AP Environmental Science

INSTRUCTOR INFORMATION

Please go to your course and access the 'Course Home' for detailed instructor information.

CONTACT INFORMATION

Please feel free to contact me if you have any questions regarding your assignments or course content. Course facilitators respond to emails within 24 hours on weekdays and 48 hours on weekends. If you don't receive a response in that time, please reach out again just in case I did not get your message.

Course Requirements

- Be proficient with the basic functions of word-processing software.
- Have access to a computer with internet that has virus-protection software.
- Use an acceptable web browser to access the course: Chrome, Safari or Firefox.
- Have access to your own digital camera or cell phone camera.
- Be able to transfer your images from your camera to your computer.

Course Goals

Environmental Science provides an investigative approach to the interrelationships of the natural world through the study of the fundamental concepts, principles, and methodologies of environmental science, with an emphasis on inquiry and critical thinking skills, including problem solving and experimental investigations. During this academic year, students will learn how to utilize scientific processes to analyze real life data obtained through scientific investigations in class and in the field. Topics of study include Earth systems and resources, Ecosystems and Energy Flow, Population Biology, Land and Water Use, Energy Resources and Consumption, Pollution, Agriculture, Conservation and Global change. The class will help students understand some of the most pressing issues of our time by interpreting scientific data and drawing logical conclusions from real life case studies. Developing laboratory skills such as data collection & analysis, evaluation of information, and communication of experimental results will be emphasized throughout the course. Ongoing field studies, labs, and investigation of various case studies are an integral component of this course.

Semester A Goals:

Course Description

Students explore the fundamental principles of chemistry which characterize the properties of matter and how it reacts. Computer-based and traditional laboratory techniques are used to obtain, organize and analyze data. Conclusions are developed using both qualitative and quantitative procedures. Topics include, but are not limited to: measurement,atomic structure, electron configuration, the periodic table, bonding, gas laws, properties of liquids and solids, solutions,motion, forces, gravity, energy, and many more.

Course Outline

Environmental Science Semester A	
Unit 1:	Ecosystems & Invasive Species
NGSS Standard Alignment	HS-LS2-1, HS-LS2-2, HS-LS2-4, HS-LS2-5, HS-LS2-6, HS-LS2-7, HS-LS2-8, HS-LS4-5
Learning Objectives:	Students will identify and explain biotic and abiotic factors that influence the carrying capacity of ecosystems. Students will use models or data to predict changes in population size based on resource availability. Students will evaluate how human activity alters carrying capacity and resource distribution. Students will apply mathematical tools (e.g., population growth equations, biodiversity indexes) to interpret population trends. Students will revise explanations of population changes based on new ecological data. Students will analyze case studies to understand how factors like competition, predation, and disease impact biodiversity.

	Students will construct or interpret models of ecosystems showing positive and negative feedback loops. Students will explain how feedback mechanisms (e.g., predator-prey cycles, plant growth cycles) contribute to population regulation. Students will evaluate ecosystem resilience by identifying stabilizing and destabilizing factors. Students will develop a visual or physical model showing how carbon is cycled through living and nonliving systems. Students will describe the roles of producers, consumers, and decomposers in the carbon cycle. Students will compare and contrast photosynthesis and cellular respiration as complementary processes. Students will analyze scientific evidence to support or refute claims about ecosystem stability. Students will describe how biodiversity contributes to the resilience of ecosystems under stress. Students will predict how disturbances (e.g., wildfires, invasive species, climate change) might shift ecosystems into new stable states. Students will identify and describe human actions that negatively affect ecosystems (e.g., pollution, habitat destruction). Students will propose evidence-based solutions to mitigate these impacts (e.g., conservation practices, policy changes). Students will use feedback from peers or data to refine their designs or strategies for

