Woodland High School **A.P.E.S. Course Syllabus** **2020-2021**

Advanced Placement Environmental Science

Instructor: Mrs. Minnie Dwaram
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Office Hours: Tuesday 3:45-4:15pm

TEXTBOOKS USED:

Friedland and Relyea Environmental Science for AP second Edition
Cost: $ 130.00

Syllabus may be changed at teacher discretion to meet the needs, interest, and abilities of students.

PREREQUISITES:

The AP Environmental Science course is an excellent option for any interested student who has completed two years of high school laboratory science – one year of life science and one year of physical science. For critical thinking skills, introductory chemistry is highly recommended. Due to the quantitative analysis that is required in the course, students should also have taken at least one year of algebra. Because of the prerequisites, AP Environmental Science will usually be taken in either the junior or senior year.

COURSE DESCRIPTION

Environmental Science is the study of relationships and connections on Earth. This course focuses on concepts from the natural sciences (biology, chemistry, geology) and social sciences (economics and sociology) to explain how the earth works and how we as humans impact the earth. The course emphasizes how all living and non-living things are connected. During your studies you will be required to read, analyze, synthesize, write, and express opinions constructively. As an AP course, this course is designed to be the equivalent of a one-semester introductory college level course in environmental science. You will be assigned outside scholarly readings, participate in lab and field investigations, and be required to write critically about environmental issues (scientific, social and political). This is a year-long course, culminating with the AP exam at the end of spring semester – **Monday, May 11, 2020 Afternoon.**

COURSE CURRICULUM CONTENT:

FROM AP CENTRAL	UNITS/TOPICS
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, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine	**I. Unit : The Living World: Ecosystems 6–8%** ●Introduction to Ecosystems (Predator Prey, Symbiotic Relationships, Competition & Resource partitioning) ●Terrestrial Biomes (taiga, temperate rainforests, temperate seasonal forests, tropical rainforests, shrubland, temperate grassland, savanna, desert, and tundra, climate impacts) ●Aquatic Biomes (streams, rivers, ponds, and lakes, oceans, coral reefs, marshland, and estuaries, Zone of Tolerance) ●Cycles (Carbon, Nitrogen, Phosphorous, Water, sources/sinks) ●Primary Productivity (GPP, NPP, light color in the ocean photosynthesis/adaptations) ●Trophic Levels, Food Webs & Energy Flow (10% rule, laws of thermodynamics) **II Unit 2: The Living World: Biodiversity 6–8%** ●Introduction to Biodiversity (define, variation & stability, bottlenecks, habitat loss, species richness) ●Ecosystem Services (provisioning, regulating, cultural, and supporting, economic & ecological impacts) ●Island Biogeography (define, impact on evolution, invasive species impact) ●Ecological Tolerance (zone of tolerance) ●Natural Disruptions (can be periodic, episodic, or random, climate change, geologic sea level, habitat alteration, wildlife migration) ●Adaptations (short vs long term, genetics, impact on survival & evolution) ●Ecological Succession (Primary vs Secondary, keystone species, indicator species, pioneer species, succession impact biomass/species richness, & NPP over time) **III. Population (10-15%)** ●Generalist vs Specialist (pros vs cons of both) ●R vs K Selected Species & Survivorship Curves (compare & contrast, biotic potential)

