Tecumseh High School
Advanced Placement Environmental Science

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COURSE DESCRIPTION

AP® Environmental Science is designed to be the equivalent of a one semester, introductory college course in environmental science. It will be a rigorous science course that stresses scientific principles, analysis, and will include a laboratory and field research component. Students will study scientific principles, concepts, and methodologies in the areas of earth systems, earth resources, ecology, population, land use, water use, energy use, pollution, and global change. This will equip them to understand the deeply rooted interrelationships of the natural world. The course will also challenge them to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving or preventing them.

COURSE AIMS

Just as you would aim at targets, this course is designed to reach certain aims:

1. Becoming stronger *autotelic* learners.
2. Demonstrate proficiency in the course through successful preparation and completion of the AP® Environmental Science Exam.

COURSE TEXT

Botkin, D. B., & Keller, E. A. (2000). *Environmental science: Earth as a living planet* (3rd ed.). Hoboken, NJ: John Wiley & Sons, Inc.

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A copy of the text will be distributed to each student. You are responsible for it's condition until it is returned to me.

RECOMMENDED COURSE SUPPLIES

Three Ring Binder
Pencil/Pen
Two Bound Lab Notebooks
Smartphone, iTouch, Tablet (Optional)

LAB FEE

Please refer to the Student Handbook for a list of fees.

Classroom Expectations and the Learning Environment

WHY VALUES?

In order to best hit the targets of our course aims! I am shooting for influence, not control. You are in control of your choices within the learning environment. Use the description of the learning environment below to guide your actions, thoughts, and words in class. REMEMBER, rules in this school are not for social control and making your life miserable or LESS FUN, but to allow you to BETTER FOCUS ATTENTION on the course aims.

If you are being disruptive, a distraction, or unproductive, the following actions will be a likely consequence to their choice/action.

1. Verbal Warning – If you receive a verbal warning, it is my advice to you to stop whatever ever it is your are doing. If you choose to continue the following two consequences will be administered.
2. See Me After Class – This gives Mr. Lloyd and the student time to evaluate the situation and their actions. It allows the student to correct their behavior or explain the situation. After class students can state their case and discuss what took place. If Mr. Lloyd thinks it is necessary detentions or office referrals will be assigned.
3. Wait in the Hall. – This action will be used if the student has crossed a line that doesn't allow Mr. Lloyd continue class while the student is in the class. Example: If Mr. Lloyd asks you to see him after class and you talk back, get angry, loud or belligerent our will be asked to wait in the hall. If Mr. Lloyd thinks it is necessary detentions or office referrals will be assigned.

Notice, these action allow the class to CONTINUE to run smoothly. It is important for students to maintain focus on emulating the class values.

WHAT DOES THIS LEARNING ENVIRONMENT LOOK LIKE?

- You are ready to work as soon as the bell rings .
- You will respect me, your classmates, yourselves, the classroom and the materials that you will use.
- We listen carefully and pay attention to one another. Your stories are not more important than another's stories.
- Follow all instructions with extreme care.
- Remain seated until dismissed by the teacher. Order makes class a more pleasant place to be.
- Work well with others.
- Substandard work isn't ever OK.
- We trust one another.
- Personal best is more important than winning (i.e. maintain INTEGRITY).
- Remember that YOU are the only one responsible for your actions and that all school rules apply at all times. You must remain ACCOUNTABLE.

STUDENT EVALUATION

GRADING SCALE

The following grading scale is in accordance with the Tecumseh Local School district policy:

Grade	Percentage
A	90-100%
B	80-90%
C	70-80%
D	60-70%
F	Below 60%

GRADING WEIGHT

Type of Assignment	Percentage
Homework	10%
Labs and Field Investigations	10%
Tests and Projects	80%

GRADING

- There are two ways that you can check your grade during the course of the year. The first is thru progress book. Progress book can be accessed thru the computer via the password given to you from the guidance department. The second way is in the classroom. Mr. Lloyd will review grades frequently during each quarter up on the board in the classroom.

- **PLEASE NOTE:** A weighted system is used to calculate your grade.

Grades will be based on the following:

Homework, Labs, and Field Investigations:
AP® Environmental Science is an interdisciplinary course that introduces environmental problems and challenges students to synthesize concepts and skills from a number of fields to explore their solutions. Homework, laboratory, and field investigations are incorporated regularly into the course to provide students with a platform to analyze and interpret the information and experimental data related to these environmental problems and at greater depth. Students will be required to keep a lab notebook to record their lab experiences, and will be expected to create formal lab write-ups at their completion.

