AP Environmental Science – Summer Assignment 2021 – C. Gray Mitchell

This summer assignment is designed to:

🐸 Help prepare you both academically and mentally for the material, expectations, and pace of the course.

🐸 Emphasize the interdisciplinary focus of APES as it combines chemistry, biology, geology, math, economics and politics.

🐸 Introduce you to ecology through non-classroom methods of learning to prepare you for inquiry- based investigations (labs & activities) in ecology that we will conduct throughout the year.

🐸 Allow you to practice and review essential math skills – without a calculator (calculators are not allowed on the APES exam).

🐸 Provide you with the opportunity to earn 100% on your first quiz, as this project will be graded for completion as your first quiz grade.

Summer Assignment Part I: We will use Carnegie Mellon's Open Learning Initiative (OLI) as our main resource. The OLI includes an online text and interactive questions throughout each chapter section to check for understanding. You will need to create a <u>free</u> student account:

1. Go to the Open Learning Initiative (OLI) website: http://oli.cmu.edu
   In the upper right hand corner of the site, click "Sign Up" and fill out the form.
2. On the **"Confirm Your Account Information"** page, review the account information you entered. If everything is correct, click the "Confirm Account" button. If not, click "Edit Account" to make your changes.
3. Read the statements in the **"Online Consent Form"** and select "I Agree" or "I Do Not Agree" then select "Submit."
4. Under "My Academic Courses" enter your Course Key and click "Go."

   Your Course Key is: GrayMitchell (there is no password)

5. Review the course details to make sure that you are registering for the correct course, and click "Register."
6. Click the return link at the bottom of the receipt page and you will be taken back to your OLI home page.
7. Under **"My Courses"** you will see your registered course. You can double-check to make sure the correct course appears by confirming that the correct Course Key and instructors are listed.
8. Complete the following modules in the Open Learning Initiative and make sure to **enter answers for all of the interactive questions and complete each quiz, as your online progress will be documented in the instructor view**.

Carnegie Mellon OLI Course: <u>APES Summer Assignment 2021</u>

Instructor: Cheryl Gray Mitchell

UNIT 10: Ecology (scroll down through all the units until you see the last unit, Ecology)

Complete Module 49: Introduction to Ecology

Learning Objective (what will be assessed)

1. Define ecology and identify its major levels of study from individual to biosphere.

Complete Module 50: Populations

Learning Objectives (what will be assessed)

1. *Define population and use sample data to calculate population size, population density, and per capita rates of birth and death (calculations are part of the online interactives "learn by doing" and "did I get this?").*
2. *Recognize the many sources of variability in population sizes over time and distinguish models from data in studies of population ecology.*
3. *Explain how population ecology poses solutions to practical problems including pest control, endangered species conservation, and fisheries management.*
4. *Use birth and death rates to calculate the rate of increase of a population and apply this to predict numeric growth in a population over a single time step (calculations are part of the online interactives "learn by doing" and "did I get this?").*
5. *Define limiting factor and explain how some populations tend to limit themselves.*
6. *Create a graph of exponential growth vs. logistic growth. Make sure to label the axes correctly.*
7. *Identify where carrying capacity is on your logistic growth curve and explain what it is.*

*Don't forget to complete the quiz!
Podcast if you need extra help: http://www.bozemanscience.com/050-populations

Complete Module 51: Communities

Learning Objectives (what will be assessed)

1. *Define ecological community and describe how a community's membership is determined.*
2. *Use the keystone species concept to explain the effects on community diversity when a keystone species is eliminated from an ecosystem.*
3. *Define and explain species richness as a measurement of community health and diversity.*
4. *Define symbiosis.*
5. *Define and recognize likely examples of mutualism, competition, and predation (including parasitism).*
6. *Define interspecific interaction and summarize relationships between species based on their direct effects on each other.*
7. *Define indirect interaction and identify examples of indirect interactions between species in communities.*

*Don't forget to complete the quiz! Podcasts if you need extra help:

Complete Module 52: Ecosystems

Learning Objectives (what will be assessed)

1. *Distinguish between the living (biotic) and nonliving (abiotic) components of an ecosystem.*
2. *Compare and contrast the movement of energy vs. matter(chemicals) in ecosystems.*
3. *Distinguish between producers, consumers, detritivores, and decomposers; recognize their roles within ecosystems and give an example of each.*
4. *Define trophic levels in an ecosystem*
5. *Distinguish between a food chain and a food web.*
6. *Create a food web that includes 1 species of detritivores,5 different species of producers, 3 different speciesof primary consumers, 2 different species of secondaryconsumers, and 1 tertiary consumer. You must identify specific species of plants, animals, and decomposers,NOT merely include "producer", "primary consumer", etc. in your web.*
7. *Explain what happens to energy as it flows through an ecosystem.*
8. *Describe how the levels of an energy pyramid correspondto the trophic levels of a food chain.*
9. *Define biogeochemical cycle and apply the concept of conservation of matter to chemical cycling in ecosystems.*
10. *Compare and contrast the water, carbon, nitrogen, and phosphorus cycles in terms of their major driving processes and abiotic reservoirs.*
11. *Identify important human influences on the water, carbon, nitrogen, and phosphorus cycles.*