	environmental improvement. Students will explain how biodiversity supports ecosystem services (e.g., water purification, pollination, climate regulation). Students will assess the effects of biodiversity loss on human health, economy, and resource availability. Students will interpret scientific studies showing the relationship between human development and declining ecosystem function. Students will evaluate data on species' population changes in response to environmental disturbances. Students will explain how climate change, habitat loss, or pollution can drive evolutionary shifts or extinctions. Students will construct scientific arguments using real-world examples of species adapting, migrating, or declining.
Block 1	**Stable Ecosystems**
Zebra Mussel Sequence Chart	Activity
Discussion - Driving Question Board	Discussion
River Food Chains	Activity
Block 2	**Population Dynamics**
KWLS Chart - Food Chains	Activity
Who's Eating Whom	Activity
DDT RGSS	Activity
Stable Ecosystems Performance Task	Performance Task
Block 3	**Ecosystem Disruption & Recovery**

Discussion - Asking Questions about Copepod Populations	Discussion
Predator/Prey Lab	Lab
Interpreting a Population Graph	Activity
Block 4	**Invasive Species**
Invasive Species	Activity
Population Dynamics Performance Task	Performance Task
Discussion - Ecosystem Disruptions	Discussion
Block 5	**Final Performance Task Ecosystems and Invasive Species**
Final Performance Task: Ecosystems and Invasive Species	Activity
KWLS Chart - Ecological Succession Types	Activity
How Wolves Change Rivers	Activity
Ecosystem Disruption and Recovery Performance Task	Performance Task
Block 6	**Climate Change Phenomenon Introduction**
Discussion - Impacts of the Zebra Mussel	Discussion
Hypothesis Testing	Lab
Short-Term Impact of Zebra Mussel Invasion Text Annotation	Activity
Block 7	Earth-Sun Dynamics
Identifying Traits of Introduced Species	Activity
Invasive Species Performance Task	Performance Task
Ecosystems and Invasive Species	Performance Task

Performance Task	
Unit 2:	Climate Change Throughout Human History
NGSS Standard Alignment	HS-ESS2-2, HS-ESS2-4, HS-ESS2-6
Learning Objectives:	Students will analyze data sets showing how land-use changes (e.g., deforestation, urbanization) impact other Earth systems (e.g., climate, water cycle). Students will explain positive and negative feedback loops involving Earth's surface processes, such as ice-albedo feedback or vegetation-climate feedback. Students will use examples (like volcanic eruptions or glacier melt) to describe how one event can trigger a cascade of changes across the geosphere, hydrosphere, atmosphere, and biosphere. Students will develop or interpret models showing how solar radiation, greenhouse gases, and Earth's albedo affect climate. Students will explain how energy imbalances (from natural or human causes) drive changes in global and regional climates. Students will use climate data to identify trends and patterns in energy flow, temperature, and weather over time. Students will construct and use models to represent carbon cycling through photosynthesis, respiration, combustion, ocean uptake, and fossil fuel extraction. Students will quantify how human activities (e.g., burning fossil fuels, land-use change) alter the natural carbon cycle. Students will use data to evaluate the long-term impact of carbon cycle disruptions on Earth systems and climate.

Block 8	Ice Caps & Oceans
Discussion - What do you know about Climate Change?	Discussion
Climate Change is Caused by Humans	Activity
Analyzing the Story	Activity
Performance Task 1 - Developing an Initial Model	Performance Task
Block 9	Greenhouse Gases
How Has the Amount of Radiation Reaching Earth Varied in the Past?	Activity
Discussion - Share your Thoughts	Discussion
How do orbital factors affect the amount of radiation reaching Earth's surface?	Activity
Did changes in Earth's position cause the patterns of radiation reaching Earth's surface and the glacial-interglacial cycle	Lab
Block 10	Climate Change Throughout Human History Final Task
How strong is the causal relationship between the Milankovitch Cycles and glacial-interglacial cycles	Lab
How well does activity from the Sun correlate with glacial-interglacial cycles?	Activity
How are changes in Earth's position and energy emitted from the Sun influencing radiation received by Earth today?	Activity
Performance Task - Earth-Sun Dynamics	Performance Task