alternative solutions for resolving or preventing them.	●Carrying Capacity ●Population Growth & Resource Availability (what limits pop growth, unequal distribution) ●Age Structure Diagrams ●Total Fertility Rates (impacts on, replacement level, infant mortality rates/healthcare etc) ●Human Population Dynamics (growing vs declining comparison & determination, Malthusian theory, density dependent vs independent limiting factors, rule of 70) ●Demographic Transition (4 stages, developing vs developed country comparison) **IV. Unit 4: Earth Systems and Resources 10–15%** ●Plate Tectonics (types of boundaries, maps, prediction) ●Soil Formation & Erosion (parent material, horizons, soil conservation & benefits) ●Soil Composition & Properties (water holding capacity, The particle size and composition of each soil horizon can affect the porosity, permeability, and fertility of the soil, chemical, physical, and biological properties to determine soil decisions, soil pyramid) ●Earth's Atmosphere (composition, structure) ●Global Wind Patterns (Coriolis, temperature, pressure, density) ●Watersheds (Characteristics of a given watershed include its area, length, slope, soil, vegetation types, and divides with adjoining watersheds) ●Insolation & Seasons (seasons & cause, latitude, length of day/night/altitude of sun) ●Earth's Geography & Climate (orographic effect, ocean currents, rain shadow) ●ENSO (impact on rainfall, ocean circulation, SST, geologic/geographic features impacting ENSO) **V Unit 5: Land and Water Use 10–15%** ●The Tragedy of the Commons ,Clearcutting ●The Green Revolution (mechanization, genetically modified organisms (GMOs), fertilization, irrigation, and the use of pesticides, pros & cons) ●Impact of Agricultural Practices (tilling, slash and-burn farming, and the use of fertilizers) ●Irrigation Methods (use of freshwater, pros & cons of drip irrigation, flood irrigation, furrow irrigation, drip irrigation, and spray irrigation, waterlogging, salinization, Ogallala Aquifer) ●Pest Control (pros & cons of pesticides, herbicides, fungicides, rodenticides, genetic engineering, ●Meat Production Methods (animal feeding operations (CAFOs), also called feedlots, and free-range grazing, pros & cons of each overgrazing, desertification, benefits of eating less meat) ●Impacts of Overfishing ●Impacts of Mining (ores, strip mining, overburden, wastes of soil/rock/ ecological & economic impacts, subsurface coal mining ●Impacts of Urbanization (resource depletion, saltwater intrusion, C cycle impact (landfills & fuel), impervious surfaces & water cycle, urban sprawl) ●Ecological Footprints ●Introduction to Sustainability (sustainable yield) ●Methods to Reduce Urban Runoff (permeable pavement, planting trees, vertical building…) ●IPM (biological, physical, and limited chemical methods such as biocontrol, intercropping, crop rotation, and natural predators of the pest, pros & cons) ●Sustainable Agriculture (contour plowing, windbreaks, perennial crops, terracing, no-till agriculture, and strip cropping, crop rotation/ green manure/limestone) ●Aquaculture (pros & cons) ●Sustainable Forestry (mitigation of deforestation, IPM, prescribed burns) **VI. Unit 6: Energy Resources and Consumption 10–15%** ●Renewable Nonrenewable Resources ●Global Energy Consumption (developing < developed countries, availability & price influence which energy is used ●Fuel Types (wood, peat, lignite/bituminous/anthracite coal, natural gas, crude oil & tar sands, refining for purpose, cogeneration) ●Distribution of Natural Energy Sources (not uniform & due to geologic history) ●Fossil Fuels (combustion CO2 & H2O, general method of energy/electrical production, methods of extraction, pros & cons of hydrofracking) ●Nuclear Power (fission U 235 fuel rods, disposal, pros & cons thermal pollution/HAZMAT, case studies: Three Mile Island, Chernobyl, and Fukushima, half life) ●Energy from Biomass (pros & cons, ethanol) ●Solar Energy (Photovoltaic, active & passive, pros & cons) ●Hydroelectric Power (pros & cons)

