

Welcome to AP Environmental Science affectionately known as "**APES.**" Thank you for your willingness to participate in the **rigorous** and academically challenging Advanced Placement (AP) Program. APES is a **college level** environmental science that is taught on a HS campus as an elective since the late 1990s. As this is a college-level course, an increased level of **independence** will be expected. **Mastery** of content objectives is the level of learning expected.

In addition to learning the fundamentals of sustainable living and how to be better stewards of our planetary environment, this course will also prepare you to take the **APES Exam**. It will provide careful guidance in the application of **scientific methods** to the **solutions** for many environmental problems. This course will cover a broad spectrum of topics. As it is a **science course**, emphasis is placed on the **science** of environmental issues and not promoting certain political agendas. Students will gain **firsthand experience** in the **practical application** of science to **real-life problems**. Topics covered are generally of higher personal **interest** and societal **importance**. Students will think **analytically** and **critically** about issues as well as apply **quantitative methods** in analysis i.e. Calculating T-Test for Statistical Significance.

Minimum requirements for the course are successful passage of two years of high school science and one year of algebra. Though typically less quantitative than chemistry or physics, there are quantitative aspects of this course and some computational work is to be expected. More specifically, students should practice using **scientific notation**, working with scientific measuring **units**, **estimating**, using **ratios** and **proportions**, doing **percentage** calculations, reading and *interpreting graphs*, employing *logical* and *deductive reasoning*.

All APES students are expected to take the AP Exam in May. Such is required to receive the "AP" designation for the course on your High School Transcript regardless of your exam score. Students are expected to spend significant time preparing independently for the exam. It is *highly suggested* to obtain a formal **APES study book** such as "Barron's" or "Princeton Review." AP Students are generally expected to spend about **5hrs studying each week** studying topics of course.

We will be starting the course with the textbook "**Living In The Environment**" 19th Edition by Miller and Spoolman, 2017. The front cover shows a Kingfisher bird diving toward a body of water. Its long pointed beak allows it to dive into water a high speeds without making a splash to catch fish. The birds design for speed is being used by Japanese designers to make faster bullet trains and reduce the noise it generates. This symbolizes is a major new theme call **biomimicry** or learning from nature.

Link to Digital Version of AP Text:

https://drive.google.com/open?id=1UCb866aQL_wBHXFA5MH18eZ5g0sGTSCX

Some **tips** for completing summer assignment:

- 1- **Acknowledge** its importance ... it is a task this summer that needs to be done. Don't procrastinate.
- 2- Create a **schedule** ... make a plan. Do not procrastinate. Make time for both work and fun.
- 3- **Reward** your progress ... treat to something special or fun as you reach your goals
- 4- **Stay in contact** with classmates and teachers ... consider forming a study group. Email.
- 5- Continually **challenge yourself** ... people who are the best at what they do become so by constantly challenging themselves. Signing up for AP course(s) is just the start.

*All work must be **In Your Own Words**. Have fun this summer!

Required: Task 1-14

Task 1: 'Textbook Cover'

1. What's the **story** of the bird on the cover of your textbook? How is it used to exemplify **biomimicry**? Give a 2nd example.

(Intro pg. ii (count backwards from pg. v); pg. 4 Core Case Study)

Task 2: 'Table of Contents'

1. Examine the **table of contents** pgs. v - xviii. What **unit/chapter** seems most interesting to you? Why? What do you know already about the topic? What would you like to know about the topic?

(Intro pgs. v - xviii)

Task 3: 'The Authors'

1. **Who** are the authors of your textbook? Tell about their stories.

(Intro pgs. xxxii, xxxiii)

Task 4: 'The Publisher'

1. What are some ways Cengage, the publisher of the textbook, is committed to **sustainable practices**?

(Intro pg. xxxiii (bottom))

Task 5: 'Learning Skills'

1. Summarize each Heading in red ink (i.e. "Why Is It Important to Study Environmental Science?")

(Intro pgs. xxvii - xxxi)

Task 6: 'Sustainability'

1. What are the **Three Scientific Principles of Sustainability** that have sustained nature for billions of years? Identify them. Describe them. Explain them (pgs. 5, 6).

2. What are the Three **Additional Principles** of Sustainability identified on pg. 9?

3. Give an **example** of something that is sustainable in your city/region.

Task 7: 'Unsustainability'

1. Generally speaking, what does it mean to live **unsustainably**? pg. 11

2. Give examples of how we are contributing towards **Natural Capital Degradation** (harming or degrading the environment). **See Figure 1.7** "Natural Capital Degradation" pg. 11

II. Give an **example** of humans living unsustainably in your city/region.

Task 8: 'World Map'

On a sheet of plain white paper *make a **World Map***. **Sketch** the following: all continents, all oceans, major seas and lakes (Caribbean Sea, Gulf of Mexico, Mediterranean Sea, Arabian Sea, Black Sea, all 5 Great Lakes, Caspian Sea, Aral Sea), major rivers and river systems (Amazon, Nile, Mississippi (also Missouri and Ohio Rivers), Yangtze, Ganges, Yellow), major mountain chains (Rockies, Andes, Appalachians, Alps, Urals, Himalayas), and approximate locations of some major world cities (New York, Los Angeles, Mexico City, London, Tokyo, Shanghai). Students should also be able to draw the equator on a map of the world within 10 degrees of latitude. A map quiz may be given during the first week of school. Take time to make this assignment be both relatively accurate and look good.