Block 11	Invasive Species Management
What is Happening to Arctic Ice Today?	Activity
How Ice Interacts with Radiation Investigation	Lab
Discussion - Key Points from How Ice Interacts with Radiation Investigation	Discussion
Developing a Model of How Ice Impacts Radiation Reaching Earth	Activity
Block 12	Research Findings
Ice Sheet Impact on Ocean Circulation Investigation	Lab
How Changes in Ocean Currents Occur and Impact Climate	Activity
Are there other ocean currents to consider?	Activity
Revisiting the Performance Task: Ice Caps & Oceans	Performance Task
Block 13	Winds, Mountain Ranges, & Bodies of Water
What were the carbon dioxide levels in the atmosphere during past climate change events	Activity
Discussion - What were the carbon dioxide levels in the atmosphere during past climate change events	Discussion
What were the carbon dioxide levels in the atmosphere during past climate change events	Lab
What Explains the Holocene Climate Optimum?	Activity
Block 14	Coastal Vs Inland Climate

What Impact did the Holocene Climate Optimum have on humans?	Activity
What evidence tells us that climate change today is caused by humans?	Lab
Revisiting the Performance Task: Greenhouse Gases	Performance Task
Block 15	Argument Task: Where Would You Live?
Climate Change Throughout Human History Final Argument	Performance Task
Discussion - Climate Change Throughout Human History Reflection	Discussion

Environmental Science Semester B	
Unit 1:	More Hurricanes and Blizzards in NYC?
NGSS Standard Alignment	HS-ESS3-5, HS-ESS2-8
Learning Objectives:	Students will interpret data sets from ice cores, ocean temperatures, and atmospheric CO_2 to identify evidence of current climate change. Students will evaluate the outputs of global climate models to forecast potential future climate scenarios. Students will construct arguments about how predicted climate changes will affect sea level, weather patterns, biodiversity, and human populations. Students will explain how natural and human-induced factors contribute to the rate and severity of climate change. Students will describe how water influences geological processes such as weathering, erosion, sediment transport, and deposition.

	Students will analyze real-world data (e.g., river discharge, groundwater depletion, glacial retreat) to assess water's role in shaping Earth's surface. Students will evaluate how the movement of water through the hydrosphere connects to changes in the geosphere, atmosphere, and biosphere. Students will use case studies to explain how human interventions (e.g., dam construction, irrigation, deforestation) alter natural water systems and surface processes.
Block 1	**Atmosphere and Weather Variables**
Discussion - Natural Disaster Observations	Discussion
Struggling to Breathe	Activity
Brainstorming Ideas	Performance Task
How do temperature and pressure vary at different altitudes in the atmosphere?	Lab
Block 2	**Blizzards**
What is air pressure lab	Lab
Why does air pressure in the atmosphere change as altitude changes	Lab
See-Think-Wonder	Activity
Why do we see these relationships between weather variables?	Activity
Block 3	**Blizzards cont. Making Predictions**
Wind Exploration Investigation	Activity

What effect does heating and cooling have on air molecules?	Lab
What causes the movement of air across the Earth's surface?	Lab
Explaining Wind from Winter Storm Jonas	Activity
Precipitation Formation Investigation	Lab
Block 4	**The Path of Severe Storms**
How Water Behaves in the Air/Atmosphere	Lab
Discussion - See-Think-Wonder	Discussion
Explaining Precipitation Formation	Lab
Precipitation Formation Investigation	Activity
Block 5	**The Path of Severe Storms cont. Drawing Conclusions and Making Arguments**
Bringing it all together - How did precipitation and wind occur during Winter Storm Jonas?	Activity
Discussion - Hurricane and Blizzard Pattern Barnstorming	Discussion
What is the Future of Winter Storms?	Activity
Blizzard CER	Performance Task
Hurricane and Blizzard Pattern Barnstorming	Activity
Air Masses Investigation	Lab
Block 6	**Hurricances**
Explaining Air Mass Origins	Activity

