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| **AP® Environmental Science**  **Spring 2020 Course Syllabus**  **Sprayberry High School | Cobb County, Georgia** |

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| **Teacher:** | Mrs. Molly Jirasakhiran | | **Phone:** | (770) 578 – 3200 (School) |
| **Subject:** | AP Environmental Science | | **Email:** | molly.jirasakhiran@cobbk12.org |
| **Room:** | 406 | | **Planning:** | 2nd Block |
| **Remind:** | Text @apesjira to 81010 | | **Website:** | www.sprayberrysciencej.weebly.com |
| **Tutoring:** AO and 7:30-8:20 am each day  **AP Central:** [Jirasakhiran S2 B3](https://myap.collegeboard.org/course/14/section/55727) code **QG7KAN**  **Course Description** | | | | |
| AP Environmental Science is designed to be the equivalent of a one-semester, introductory college course in environmental science. The goal of the this inter disciplinary course is to provide students with the scientific principles, concepts, principles, 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 alternative solutions for resolving or preventing them. To achieve these goals, we will focus on the following major interconnected themes:   |  | | --- | | 1. Science is a Process.    * Science is a method of learning more about the world.    * Science constantly changes the way we understand the world. 2. Energy conversions underlie all ecological processes.    * Energy cannot be created; it must come from somewhere.    * As energy flows through systems, at each step more of it becomes unusable. 3. The Earth itself is one interconnected system.    * Natural systems change over time and space.    * Biogeochemical systems vary in ability to recover from disturbances. 4. Humans alter natural systems.    * Humans have had an impact on the environment for millions of years.    * Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment. 5. Environmental problems have a cultural and social context.    * Understanding the role of cultural, social, and economic factors is vital to the development of solutions. 6. Human survival depends on developing practices that will achieve sustainable systems.    * A suitable combination of conservation and development is required.    * Management of common resources is essential. |   **AP Exam Preparation**  This course will prepare students to take the AP Exam. The three hour long exam will be divided equally between a Multiple Choice and a Free Response (FRQ) Section.  The multiple choice section consists of 100 questions and constitutes 60% of the final grade. The free response section emphasizes the application of the principles to a greater depth and comprises 40% of the exam grade.  Taking the AP Exam is not required but it is encouraged. College credit may be given for exam scores of three and above. Exactly what scores will be accepted and how much credit will be awarded depends on the individual college. AP Environmental Science Exam Date: *May 11th at 12 NOON.*  **Description of incoming students**  It is recommended that students take two years of science courses, including biology and one physical science course. These prerequisites result in the students being either juniors or seniors. All students, therefore, will already have a background in the scientific method and the skills to write effective lab reports.  **Teacher’s Philosophy**  Since this course is a laboratory and field based course, the teaching of it takes advantage of local environments and resources. While our area in Georgia does not have marine environments, estuaries and coniferous forests, it does have deciduous forests, river systems, and clearly defined watersheds. Therefore, laboratory activities that are conducted outside and are consequently dependent on the weather have to be performed at certain times during the year. Examples of this would be water quality testing, soil analysis, testing ozone levels and biodiversity.  The topics in AP Environmental Science do not lend themselves to short term memorization of facts. The emphasis of the course is on the understanding of systems and the processes.  Students should come prepared every day. Lectures and laboratory activities will supplement the required reading and homework assignments. | | | | |
| **Resources** | | | | |
| Text for home use: | | * ***Environmental Science for AP***  by Friedland and Relyea, 3rd edition * Online Textbook: Link will be provided in class | | |
| Supplemental Resources: | | * Assorted texts found in classroom library; peer reviewed science publications, lab manuals, current issue case studies and the Internet. | | |
| Class website: | | * sprayberrysciencej.weebly.com | | |
| **Mandatory Materials** | | | | |
| \*2 inch, 3 ring binder with 8 dividers, Scientific Calculator | | | | |

