4*).
* Laboratory Investigation 1-12:The Rock Cycle, Rocks and Soil (*Molnar, 23*).

Activities:

* Energy in Recycling Quantitative Activity (*Molnar, 63*)
* Timeline of the History of the Earth
* Personal Water Consumption
* Global Water Shortage Case Study
* Modeling Layers of Earth’s Atmosphere
* Modeling movement of Ground Water

**End of First Semester**

**Unit 6 – Global Change** (12 90-minute class periods/5wks)

Text Chapters

* Chapter 14, 19 & 20 Geology and Nonrenewable Mineral Resources
* Chapter 5 & 6 Climate and Terrestrial/Aquatic Biodiversity
* Chapter 16 Air Pollution and Climate
* Chapter 15 Climate Change and Ozone Depletion

Topics:

* Stratospheric Ozone: Formation of stratospheric ozone, ultraviolet radiation, causes of ozone depletion, effects of ozone depletion, and strategies for reducing ozone depletion, relevant laws and treaties.
* Global Warming: Greenhouse gases & the greenhouse effect, impacts/consequences of global warming, reducing climate change, relevant laws and treaties.
* Loss of Biodiversity: Habitat loss, overuse, pollution, introduced species, endangered & extinct species.
* Maintenance through conservation
* Relevant laws and treaties.

Labs:

* Carolina ™ Exploring Air Pollution Generated by Fossil Fuel Combustion
* Case of the Florida Panther

Activities:

* Global Climate Change Project (*Molnar, 209*)
* CO2 Emissions from Fossil fuel Burning Quantitative Activity (*Molnar, 167*)
* Consequences of Global Warming jigsaw activity
* Slowing the Production of Global Gases/The Kyoto Protocol

Videos

* An Inconvenient Truth
* Planet in Peril (*CNN*)
* America’s Endangered Species: Don’t Say Good-bye (*National Geographic*)
* Six Degrees Could Change the World (*National Geographic*)

**Unit 7 – Pollution** (8 90 minute class periods/ 4 wks)

Text Chapters:

* Chapter 1 & 21 Environmental Hazards and Human Health
* Chapter 16 Air Pollution
* Chapter 18 Water Pollution
* Chapter 21 Solid and Hazardous Waste

Topics:

* Air pollution-Sources-primary/secondary, major air pollutants, measurement units, smog, acid deposition-causes/effects, heat islands & temperature inversions, indoor air pollution, remediation & reduction strategies, clean air act & other relevant laws
* Noise pollution-sources, effects, control measures
* Water pollution-types, sources, causes & effects, cultural eutrophication, ground water pollution, maintaining water quality, water purification, sewage treatment/septic systems, clean water act & other relevant laws.
* Solid Waste types, disposal, reduction
* Impacts on the Environment & Human Health
* Hazards to human health-environmental risk analysis, acute/chronic effects, dose-response relationships, air pollutants, smoking & other risks
* Hazardous chemicals in the environment – types hazardous waste, treatment/disposal of hazardous waste, cleanup of contaminated sites, biomagnifications, relevant laws.
* Economic Impacts: Cost Benefit analysis, externalities, marginal costs, sustainability.

Labs:

* Carolina ™ Acid Deposition Kit
* Carolina ™ Exploring the Quality of Natural Water Kit
* Laboratory Investigation 28: Acid Rain (*Molnar 183*)
* Laboratory Investigation 12: Water Quality Index (*Molnar 85*)
* Laboratory Investigation 30: Solid Waste Collection (*Molnar 193*)

Activities:

* Toxic Sites in your Neighborhood project (*Molnar 20*)
* [Breathing Easy About New Air Pollution Standards](http://ublib.buffalo.edu/libraries/projects/cases/breathing/breathing.html)case study
* [The Petition: A Global Warming Case Study](http://ublib.buffalo.edu/libraries/projects/cases/petition.html)

Videos:

* Strange Days on Planet Earth: Troubled Waters (*PBS*)

Possible Field Trip:

* Fred Webber Sanitary Landfill <http://dnr.mo.gov/env/swmp/facilities/fredweb.htm>

**Unit 8 – Energy Resouces & Consumption** ( 18 90-minute class periods/8wks)

Text Chapters:

* Chapter 14, 19 Geology and Nonrenewable Mineral Energy
* Chapter 20 Energy Efficiency and Renewable Energy
* Chapter 22 Urbanization and Sustainable Cities
* Chapter 23,24 Economics, Environment, Ethics, and Sustainability
* Misc Review activities for AP Exam and Final Project

Topics

* Energy concepts: Energy forms, power, units, conservations, Laws of Thermodynamics
* Energy Consumption: History-Industrial revolution, exponential growth, energy crisis
* Present global energy use
* Future energy needs
* Fossil fuel resources & use: formation of coal, oil & natural gas, extraction/purification methods, world reserves & global demand, synthetic fuels, environmental advantages/disadvantages. Safety issues, radiation & human health, radioactive wastes, nuclear fusion.
* Nuclear Energy: Nuclear fission process, nuclear fuel, electricity production, nuclear reactor types, environmental advantages/disadvantages, safety issues, radiation & human health, radioactive wastes, nuclear fusion.
* Hydroelectric Power: Dams, flood control, salmon, silting, other impacts
* Energy Conservation: Energy efficiency, CAFÉ standards, hybrid electric vehicles, mass transit
* Renewable Energy: Solar Energy, solar electricity, hydrogen fuels cells, biomass, wind energy, small-scale hydroelectric, ocean waves/tidal energy, geothermal, environmental advantages/disadvantages.

Labs:

* Carolina ™ Inquiries in Science: Examining Energy Resources Kit
* Ward’s Science Modeling Solar Absorption Capacities
* Ward’s Science [Biodiesel from Waste Vegetable Oil Lab Activity](http://wardsci.com/product.asp_Q_pn_E_IG0044093_A_name_E_Biodiesel%2Bfrom%2BWaste%2BVegetable%2BOil%2BLab%2BActivity)
* Ward’s Science [Modeling Copper Extraction , AP Environmental Lab Activity](http://wardsci.com/product.asp_Q_pn_E_IG0035863_A_name_E_Modeling%2BCopper%2BExtraction%2B%2C%2BAP%2BEnvironmental%2BLab%2BActivity)
* Ward’s Science [Mining and Mineral Resource Evaluation Lab Activity](http://wardsci.com/product.asp_Q_pn_E_IG0008879_A_name_E_Mining%2Band%2BMineral%2BResource%2BEvaluation%2BLab%2BActivity)
* Ward’s Science [Dr. Fuel Cell™ Solar Hydrogen Technology Activity Set](http://wardsci.com/product.asp_Q_pn_E_IG0014138)

Activities

* Energy Resource Comparison Project (*Molnar, 163*)
* Measuring Household Energy Consumption
* Renewable Energy Research Project
* Case Studies in Biological and Environmental Ethics

END OF 2ND SEMESTER