Global Air Movement Investigation	Activity
Explaining Global Wind Patterns	Activity
Explaining Patterns of Storm Origin and Trajectories	Activity
Block 7	Looking at Air Quality and Wildfires
Making Predictions about the Trajectory of Winter Storm Jonas	Activity
Discussion - Predicting Winter Storm Jonas	Discussion
How will global wind patterns be affected by rising global temperature	Activity
Discussion - What Caused the 2005 Hurricane Season?	Discussion
Block 8	Sharing Solutions
What Patterns Do We See in Global Occurrence of Hurricanes?	Activity
What Explains Patterns of Hurricane Occurrence?	Activity
What is happening to precipitation as global temperatures rise?	Activity
What is the Future of Tropical Cyclones?	Performance Task
Unit 2:	Solutions for a Sustainable Future
NGSS Standard Alignment	HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-6
Learning Objectives:	Students will compare different methods of resource extraction and energy production (e.g., solar vs. fossil fuels) using environmental and economic criteria. Students will evaluate the trade-offs involved in using renewable vs. nonrenewable resources.

	Students will analyze real-world case studies to assess the sustainability and long-term impacts of various energy strategies. Students will model how population growth and resource use influence the risk of natural hazards such as wildfires, droughts, or floods. Students will assess the effectiveness of mitigation strategies (e.g., levees, early warning systems, land-use planning). Students will explain how human behaviors and policies can reduce or increase vulnerability to natural disasters. Students will identify how human activities (e.g., agriculture, urbanization, industrialization) affect the atmosphere, biosphere, and geosphere. Students will evaluate the effectiveness of current technologies designed to reduce environmental impact (e.g., electric vehicles, carbon capture, green infrastructure). Students will propose improvements or alternative designs for reducing pollution, resource depletion, or habitat loss. Students will develop or use models to represent how greenhouse gas emissions alter feedback loops in Earth's climate system. Students will explain how solutions like renewable energy adoption or reforestation mitigate climate change. Students will analyze data showing the effectiveness of global or local initiatives aimed at reducing climate impact. Students will communicate the interconnectedness of human actions and natural systems using data and systems

	thinking.
Block 9	Mining for Material
Discussion - Remember the Fires	Discussion
Telling the Story	Activity
Discussion - Driving Question Board	Discussion
Initial Model for solutions to human impacts on the environment	Performance Task
Block 10	Environmental Vulnerability
Spreading the Word	Activity
Discussion - Why is Air Quality so Bad?	Discussion
Ecological Footprint	Activity
Diving into the Data	Activity
What solutions exist?	Activity
Block 11	Air Pollution Solutions
Human Impacts on Air Quality	Activity
Revisiting the Performance Task: Human Impacts on Air Quality	Performance Task
Elements Needed for Technology and Mining Locations	Activity
Discussion - Inequities in Mining	Discussion
Block 12	What is Climate
Extraction of Ores from the Earth Model	Activity
Understanding the Impacts of Mining Materials	Activity
Mining and Air Quality	Activity

Revisiting the Performance Task: Mining for Materials	Performance Task
Block 13	Winds, Mountain Ranges, & Bodies of Water
What is in a B.L.T. Sandwich?	Activity
Discussion - Species Vulnerability	Discussion
The story of soil - How does soil play a role in agriculture and the environment?	Lab
How can a model show how changing human activity can benefit the environment?	Activity
Block 14	Coastal Vs Inland Climate
Investigating Agriculture and Land Management Impacts	Activity
Sustainable Agriculture and Land Management	Activity
How does agriculture contribute to air quality?	Activity
Revisiting the Performance Task: Agriculture & Land Management	Performance Task
Block 15	Argument Task: Where Would You Live?
Human-Created Systems Final Model	Performance Task
Discussion - Solutions for a Sustainable Future Reflection	Activity

Method of Instruction

This is an online course, and while there is flexibility in how and when you do assignments, it is best to log in and complete work each day according to the posted pacing schedule. Due dates will be clearly stated for each assignment in the course calendar and the weekly schedule. It is highly recommended that learners follow the pacing schedule posted, but work may be submitted late.