Unit Tests:
Each student will also take a test at the completion of each unit. Each test will include a combination of multiple-choice questions and previously released free-response questions related to the content and skills covered during that unit. Tests are organized in this way to model the organization and environment of the AP® Exam as closely as possible.

OTHER CLASSROOM PROCEDURES

Make-up Work:

- If you miss a day a school it is your responsibility to make up that work. You are ACCOUNTABLE for your work. Notes will need to be copied from a friend in the class.

- Tests may be made up before or after school or during lunch or a study hall. Class time in my class or another teacher's class will not be used.

Cheating:

- Cheating or copying from another student will result in a zero and an office referral. Cheating is turning in any work that is not yours. If I wanted a copy machine I would go down to the office and use one. Remember… we are placing a HIGH value on HONESTY and INTEGRITY this year.

Bookbags:

-This year in class an important boundary I would like to establish is that when we are in science class, we are working on science. Therefore, I will be enforcing a NO BOOKBAG policy when you enter my classroom. You are still expected to be prompt to class, and if unable to leave your bookbag in your locker, will need to leave it in the back of the room. Ultimately, you will still need to be in your seat with the appropriate materials when the bell rings.

Website:

Throughout the year I will begin to build a class web page that will include reminders and assignments from class. To access the web page follow the instructions below:

1.) (http://www.tecumseh.k12.oh.us/).
2.) Select "Tecumseh High School" shown on the left side of the screen
3.) Select "THS Teacher Web Pages" from the selection on the left hand side.
4.) Find the science department and select "Mr. Lloyd"

Ohio Alerts:

Please have parents refer to the "Ohio Alterts Instructions" on my web page if you are interested in receiving updates and reminders about class through Ohio Alerts. I will have students work through the process of subscribing to Ohio Alerts in class.

2013 – 2014 COURSE SYLLABUS:

Note: This is a tentative schedule of topics and key assignments. The topics and their order are subject to change.

First Semester

Summer Reading: James Speth's *Red Sky at Morning* with review questions.

Unit 1: Key Themes in Environmental Science (2 Weeks)
This unit will provide an overview of the key themes in Environmental Science, the scientific method, and thinking critically about the environment.
Content:
Chapter 1: Key Theories in Environmental Science
Chapter 2: Thinking Critically About the Environment
Key Labs and Activities:

- Video: *The Lorax* with application to sustainability questions
- Reading: Garrett Hardin's *Tragedy of the Commons* with review questions
- Lab: Tragedy of the Commons Simulation
  This simulation contains two different stages students to explore the "tragedy of the commons At the end of this simulation, students should have an understanding of what leads to the "tragedy of the commons" and what can be done to prevent it.
- Lab: Soil Salinization
  In this lab, students will create their own experimental design to investigate how salinization affects germination of four species of crop seeds by determining at what salt concentrations the seeds no longer germinate. They will then need to prepare a report where they will analyze and graphically present their experimental data as if they were consultants reporting to a group of farmers.
- Reading: EPA's *Top Environmental Stories, 1997-2000*

Unit 2: The Earth as a System (3 Weeks)
This unit will provide students with a study of Earth as a system, including basic principles of ecology, biogeochemical cycles, and how human populations are a part of this system.

Content:
Chapter 3: Systems of Change
Chapter 4: Biogeochemical Cycles
Chapter 5: Human Population as an Environmental Problem
Key Labs and Activities:

- Lab: Eco-column Water Quality Testing (Ongoing Project)
  The purpose of this lab is to create simulated ecosystems in an effort to explore sustainability and the processes and functions of ecosystems in the real world. Students will construct, maintain and monitor changes in the system of the eco-column over a specified time period. They will also create a lab report to share their experiments, results, and conclusions from their study. This lab is ongoing and will last until December.
- Project: Plate Tectonics
  Students will use the Internet to explore key geologic events and, using a map, correlate these events to tectonic plate boundaries.
- Quantitative Analysis: World Population Growth
  Students will graph and mathematically analyze the rates of human population growth through history. They will also calculate projected changes to the human population using data resources from modern times.
- Project: Global Population Trends
  In this project, students will use data sets of countries with varying economic developments to explore how factors would impact countries with these varying developments.
- Lab: Population Distribution and Survivorship
  Students will collect data from a cemetery to construct survivorship curves and age-sex population pyramids. They will then analyze these data sets and use them to predict the characteristics of future populations.