	●Geothermal (pros & cons including hydrogen sulfide) ●Hydrogen Fuel Cells (pros & cons) ●Wind Turbines (kinetic & mechanical energy, pros & cons) ●Energy Conservation (methods) **VII. Unit 7: Atmospheric Pollution 7–10%** ●Introduction to Air Pollution (Coal & carbon dioxide, sulfur dioxide, toxic metals, and particulates; Photochemical Smog, NOx, O3, HNO3, acid rain, CO, hydrocarbons, particulates; SO2; Clean Air Act EPA, Primary vs Secondary) ●Photochemical Smog (formation, factors impacting photochemical smog, NO/NO2/O3 time curve; sources of VOCs, ways to reduce, impacts on human health) ●Thermal Inversions (define & impact on air pollution) ●Atmospheric CO2 & Particulates (natural sources) ●Indoor Air Pollutants (CO, NOx, SO2, particulates, tobacco smoke; particulates: dust, smoke, asbestos; *radon, mold, VOCs, lead; impacts on human health ●Reduction of Air Pollutants (methods, vapor recovery nozzles, catalytic converter, wet & dry scrubbers, electrostatic precipitators) ●Acid Rain (formation & sources of NOx SOx; environmental & human impacts, regional differences in soil & bedrock) ●Noise Pollution (sources, human & environmental impacts) **VIII. Unit 8: Aquatic and Terrestrial Pollution 7–10%** ●Sources of Pollution (define point-smokestack / discharge pipe & nonpoint- runoff) ●Human Impacts on Ecosystems (zone of tolerance; coral reefs & temperature/sediment/fishing, oil spills; dead zones; O2 sag curve, heavy metals; litter/plastic; sediments; methylmercury) ●Endocrine Disruptors (define; describe impacts) ●Human Impacts on Wetlands & Mangroves (define; ecological services; threats) ●Eutrophication (describe; hypoxic; oligotrophic; anthropogenic sources) ●Thermal Pollution (thermal pollution & impact on DO) ●Persistent Organic Pollutants (DDT; PCB; fat soluble) ●Bioaccumulation & Biomagnification (define; DDT eggshell thinning; developmental deformities; DDT, PCB, Hg) ●Solid Waste Disposal (define; landfills; e-waste; sanitary landfill-liners/ stormwater collection/ leachate collection/CH4 collection; decomposition in landfill; incineration; tires; plastic ocean pollution) ●Waste Reduction Methods (recycling , composting, e-waste pros & cons; gases for electricity) ●Sewage Treatment (Primary, Secondary, Tertiary) ●LD50 (define) ●Dose Response Curve (evaluate) ●Pollution & Human Health (dysentery; Mesothelioma; O3) ●Pathogens & Infectious Disease (evolution of pathogens; vectors; developing countries; plague; Tuberculosis; Malaria; West Nile; Middle East Respiratory Syndrome (MERS) ; Zika; Cholera) **IX Unit 9: Global Change 15–20%** ●Stratospheric Ozone Depletion (function; CFC & Antarctica; increase in UV rays) ●Reducing Ozone Depletion (Hydrofluorocarbons replacement) ●Greenhouse Effect (carbon dioxide, methane, water vapor, nitrous oxide, & CFC's; H2O; Carbon dioxide GWP 1, CFCs the highest GWP, followed by nitrous oxide, then methane) ●Increases in GHG's (disease, rising sea level) ●Global Climate Change (geologic time changes; impacts of; Hadley cell & Jet Stream winds; ocean currents; soil impacts; poles & + feedback) ●Ocean Warming (coral bleaching & other symptoms) ●Ocean Acidification (chemical equation; causes of; loss of calcium carbonate) ●Invasive Species (r species; ways to control) ●Endangered Species (causes of endangerment; adaptations; competition & endangerment; strategies for protection) ●Human Impact on Biodiversity (HIPPCO; habitat fragmentation; role of domestication; mitigation)

LABORATORY FIELD INVESTIGATION

Because it is designed to be a course in environmental science rather than environmental studies, the AP Environmental Science course includes a strong laboratory and field investigation component. The goal of this component is to complement the classroom portion of the course by allowing students to learn about the environment through firsthand observation. Experiences both in the laboratory and in the field provide students with important opportunities to test concepts and principles that are introduced in the classroom, explore specific problems with a depth not easily achieved otherwise, and gain an awareness of the importance of confounding variables that exist in the "real world." In these experiences students employ alternative learning styles to reinforce fundamental concepts and principles. Because all students have a stake in the future of the environment, such activities are intended to motivate students to study environmental science in greater depth. **Colleges often require students to present their laboratory materials from AP science courses before granting college credit for laboratory, so students are expected to retain their laboratory notebooks, reports, and other materials.**

INSTRUCTIONAL MATERIALS AND SUPPLIES

Published Materials	Instructional Supplies
Friedland and Relyea second Edition Environmental science	1. Three ring binder w/ dividers for each Unit 2. Notebook Paper (college rule) 3. **2** Composition Books (FRQ,VOC,Lab) 4. Pens (blue or black ink) and Pencils Recommended: Notecards,Colorpensils,Markers *Other supplies may be needed throughout the year

EVALUATION AND GRADING

Assignments	Grade Weights	Grading Scale
Classwork Homework Quizzes Laboratory Reports Unit Tests Projects MidTerms Nine Week Exams Final Exams	Grade Types: Formative Assessments 50% • Practice 15% -Homework, Classwork, & Quizzes • Labs 35% Summative Assessments 50% -Major tests, Case Studies, Projects Final Exam 20% - Overall Grade	A: 90 and above B: 80 – 89 C: 71 – 79 D: 70 F: 69 or below

