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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:

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| 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.
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**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
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| Supplemental Resources: | * Assorted texts found in classroom library; peer reviewed science publications, lab manuals, current issue case studies and the Internet.
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| Class website: | * sprayberrysciencej.weebly.com

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| **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 ecosystemsTerrestrial BiomesAquatic BiomesThe Carbon, Nitrogen, Phosphorus, Hydrolytic CyclesPrimary ProductivityTrophic Levels and Energy FlowFood 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 StatesActivity: Climatograms -- Students design climatograms of assigned biomes, using data they have researched from the internetProject: Biomes – Students work in groups to create biome posters, followed by a Gallery WalkInternet Activity: Footprint calculations-Using an online footprint calculator, students calculate their ecological footprint based on their lifestyleActivity: 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 systemsVideo: 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 BiodiversityEcosystem ServicesIsland BiogeographyEcological ToleranceNatural Disruptions to EcosystemsAdaptationsEcological 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 speciesLab: Diversity Study using cars - Students use data to calculate the Shannon-Wiener IndexVideo: Cane ToadsCase Study: Saving the Northern Spotted OwlLabs: 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 SpeciesK-Selected, r-selected SpeciesSurvivorship CurvesCarrying CapacityPopulation Growth and Resource AvailabilityAge Structure DiagramsTotal Fertility RateHuman Population DynamicsDemographic 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 VideoInternet 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 TectonicsSoil Formation and ErosionSoil Composition and PropertiesEarth’s AtmosphereGlobal Wind PatternsWatershedsSolar Radiation and Earth’s SeasonsEarth’s Geography and ClimateEl 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 CommonsClearcuttingThe Green RevolutionImpacts of Agricultural PracticesIrrigation MethodsPest Control MethodsMeat Production MethodsImpacts of OverfishingImpacts of MiningImpacts of UrbanizationEcological FootprintsIntroduction to SustainabilityMethods to Reduce Urban RunoffIntegrated Pest Management Sustainable AgricultureAquacultureSustainable Forestry | 10, 11 | Activity: Energy problem sets Lab: Salinization – Students observe the effect of salinity on mustard seedsVideo: When the Salmon Runs DryVideo: Great Wall Across the YangtzeLab: The Tragedy of the Commons Goldfish Activity Lab: Mining SimulationProject: 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 townshipInternet 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 climateVideo: Harvest of FearVideo: 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 ResourcesGlobal Energy ConsumptionFuel Types and UsesDistribution of Natural Energy ResourcesFossil FuelsNuclear PowerEnergy from BiomassSolar EnergyHydroelectric PowerGeothermal EnergyHydrogen Fuel CellWind EnergyEnergy 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 setsInternet Activity: Efficiency of a Coal Plant LabActivity: Radioactive Half-life problem setsActivity: Personal Energy Consumption AuditVideo: Japan’s Nuclear DisasterLab: 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 carsLab: 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 CarWind Turbines ActivityActivity: 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 PollutionPhotochemical SmogThermal InversionAtmospheric CO2 and ParticulatesIndoor Air PollutantsReduction of Air PollutantsAcid RainNoise Pollution | 15 | Video: Can Buildings Make You Sick?Lab: Urban HotspotsLab: 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 GerminationLab: Greenhouse Effect – Students investigate the processes that might occur in global warmingActivity: 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 PollutionHuman Impacts on EcosystemsEndocrine DisruptorsHuman Impacts on Wetlands and MangrovesEutrophicationThermal PollutionPersistent Organic Pollutants (POPS)Bioaccumulation and BiomagnificationSolid Waste DisposalWaste Reduction MethodsSewage TreatmentLethal Dose 50% (LD50)Dose Response CurvePollution and Human HealthPathogens 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 UpLab: Water Quality Testing ActivityVideo: Outrage at ValdezLab: 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: GarbageCase Study: MinamataInternet Simulation: Recycle City & Toxtown – Students observe various recycling issuesInternet Activity: Wastewater TreatmentVideo: Scientists and the Alaskan Oil SpillLab: LD 50 – Students check the effects of common household chemicals on brine shrimp and calculate the LD-50 levelsActivity: Risk Assessment – Students will survey friends and family to find out how they perceive various risksSelected 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 DepletionReducing Ozone DepletionThe Greenhouse EffectIncreases in Greenhouse GasesGlobal Climate ChangeOcean WarmingOcean AcidificationInvasive SpeciesEndangered SpeciesHuman 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 warmingLab: Tropospheric Ozone – Students make ozone test strips and check ozone levels in surrounding areasActivity: 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 WorldVideo: Warning from the IceLab: Coliform TestingProject: Endangered Species – PowerPoint Presentations on an organism of their choiceProject: Sustainability Feast Research and ReflectionVideo: America’s Endangered Species: Don’t Say GoodbyeVideo: Never Cry WolfVideo: Frogs as Indicator SpeciesProject: APES in the news - Students collect, make a journal, and analyze newspaper articles over a nine-week periodProject: 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