**Evaluation**

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| Cobb County Grading Scale: | | Grading Category | Percentage of Grade |
|  |  | Tests | 40% |
| 90 – 100% | A | Projects and Labs | 20% |
| 80 - 89% | B | Classwork and Activities | 15% |
| 75 – 79 % | C | Quizzes and Homework | 15% |
| 70 – 74% | D | Final Exam | 10% |
| 0 – 69 % | F | The Final Exam is a cumulative project that can be exempted as determined by the Sprayberry HS exemption policy. | |
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| **Laboratory Work- 25% of class** |
| AP Environmental Science will contain laboratory experiences from lab manuals, data sets, fieldwork and student-designed experiments. Emphasis is placed on in-depth investigation and experimental design regarding environmental science concepts. These lab activities emphasize development and testing of hypotheses; collection, analysis, and presentation of data; and clear discussions of results. Formal reports are required and must include the previously mentioned elements, as well as proper labeling of tables and graphs. In many cases, software and Internet simulations will be conducted in support of the lab being undertaken. On average, a minimum of one block per week is spent engaged in lab and/or field work.  **Each lab will require:**   * The formation of an hypothesis or hypotheses, based on in-class discussion of the presented problem or focus of each experiment * Design of (an) experiment(s), also based on in-class discussion, to test the hypothesis or hypotheses * Collection of data and observations * Calculations using the collected data * Conclusions about how well the hypothesis or hypotheses held up based on the experiment * Class discussion of variance and error analysis * Written report   **Homework**  May include but not be limited to:  • reading the current unit content and answering textbook questions  • reviewing lecture notes (from PowerPoints)  • readings and analyzing case studies  • making and studying flash cards for unit tests and quizzes  • lab write-ups  • essays  • creating posters, surveys, etc. |

**Late Work**

Late work is accepted for 70% of the original grade. It is the student’s responsibility to make arrangements with the instructor for make-up lab or test time, if necessary.

**Tardiness to Class**

If you are not in the classroom when the final bell rings, you must obtain a tardy pass or excused note. No student will be permitted into the classroom without a pass after the tardy bell rings. Any student in the hallway, even if visible to the teacher, is tardy when the bell rings. Please see your student handbook for further information about the SHS tardy policy.

**Course Outline**

Students will be given monthly calendars detailing chapter reading assignments, laboratory assignments, as well as due dates for all work. This information will also be available on the class website. Note: due to time restraints videos may be shown in clips instead of entirety.

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| **Unit 1: The Living World: Ecosystems – 7-8 class periods (6-8%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| Intro to ecosystems  Terrestrial Biomes  Aquatic Biomes  The Carbon, Nitrogen, Phosphorus, Hydrolytic Cycles  Primary Productivity  Trophic Levels and Energy Flow  Food Chains and Webs | 1, 2, 3,4 | Activity: Selected Reading: Rachel Carson, Garrett Hardin,  Paul Ehrlich - How humans have adapted to and modified the environment. Environmental history of the Unites States  Activity: Climatograms -- Students design climatograms of assigned biomes, using data they have researched from the internet  Project: Biomes – Students work in groups to create biome posters, followed by a Gallery Walk  Internet Activity: Footprint calculations-Using an online footprint calculator, students calculate their ecological footprint based on their lifestyle  Activity: Food Webs – Students analyze the interactions between 30-35 organism and diagram a food web to look at the intricate interactions of different food webs.  Biomagnification Through a Food Chain Lab  Activity: The Nitrogen Passport – Students pretend to be a nitrogen molecule traveling through the biotic and abiotic systems  Video: The Lorax – Students analyze the O2 and CO2 cycles |

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| **Unit 2: The Living World: Biodiversity – 6 class periods (6-8%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| Intro to Biodiversity  Ecosystem Services  Island Biogeography  Ecological Tolerance  Natural Disruptions to Ecosystems  Adaptations  Ecological Succession | 5, 6, | Virtual Lab: Natural Selection - Students conduct a simulation of the adaptation of organisms to different habitats and use simple statistical tools to analyze their data.  Project: Wanted Poster- Students design a wanted poster for a non-native species  Lab: Diversity Study using cars - Students use data to calculate the Shannon-Wiener Index  Video: Cane Toads  Case Study: Saving the Northern Spotted Owl  Labs: Ecological Succession – Students study succession over a five week period using eco-columns (start)  Case Study: The Everglades |

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| **Unit 3: Populations – 6-7 class periods (10-15%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| Generalist and Specialist Species  K-Selected, r-selected Species  Survivorship Curves  Carrying Capacity  Population Growth and Resource Availability  Age Structure Diagrams  Total Fertility Rate  Human Population Dynamics  Demographic Transition | 7,8 | Lab: Duckweed Population Study -- Students perform a long-term study to analyze how different conditions effect carrying capacity and population dieback.  Internet Activity: The Wealth Gap-Using the internet, students examine the characteristics (economics, population growth, resource use, etc) of developed and developing nations.  Lab: The Power of the Pyramid - Using census data from different countries, (internet) students construct age structure pyramids and analyze those using social, economic, and political parameters.  Video: World Population Video  Internet Activity: World Population History Activity. |