*Don't forget to complete the quiz! Podcasts if you need extra help:

Complete Module 53: Human Impact (what will be assessed)

Learning Objectives:

1. *Identify three major factors that promote a large human impact on our environment.*
2. *Define sustainable technology and identify practices as sustainable or unsustainable based on long-term consequences for people and the environment.*
3. *Define and identify renewable versus nonrenewable resources; define and identify biodegradable versus non-biodegradable materials.*
4. *Graph how the global human population size has changed over time and explain the roles of the Agricultural and Industrial Revolutions.*
5. *Define biodiversity and list 5 benefits humans derive from biological diversity.*
6. *List examples of the four major threats to biodiversityin the modern world.*
7. *Explain the greenhouse effect as it relates to climate change.*
8. *Define anthropogenic global climate change.*

9. *Identify the main human activities that have contributed to increased levels of carbon dioxide and other greenhouse gases in the atmosphere.*
10. *Identify examples of evidence for recent warming andglobal climate change.*
11. *Identify some changes that may help to limit future impacts of humans on the environment, including strategies to deal with global climate change.*

*Don't forget to complete the quiz! Podcast if you need extra help:
http://www.bozemanscience.com/051-ecosystem-change

Complete Module 54: Unit Summary – Ecology

1. Skim over the summary page

*Don't forget to complete the quiz!

Summer Assignment Part II: APES Math Review

All work must be done **without the use of a calculator.** Complete the following sections of math review on a separate sheet of paper or word document that you will upload as a file on our Canvas course page. All work needs to be included (where appropriate).

*If you are unsure how to complete any of these questionsor would like help with this review please do not hesitate to reach out to myself (sciencematters2@gmail.com) or Mr. Silver (asilver@jbha.org) via email. We would be happy to set up a tutorial via Zoom or discuss via email.

1. Put the following numbers into scientific notation.
A.   0.003 = _____
B.   1,530,000 = _____
C.   0.00005 = _____
D.   142 = _____
E.   2020 = _____

1.   Write the following numbers in standard notation (convert from scientific)
A. 1×10^6 = _____
B. 3.5×10^2 = _____
C. 5.1×10^{-3} = _____
D. 1.2×10^{-6} = _____
E. 4×10^{-10} = _____

1.   Solve the following
A. $10^3 \times 10^4$ = _____
B. $10^3 \times 10^{-4}$ = _____
C. $10^{-1} \times 10^5$ = _____
D. $10^{-4} \times 10^{-2}$ = _____
E. $10^{-2} \times 10^{-2}$ = _____
F. $10^3 / 10^4$ = _____

G. $10^2 / 10^1 =$ _____
H. $10^3 / 10^{-4} =$ _____
I. $10^{-4} / 10^{-2} =$ _____
J. $10^{-3} / 10^{-5} =$ _____

1.   Solve the following using scientific notation
A.   0.003 X 0.0005= _____
B.   0.015 X 0.02= _____
C.   0.000005 X 0.000006 = _____
D.   15,000 X 100= _____
E.   125 X 1,000,000= _____
F.   150,000,000 X 0.00005= _____
G.   0.0003 X 1,000= _____
H.   1,000 / 130,000= _____
I.   15/ 0.00015= _____
J.   150/ 1,000,000= _____

1.   Percentages

   A. What is 15% of 1,500?

   B. You start with 100 units and end with 150 units, what is the percentage increase?

   C. You start with 100 units and end with 50 units, what is the percentage decrease?

   D. You start with 200 units. How many units would you have after a 75% decrease?

   E. You use 1,000 kilowatts of power. You increase your usage by 30%. How many total kilowatts are you using?

   F. Your old microwave used 2 kilowatts an hour. Your new microwave uses 1.5 kilowatts an hour. What is your percent energy savings?

   G. A light bulb uses 100 watts of power. 95 watts are wasted as heat. What percentage of energy is used to light the bulb?

   H. A fluorescent bulb uses 22 watts and gives off the same amount of light as a 100 watt regular bulb. What is the percentage in energy savings by switching to a fluorescent bulb?

   I. A population starts the year with 1,000 residents. By the end of the year, 100 new babies were born. What is the percent increase for this population?

   J. You dissolve 5 grams of salt into 95 grams of water. What is your percent salt solution?

6. Dimensional Analysis : Set up and solve the following equations using all units and showing all work. Conversion factors are included. Use scientific notation when appropriate.

A. There are 2.2 pounds in 1 kilogram. How many pounds in 120 kilograms?

B. There are 2.53 centimeters in one inch. How many centimeters are in 24 inches?

C. There are 36 inches in one yard, how many centimeters are in one yard?

D. There are 100 centimeters in 1 meter. How many yards are in one meter?

E. Given 1000 watts in 1 kilowatt, how many watts are in 2.3 kilowatts?

F. 1 megawatt is 10^6 watts. How many kilowatts are there in one megawatt?

G. There are 1,000 grams in one kilogram, and 1,000 micrograms in one gram. How many micrograms are in 2,500 kilograms?

H. You have 24 lightbulbs. Each uses 100 watts an hour. How many watts are used in 120 hours?

I. 1,000 homes are in a city. Each home uses 200 kilowatt hours a month. How many kilowatt hours does the entire city use in a month?