This course uses project based learning to encourage an authentic, developed appreciation of the topics covered. That means that while it may include some traditional assessments, the bulk of the coursework focuses on projects that require learners to display their learning in a thorough and creative manner.

If you are struggling to complete your work or you need some assistance with an alternate schedule or workload, please contact me as soon as possible. I am more than happy to help support your success in the class!

Learner Expectations

- Check the course pages for directions and announcements every weekday.
- Check your email every weekday to see if your instructor has emailed you.
- Read the assigned readings on the weekdays you're directed to.
- Use available resources including teacher support.
- Create original work and submit it on time.

Discussion Board Posts

- Discussions are credit/no credit so just participating in them will earn you credit. If you are unable to answer the discussion questions just mention that and then share what you think of the video or ask a question about it. Your opinion matters so feel free to share it. :)
- Note: If you feel uncomfortable interacting with the other learners then please message me directly so I may accommodate you.

Netiquette

Netiquette is a set of rules for behaving properly online. The following bullet points cover some basics to communicating online:

- Use good taste when composing your responses in Discussion Forums. Swearing and profanity is also part of being sensitive to your classmates and should be avoided. Also consider that slang can be misunderstood or misinterpreted.
- Be sensitive to the fact that there will be cultural and linguistic backgrounds, as well as different political and religious beliefs, plus just differences in general.
- Don't use all capital letters when composing your responses as this is considered "shouting" on the internet and is regarded as impolite or aggressive. It can also be stressful on the eye when trying to read your message.
- Be respectful of your others' views and opinions. Avoid "flaming" (publicly attacking or insulting) them as this can cause hurt feelings and decrease the chances of getting all different types of points of view.
- Be careful when using acronyms. If you use an acronym it is best to spell out its meaning first, then put the acronym in parentheses afterward, for example: Frequently Asked Questions (FAQs). After that you can use the acronym freely throughout your message.
- Use good grammar and spelling, and avoid using text messaging shortcuts.

- I expect students to treat fellow students, their instructors, other faculty, and staff with respect. Any student or employee will tolerate no form of “hostile environment” or “harassment.”

Grading:
Each assignment is given a specific number of points. The number of points earned by the student is determined and a percentage is calculated. The raw score is recorded in the grade book.

An overall grade in the course will be determined according to your school’s grading scale.

Scoring Rubric

90-100	Mastered process and technique Strong composition Appropriate subject-matter Strong creative expression
80-89	Good-Very good process and technique Good-Very composition Shows some creative strength Appropriate subject-matter
70-79	Technique/composition needs improvement Fair quality composition Shows a little creativity or originality
60-69	Poor evidence of technique/composition Lacks creativity or originality Did not follow some directions
0-59	Incomplete Did not follow most or all directions Please redo and resubmit

Discussion Rubric

9-10	Response is long On-topic / relevant / varied structure No grammar / spelling errors
7-8	Response is ok length On-topic / relevant Minor grammar / spelling errors

5-6	Response is short Somewhat on-topic / relevant Many grammar / spelling errors
0-5	Response is too short Off-topic / not relevant Please redo

Honesty and Plagiarism

Plagiarism of any sort is prohibited. According to the Merriam-Webster online dictionary, to "plagiarize" means:

- to steal and pass off (the ideas or words of another) as one's own
- to use (another's production) without crediting the source
- to commit literary theft
- to present as new and original an idea or product derived from an existing source

Please review THIS RESOURCE for more information on plagiarism. Any plagiarized work will be given a zero and referred to your EF/COACH/GUIDE for review.

Privacy Policy

All work submitted is the property of the author and is not available to anyone not in the class. If work is to be submitted or viewed outside of this website, I will obtain permission from the author. FERPA Info