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| **Unit 4: Earth Systems and Resources – 6 class periods (10-15%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| Plate Tectonics  Soil Formation and Erosion  Soil Composition and Properties  Earth’s Atmosphere  Global Wind Patterns  Watersheds  Solar Radiation and Earth’s Seasons  Earth’s Geography and Climate  El Nino and La Nina | 8,9 | Activity: Plate Tectonics - Using the theory of the plate tectonics, students observe and analyze the movement of the tectonics plates  Internet Activity: Earthquake and Volcanic Activity – students map the sites of recent earthquake activity.  Lab: Soil, The Wealth Beneath Your Feet- Students collect and analyze soil from different sites. Calculations include infiltration rate, water-holding capacity, and nutrient-retention rates.  Lab: Soil, Physical and Chemical Weathering – Students recreate the process involved in physical and chemical weathering on different kinds of rocks. |

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| **Unit 5: Land and Water Use – 9-10 class periods (10-15%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| The Tragedy of the Commons  Clearcutting  The Green Revolution  Impacts of Agricultural Practices  Irrigation Methods  Pest Control Methods  Meat Production Methods  Impacts of Overfishing  Impacts of Mining  Impacts of Urbanization  Ecological Footprints  Introduction to Sustainability  Methods to Reduce Urban Runoff  Integrated Pest Management  Sustainable Agriculture  Aquaculture  Sustainable Forestry | 10, 11 | Activity: Energy problem sets  Lab: Salinization – Students observe the effect of salinity on mustard seeds  Video: When the Salmon Runs Dry  Video: Great Wall Across the Yangtze  Lab: The Tragedy of the Commons Goldfish Activity  Lab: Mining Simulation  Project: National Parks - Students research the ecology, biology, geology, botany, natural history, and challenges faced by public lands.  Activity: Land Use – Students given certain parameters, students design an environmentally friendly township  Internet Activity: Water Footprint – Students keep a daily log of their personal water usage for a week, calculate their total water usage, and analyze their impact on the environment.  Lab: Effect of radiation on seeds -- Students measure, over a period of two weeks, the effects of radiation on the germination and growth of irrigated mustard seeds. Data is analyzed using statistical tests.  Internet Activity: Pest Control – Students research various pesticides and their effect on the environment  Case Study: Growing rice in an arid climate  Video: Harvest of Fear  Video: Food, Inc |

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| **Unit 6: Energy Resources and Consumption – 8-9 class periods (10-15%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| Renewable and Nonrenewable Resources  Global Energy Consumption  Fuel Types and Uses  Distribution of Natural Energy Resources  Fossil Fuels  Nuclear Power  Energy from Biomass  Solar Energy  Hydroelectric Power  Geothermal Energy  Hydrogen Fuel Cell  Wind Energy  Energy Conservation | 12, 13 | Lab: Owl Pellet - Students assemble a skeleton from the bones found in the pellets and calculate the biomass required to support the predator.  Activity: Energy problem sets  Internet Activity: Efficiency of a Coal Plant Lab  Activity: Radioactive Half-life problem sets  Activity: Personal Energy Consumption Audit  Video: Japan’s Nuclear Disaster  Lab: Airborne Particulates & Car Exhaust - Using prepared test strips, students monitor and calculate the number and size of particulates in their own bedrooms and their own cars  Lab: Fossil Fuels - Students keep a daily log of their driving for a week and calculate how much carbon dioxide they have generated.  Lab: Exhausting Problems - Using the Gastek apparatus from Carolina Biologicals, students calculate the amount of carbon dioxide, carbon monoxide, and sulfur dioxide that are being emitted by their cars.  Video: Who Killed the Electric Car  Wind Turbines Activity  Activity: Energy Efficiency – Students calculate the fuel efficiency of different cars to identify environmental  Project: Designing an Efficient Home – Students will research and design an energy efficient home |

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| **Unit 7: Atmospheric Pollution – 6 class periods (7-10%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| Intro to Air Pollution  Photochemical Smog  Thermal Inversion  Atmospheric CO2 and Particulates  Indoor Air Pollutants  Reduction of Air Pollutants  Acid Rain  Noise Pollution | 15 | Video: Can Buildings Make You Sick?  Lab: Urban Hotspots  Lab: Micrometeorology: Students study the effect of weathering in a locality. Parameters used—ambient air temperature, soil, temperature, and plants.  Video: What’s Up with the Weather  Lab: Effects of Acid Rain on Seed Germination  Lab: Greenhouse Effect – Students investigate the processes that might occur in global warming  Activity: What can you do to stop global warming? -  Students address this problem using teacher generated scenarios that apply to their daily lives.  Lab: Fossil Fuels - Students keep a daily log of their driving for a week and calculate how much carbon dioxide they have generated. |