Unit 3: Life and the Environment (3 Weeks)
In this unit, students will study ecosystems, biological diversity, and the distinguishing characteristics of biomes.
Content:
Chapter 6: Ecosystems and Ecological Communities
Chapter 7: Biological Diversity and Biogeography
Key Labs and Activities:

- Project: Biomes Research and Presentation
  Students will research and design a presentation on a biome of choice.
- Project: Formation of Deserts
  In this project, students analyze atmospheric, geographic, and oceanographic data and explain how it relates to desert formation.
- Lab: Shannon-Weiner Diversity Index
  Students will collect and count organisms and species from several local habitats. They will then use the data to calculate an Index value and apply the data to various biodiversity issues.
- Lab: Predator-Prey Simulation
  In this simulation, students analyze the interactions between a predator population of coyotes and a prey population of mice. They then organize and graph data from the simulation, and apply the results to data taken from nature.

Unit 4: Energy, Productivity, and Restoration (2 Weeks)
This unit covers principles of biological productivity and energy flow. It will also address ecological restoration and how ecosystems recover in response to disturbance.
Content:
Chapter 8: Biological Productivity and Energy Flow
Chapter 9: Succession and Restoration: How Ecosystems Respond to Disturbance
Key Labs and Activities:

- Quantitative Analysis: Energy and Recycling
  Students compare the costs of recycling aluminum for cans to making cans from raw materials. They also explore in more depth the advantages and disadvantages of recycling, such as environmental and economic factors.
- Lab: Net Primary Productivity
  In this lab, students measure the net primary productivity (NPP) of rye grass. They will also analyze and compare the methods of measuring NPP for reliability. Finally, students will apply the NPP concept to problems of crop growth and the support of higher trophic levels in ecosystems.
- Quantitative Analysis: Eating at a Lower Trophic Level
  Students will compare human food needs at different trophic levels, and use the data to construct a biomass period. They will also analyze the benefits and drawbacks of eating at lower trophic levels on a global scale.

Unit 5: Food and Agriculture (2 Weeks)
In this unit, students will examine sustainability from through a discussion of the nutritional needs of humans how we attempt to meet these needs through the various agricultural methods.

Content:
Chapter 10: World Food Supply
Chapter 11: Effects of Agriculture on the Environment

Key Labs and Activities:

- Lab: Soil Analysis
  In this lab, students will grow a crop sample in a local soil sample. They will then perform a thorough analysis of the soil, testing such factors as texture, moisture, percent organic matter, porosity, percolation rate, and fertility. They will then be given the chance to remediate the soil, grow a second crop sample, and compare the results of each analysis.
- Lab: Apple Orchard IPM Simulation
  Students will complete a simulation where they apply IPM strategies to a red mite problem plaguing their orchards.
- Video: *Food, Inc.* with review questions
- Reading: *Genetically Modified Foods: Harmful or Helpful?*

Unit 6: Land Use and Biodiversity (2 Weeks)

This unit addresses the various ways humans impact the environment through land and water use. It will also cover sustainability through the interventions of wildlife management, species protection, conservation, and preservation.

Content:

Chapter 12: Wild Living Resources: Plentiful and Endangered

Chapter 13: Landscapes and Seascapes

Key Labs and Activities:

- Reading: NASA's *Tropical Deforestation*
- Internet Activity: Sustainable Forestry Practices

Unit 7: Environmental Health, Toxicology, Risk and Natural Disasters (2 Weeks)

In this unit, students will examine the effects that environmental hazards have on human health.

Content:

Chapter 14: Environmental Health, Pollution, and Toxicology

Key Labs and Activities:

- LD-50 and LC-50 Activity
  Students will analyze experimental data and calculate, graph, and discuss the data as related to LD-50 and toxicity.
- Lab: Bioassay Experiment
  Students will conduct a controlled experiment where they will test the toxicity of salt to the growth of lettuce seeds. They will graph their data, including the threshold of toxicity and LD-50. They will also apply the results of their experiment to common environmental problems.

End of 1st Semester

Winter Reading: Selections from Aldo Leopold's *A Sand County Almanac*, Rachel Carson's *Silent Spring*, John Muir's *Hetch Hetchy Valley*, and Sigurd Olson's *The Singing Wilderness* with review questions and journaling.

Winter Assignment: AP® Environmental Science Exam Review.