Note: Identify which projection you are using? i.e. Mercator, Peterson's, etc.

Task 9: 'Supplements' (pages are in the back of textbook)

Write a detailed **summary** of the supplement 1, **Measurement Units and Unit Conversions**, pgs. S1, S2
-Answer the Unit Conversion Exercises #s 1, 2 on pg. S2

Task 10: 'Supplements' (pages are in the back of textbook)

Write a detailed **summary** of the supplement 2, **Reading Graphs and Maps**, pgs. S3 - S5

Task 11: 'Supplements' (pages are in the back of textbook)

Write a detailed **summary** of the supplement 3, **Some Basic Chemistry**, pgs. S6 - S13

Task 12: 'Supplements' (pages are in the back of textbook)

Write a detailed **summary** of the supplement 4, **Maps and Map Analysis**, pgs. S14 - S39

Task 13: 'Supplements' (pages are in the back of textbook)

Write a detailed **summary** of the supplement 5, **Environmental Data and Data Analysis**, pgs. S40 - S45

Task 14: 'Supplements' (pages are in the back of textbook)

Write a detailed **summary** of the supplement 6, **Geologic and Biological Time Scale**, pg. S46

Feel free to email me this summer:

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Extra Credit - **Optional** Study Assignments - Tasks A-E

Task A: Fruits and Vegetables on the Move!

At some point over the summer, look around your house and identify a piece of fruit or vegetable that has travelled to be a part of your diet. Usually there is a sticker on the item telling you its country of origin – or you could go to a food store and browse. (hint: do not use the tomato you picked out of the garden that morning) For the item you select: a. Record date, item, and its country of origin b. Use internet resources or other sources to estimate the distance from where the item was grown to your home. Do the best estimate you can – obviously it is difficult/impossible to tell where in Mexico that cantaloupe came from... c. List the most likely modes of transportation (hint: there are probably more than one of them) used to move that item from the field where it was growing to your kitchen. d. Respond to the following in a paragraph or two: What are the environmental impacts of shipping fresh produce over long distances? What are the health benefits/health costs of having a wide variety of fresh produce available at all times? Is it “worth it”?

Task B: 'Water'

Water is essential for all living things including humans. In this part of the assignment I want you to think about all the ways in which you use water everyday. Figure out how much water you use personally everyday. Use a chart to show all the ways you use water and how much total water you used in gallons everyday (Don't forget washing clothes & dishes, watering lawns, cooking, etc. . .). Research how much water is used daily by Americans, Californians, & Sacramento County residents. Write a brief report on your water usage and how it compares to the water usage to the other groups.

Task C: Go to <http://www.greenfacts.org/en/ecosystems/>

There are 10 questions on this web site and answers to these questions. The answers for each question are presented in 3 different levels of depth which allows readers to explore as deeply or as superficially as they like. You should read the first “Summary” level answers for all 10 questions and be prepared for a quiz on the first level answers the second day of school. You are encouraged to read the second “Details” level if your background in ecology/ecosystems is weak.

Task D: 'Vocabulary Terms '

On each flash card, write a definition and sentence/example for each the following vocabulary terms in the context of environmental science: environment, environmental science, ecology, ecosystem, environmentalism, sustainable, natural capital, natural resources, nutrient cycling, per capita, resource conservation, sustainable yield, environmental degradation, tragedy of the commons, pollution, point source vs. nonpoint source, output pollution control, input pollution control, deforestation, poverty, affluenza, environmental ethics, inductive reasoning, deductive reasoning, paradigm shift, pH, organic compounds, acidity, inorganic compounds, positive feedback loop, negative feedback loop, tipping point, synergy, ecology, species, population, community, genetic diversity, habitat, biosphere, hydrosphere, salt water, fresh water, geosphere, biome, natural greenhouse effect, abiotic, biotic, range of tolerance, limiting factor, trophic level, formula for photosynthesis, formula for respiration, anaerobic respiration, detritivore, omnivore, decomposer, food web, food chain, biomass, ecological efficiency, net primary productivity, transpiration, aquifer, renewable energy, nonrenewable energy, nuclear fission, nuclear fusion

Task E: 'Math Assignment'

Please complete the following problems, showing all work and units. The AP Environmental Science exam will have some mathematical calculations in the multiple choice section, and one of the free response questions always involves mathematical calculations. No calculators are allowed during the exam.

Answer the questions #s 1-5. Use a separate sheet of paper to **show all work** as necessary.

- 1) A population of deer had 325 individuals. If the population grows by 16% in one year, how many deer will there be the next year?
- 2) Electricity costs 7 cents per kilowatt hour. In one month one home uses 1.8 megawatt hours of electricity. How much will the electric bill be?
- 3) Your car gets 21 miles to the gallon and your friend's car gets 28 miles to the gallon. You decide to go on a road trip to the University of Virginia, which is 175 miles away. If gas costs \$4 per gallon and you decide to split the gas money, how much money will each of you save in gas by driving your friend's car?
- 4) The concentration of mercury in a water supply changes from 10ppm (parts per million) to 56ppm over a ten-year period. What is the percentage change of the mercury concentration?
- 5) Consider a wind turbine that is rated at 1.5 MW (megawatts) per hour. This means that with sufficiently high winds, it will produce 1.5 MW or 1,500 kW (kilowatts) of power. If this wind turbine runs at its rated power of 100% of the time for a full year, how much energy would it produce in a year? Give your answer in kWh/year (kilowatt hours per year).

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