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| **Unit 8: Aquatic and Terrestrial Pollution – 9-10 class periods (7-10%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| Sources of Pollution  Human Impacts on Ecosystems  Endocrine Disruptors  Human Impacts on Wetlands and Mangroves  Eutrophication  Thermal Pollution  Persistent Organic Pollutants (POPS)  Bioaccumulation and Biomagnification  Solid Waste Disposal  Waste Reduction Methods  Sewage Treatment  Lethal Dose 50% (LD50)  Dose Response Curve  Pollution and Human Health  Pathogens and Infectious Diseases | 14,16, 17 | Lab: No Water Off a Duck’s Back - Students simulate the damage done to birds as the result of an oil spill. Hard boiled eggs are immersed in oil over a timed period and peeled to see the effects. Feathers are immersed in oil and washed in water and detergent to see the effects on the morphology of the feathers.  Activity: Water Muddled Up and Clean Up  Lab: Water Quality Testing Activity  Video: Outrage at Valdez  Lab: Grass Decomposition - Students look at patterns of decomposition over a six week period.  Lab: A Lab of Rot -- Students compare the decomposition rates of banana peels and newspapers under varying conditions.  Video: Garbage  Case Study: Minamata  Internet Simulation: Recycle City & Toxtown – Students observe various recycling issues  Internet Activity: Wastewater Treatment  Video: Scientists and the Alaskan Oil Spill  Lab: LD 50 – Students check the effects of common household chemicals on brine shrimp and calculate the LD-50 levels  Activity: Risk Assessment – Students will survey friends and family to find out how they perceive various risks  Selected Reading: “Our Stolen Future” by Theo Coburn |

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| **Unit 9: Gobal Change – 9-10 class periods (15-20%)** | | |
| **Topic** | **Chapters** | **Activities/Labs/Videos/Projects** |
| Stratospheric Ozone Depletion  Reducing Ozone Depletion  The Greenhouse Effect  Increases in Greenhouse Gases  Global Climate Change  Ocean Warming  Ocean Acidification  Invasive Species  Endangered Species  Human Impacts on Biodiversity | 15,18,19,20 | Activity: What can you do to stop global warming? -  Students address this problem using teacher generated scenarios that apply to their daily lives.  Lab: Greenhouse Effect – Students investigate the processes that might occur in global warming  Lab: Tropospheric Ozone – Students make ozone test strips and check ozone levels in surrounding areas  Activity: What can you do to stop global warming? -  Students address this problem using teacher generated scenarios that apply to their daily lives.  Video: Six Degrees Could Change the World  Video: Warning from the Ice  Lab: Coliform Testing  Project: Endangered Species – PowerPoint Presentations on an organism of their choice  Project: Sustainability Feast Research and Reflection  Video: America’s Endangered Species: Don’t Say Goodbye  Video: Never Cry Wolf  Video: Frogs as Indicator Species  Project: APES in the news - Students collect, make a journal, and analyze newspaper articles over a nine-week period  Project: Environmental Hot Spots – Using [www.scorecard.org](http://www.scorecard.org/) students write a paper on one of the following pollutants in their area: lead, carbon monoxide, nitrogen oxides, particulates, sulfur dioxide, land contamination, toxic releases.  Video: Affluenza, Escape from Affluenza. |

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**Acknowledgement of Receipt of Course Information**

**Mrs. Jirasakhiran’s AP Environmental Class 2019-2020**

Students: Please go over your syllabus and safety contract with your parents/guardians. After you have read each of them, both of you need to sign and date this page. Your signature acknowledges the fact that both of you have read and understood the syllabus and safety contract.

**THIS PAGE MUST BE TURNED IN IN ORDER TO PARTICIPATE IN LABS.**

**Student:** I have read the rules and procedures in the syllabus and safety contract, and I understand them. I will honor these rules and procedures while in Mrs. Jirasakhiran’s class.

Student signature: Date:

**Parent/Guardian:** My child has discussed the rules and procedures in the syllabus and safety contract with me. I understand and support them.

Parent/Guardian signature: Date:

\*\*\*\*\*\*\*\*\*\*\* CUT HERE AND KEEP BOTTOM PORTION FOR YOUR REFERENCE\*\*\*\*\*\*\*\*\*\*

**TEACHER CONTACT INFORMATION:**

Should you need to contact Mrs. Jirasakhiran, please use the information provided below. Please cut off the bottom of this sheet and keep for you records. Return the top portion to Mrs. Jirasakhiran. Your student will keep the syllabus and safety contract for future reference.

SCHOOL ADDRESS: EMAIL: molly.jirasakhiran@cobbk12.org

Sprayberry High School

ATTN: Molly Jirasakhiran

2525 Sandy Plains Rd PLANNING PERIOD: 2nd block

Marietta, Georgia 30066

PHONE: (770) 578-3200 Ext 1406