Second Semester

Unit 8: Earth's Resources and Energy Resources (4 Weeks)
Students will study the basic principles associated with energy, the uses of finite resources and trends in our energy consumption, as will as alternative sources of energy that can be used in place of fossil fuels.
Content:
Chapter 28: Minerals and the Environment
Chapter 15: Energy: Some Basics
Chapter 16: Fossil Fuels and the Environment
Chapter 17: Alternative Energy and the Environment
Chapter 18: Nuclear Energy and the Environment
Key Labs and Activities:

- Lab: Copper Extraction
  Students will measure the amount of copper metal extracted from a sample of copper (II) carbonate, and examine more environmentally sound ways of extracting minerals profitably.
- Video: Solar Energy: Saved by the Sun with review questions
- Video: *Who Killed the Electric Car?*
- Energy Calculations Worksheet
- Quantitative Analysis: Personal Energy Use Audit
  Students will record and calculate the approximate energy use in their homes per day and then compare the costs and by-products of various fuel resources used for energy today.
- Lab: Solar Absorption
  In this lab, students will design an experiment to calculate and compare the heat-absorbing capacities of various fluids under solar radiation. They will then apply those calculations to a model for fluid solar-energy collection.

Unit 9: Atmosphere Dynamics, Air Pollution, Ozone Depletion, and Global Warming (4 Weeks)
This unit includes an introduction to the structure and characteristics of the Earth's atmosphere, and will also survey several forms of air pollution and their contributions to some of the global environmental problems we face today.
Content:
Chapter 21: The Atmosphere, Climate, and Global Warming
Chapter 22: Air Pollution
Chapter 23: Indoor Air Pollution
Chapter 24: Ozone Depletion
Key Labs and Activities:

- Video: *An Inconvenient Truth*
- Project: Global Warming and Atmospheric CO_2 Correlation
  Students will research carbon dioxide concentrations in the atmosphere for the last 420,000 years and correlate that data mathematically to global temperatures.
- Quantitative Analysis: CO_2 Emissions from Fossil Fuel Burning
  Students will investigate the effects of carbon dioxide and other greenhouse gases on global temperatures by tracking long-term energy production (1751-2000) and correlating the data to atmospheric concentrations of carbon dioxide.
- Lab: Particulate Air Pollution
  Students will measure and record particulate matter locally and evaluate the data using EPA standards.
- Project: Global Climate Change
  Students will create a graphic organizer depicting the complex effects of global warming and analyze and apply the effects (i.e. environmental, economic, sociopolitical) on a local and global scale.
- Various Readings: NASA's *Earth Science Enterprise* and *The Earth Observing System Terra* series (Topics include Aerosols, El Nino, La Nina, Ozone, and Global Warming).

Unit 10: Water Use and Water Pollution (3 Weeks)
In this unit, students will investigate the details of water supply, methods of use, and ways in which water can be polluted and treated.
Content:
Chapter 19: Water Supply, Use, and Management
Chapter 20: Water Pollution and Treatment
Key Labs and Activities:

- Lab: Water Quality Index
  In this lab, students will perform tests to determine the Water Quality Index (WQI) of a local body of water and then analyze and discuss their results.
- Quantitative Analysis: Water Loss Drop by Drop
  Students will estimate household water loss from common leaks and apply that data and recommend water prevention actions for the surrounding community.
- Project: Water Diversions
  Students will research and analyze the effects of water diversions on surrounding ecosystems and human communities. They will also apply this research to remediation attempts being made in a local watershed.
- Data Analysis: Buck Creek Watershed Educational Corridor
  Students will analyze real-time data from a local watershed and describe the effects of local events on water quality.

Unit 11: Environmental Economics and Costs (2-3 Weeks)
This unit will address the basic economic principles associated with our use of environmental resources. It will also cover some of the costs and effects of using those resources, including urban land use, waste production and waste management. Lastly, students will examine the processes and principles of environmental law and land-use planning.

Content:
Chapter 25: Environmental Economics
Chapter 26: Urban Environments
Chapter 27: Waste Management
Chapter 29: Environmental Impact and Planning
Key Labs and Activities:

- Lab: Solid Waste Collection
  Students will measure and analyze a week's worth of household waste and then discuss strategies to reduce and recycle their waste.
- Reading: Brundtland's *Towards Sustainable Development* with review questions.
- Video: *Guns, Germs, and Steel* with review questions

AP® Environmental Science Exam Review (2-3 Weeks)
Students will review course content and practice taking and then grading released materials from past AP® Environmental Science exams. In addition, students will review all relevant vocabulary, notes, labs, and projects from the school year.

Unit 12: Reel Environmental Science
Students will critically examine the portrayal of environmental problems and the associated human health risks in various films. They will then work collaboratively in groups to create a medium of advocacy to further prevent the problems associated with one of these topics.

ANY QUESTIONS?

“Try not to become a man of success but rather try to become a man of value.”
-Albert Einstein

“The mercenaries will always beat the draftees, but the volunteers will crush them both.”
–Chuck Noll