OTHER INFORMATION

Expectations regarding Assignments	Additional Information
1. Homework is due at the beginning of the class period unless otherwise specified by the teacher. Late assignments will NOT be accepted. 2. All work must be legible. 3. When you are absent, it is **YOUR** responsibility to check with me *before or after* class concerning missed assignments. Please check the class web page for assignments, notes and handouts, quiz and test dates, and other important information. 4. If you are absent, I expect assignments due on the day you miss to be turned in on the day you return to class (provided the absence is excused). *You will not be reminded – it is your responsibility!* 5. **If you are absent the day before a pre-announced quiz or test, you are expected to take the assessment at the originally scheduled time.**	**Make-up work:** *Students are allowed to complete make-up work **only** for excused absences!* Check the student handbook for policies regarding make-up work. It is the student's responsibility to see the teacher before or after class/ school for make-up work the day the student returned from an absence. Unless an absence exceeds 3 days, labs and tests must be completed (or scheduled at the teacher's discretion) within 3 days of the student's return to school in order to receive credit. If the student does not make arrangements, then the test becomes an automatic **(ZERO)** 0. The exception to this policy is the student who is habitually absent on test day. The student will be informed of the habit and will then **make up the test the first day that he/she returns to class**.

Academic Integrity: Academic integrity is a fundamental value of quality education; therefore, Woodland High School will not tolerate any acts of cheating, plagiarism, or falsification of school work. Should it be determined that an academic integrity violation has taken place, the school reserves the right to assign a grade of a zero and submit disciplinary referral to the appropriate Assistant Principal. The school also reserves the right to remove or suspend enrollment in any Advanced Placement/Honors classes as well as Academic Honor Society. This includes but is not limited to tests, quizzes, homework, labs, and projects.

Late work: Work is assigned in an order that will increase understanding. Failure to turn work in at the appropriate time will make learning difficult. Any assignment categorized as a formative assessment will be accepted late with a 50% deduction for each day that it is late. This means that after one day it will no longer be accepted. Any major projects unless otherwise notified will be accepted late with a 10% deduction for each day that it is late. This means that after 9 days the assignment will no longer be accepted.

Technology Information:
All students will sign the computer use form provided by Henry County Schools. Students are free to use technology for instructional purposes ONLY!

Classroom Rules

Consequences for inappropriate behavior:

Woodland High School Classroom Expectations

To ensure an optimum learning environment, please adhere to the following:

1. Students will be respectful to all adults and classmates.
2. Students will be seated in class when the bell rings.
3. Students will use computers/technology appropriately at all times.
4. Students are allowed two emergency restroom passes per semester.
5. No food or beverages allowed. (Only H_2O)

As WHS students, you are to follow the guidelines for our Science Classroom as well as those stated in your Student Handbook and on the Lab Safety Guidelines. There is no eating or drinking in the lab science classroom.

Laboratory Safety:
A separate Lab Safety Contract will be provided for review and signature by both student and parent. It must be signed by both parties and returned before the student can participate in lab. Failure to adhere to the safety regulations during a lab will result in immediate removal from the lab, loss of grade and possible disciplinary actions according to the offense.

The following consequences will be enforced if the Classroom Expectations are broken

1st offense	Warning
2nd offense	Student conference and call to parent *(if a second tardy, silent lunch or detention; if inappropriate technology use, item will be taken up for the parent/guardian)*
3rd offense	30-minute detention and call to parent
4th offense	office referral

A major offense including but not limited to inappropriate technology/cell phone use by ANY student will result in an immediate referral to the office.

Welcome to Science, where you will be compelled to
THINK, EXPLORE, CONNECT, IMAGINE and QUESTION!

Mrs.Dwarams' AP Environmental Syllabus

"I have read and understand the course requirements and expectations outlined in the course syllabus. I also understand that I may contact Ms. Butts at Woodland High with any questions or concerns I might have."

_____
Student Name, please print.

_____ _____
Student Signature **Student email, please print.**

_____ _____
Parent/Parents' Signature **Parent email, please print.**

_____ _____
Date **Additional Parent Email, please print.**

Comments/Questions/Concerns: