GEO101C: Earth Science

Credit Hours: 4

Contact Hours: This is a 4-credit course, offered in accelerated format. This means that 16 weeks of material is covered in 8 weeks. The exact number of hours per week that you can expect to spend on each course will vary based upon the weekly coursework, as well as your study style and preferences. You should plan to spend 14-20 hours per week in each course reading material, interacting on the discussion boards, writing papers, completing projects, and doing research.

Faculty Information

Faculty contact information and office hours can be found on the faculty profile page.

Course Description and Outcomes

Course Description:
This course emphasizes four regions: the hydrosphere (water), the atmosphere (air), the lithosphere (rock), and space. This course fulfills a general education Physical and Natural Science requirement. It is an approved Colorado gtPathways course.

Course Overview:
This course is designed to provide students with a general knowledge of the world around them. We will go on a journey from the center of the Earth, becoming part of the crust as a volcano, earthquake, rock or mineral. Then, we see how gases follow us into the atmosphere, eventually falling as rain and filling the oceans and rivers. Next, we examine how those waters interact with the gases and the crust to control our weather and climate. Finally, we study how humans have influenced all of this, for better or for worse, and how we have been able to leave our planet to explore the stars, both figuratively and literally.

Course Learning Outcomes:

1. Describe and explain how the Universe, Milky Way, Solar System and Earth evolved, and examine how the Earth’s crust interacts to cause volcanoes and earthquakes.
2. Identify properties of minerals and explain how they form to become rocks via cooling, heating, pressure, weathering and erosion.
3. Examine the physical aspects of the oceans and seas including waves, tides, currents, and the ocean basin, and how they are linked to climate.
4. Describe the dynamics of atmospheric convection and explain how it relates to weather.
5. Describe the sequence of star formation, maturity and death, methods in astronomical data collection including spectral analysis, and characteristics of the planets.
6. Examine the role of water on the landscape, related geomorphology, glacial and desert landscape evolution, and water usage.

**Participation & Attendance**

Prompt and consistent attendance in your online courses is essential for your success at CSU-Global Campus. Failure to verify your attendance within the first 7 days of this course may result in your withdrawal. If for some reason you would like to drop a course, please contact your advisor.

Online classes have deadlines, assignments, and participation requirements just like on-campus classes. Budget your time carefully and keep an open line of communication with your instructor. If you are having technical problems, problems with your assignments, or other problems that are impeding your progress, let your instructor know as soon as possible.

**Course Materials**

Textbook Information is located in the CSU-Global Booklist on the Student Portal.

**Course Schedule**

**Due Dates**

The Academic Week at CSU-Global begins on Monday and ends the following Sunday.

- **Discussion Boards:** The original post must be completed by Thursday at 11:59 p.m. MT and Peer Responses posted by Sunday 11:59 p.m. MT. Late posts may not be awarded points.
- **Opening Exercises:** Take the opening exercise before reading each week’s content to see which areas you will need to focus on. You may take these exercises as many times as you need. The opening exercises will not affect your final grade.
- **Mastery Exercises:** Students may access and retake mastery exercises through the last day of class until they achieve the scores they desire.
- **Critical Thinking and Labs:** Assignments are due Sunday at 11:59 p.m. MT.

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<thead>
<tr>
<th>Week #</th>
<th>Readings</th>
<th>Assignments</th>
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<tr>
<td>1</td>
<td>Chapters 5-7 &amp; 16 in <em>Foundations of Earth Science</em></td>
<td>Discussion (25 points)</td>
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<td></td>
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<td>Open Exercise (0 points)</td>
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<td></td>
<td>Mastery Exercise (10 points)</td>
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<td>Lab Exercise (20 points)</td>
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<tr>
<td>2</td>
<td>Chapters 1, 2 &amp; 8 in <em>Foundations of Earth Science</em></td>
<td>Discussion (25 points)</td>
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<td>Open Exercise (0 points)</td>
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<td>Mastery Exercise (10 points)</td>
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<td>Lab Exercise (30 points)</td>
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<td>Critical Thinking (50 points)</td>
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### Assignment Details

This course includes the following assignments/projects:

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<th>Module</th>
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<tr>
<td><strong>Module 1</strong></td>
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**Lab Exercise 1: The Scientific Process (20 points)**

**Section 1 – Scientific Method**

Part 1. Please answer the following questions in your own words.

1. Explain each of the basic steps of the scientific process.
2. Describe the difference between a hypothesis and a theory?
3. Define empirical data. Provide and describe an example of something about Earth that we know because of empirical data.
4. You have observed that the sun rises in a different location at certain times of the year, and then back again. Describe a method of data collection that would help you define the range over the year for the sunrise on the horizon at your location.
5. Using empirical data, argue with a climate denial argument that, “it hasn’t warmed since 1998.”

6. Identify and describe one type of data collection that has an end, and one type of data collection that will always be ongoing.

Part 2. There has been very much in the news in recent years about increasing CO2 levels, and climate change. Using the Keeling Curve website (https://scripps.ucsd.edu/programs/keelingcurve/), address the following.

1. Explain briefly the history of the Keeling Curve.
2. Explain how this is empirical data.
3. Starting with the current week, and working back to 800,000 years ago, explain the trends seen in the data.
4. How is the Keeling Curve an example of the scientific method?

Part 3. In your own field of study, identify and describe one way in which empirical data is collected and used.

Section 2 – Earthquakes, Geologic Structures, and Plate Tectonics

Part 1. Use your textbook and interactive lab lecture to answer the following questions about earthquake measurement.

1. Use figure 6.20, page 184 in your textbook to help you fill in the blanks:

<table>
<thead>
<tr>
<th>S-P, sec</th>
<th>Magnitude</th>
<th>Amplitude mm</th>
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<tbody>
<tr>
<td>4</td>
<td></td>
<td>5</td>
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<tr>
<td>8</td>
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<td></td>
<td>5.5</td>
<td>100</td>
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<td>2</td>
<td>20</td>
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2. The Pacific plate is moving at an average of 5 cm per year. Use the following schematic to calculate the age of:
   a. Midway Island
   b. Kanmu Seamount
   c. Meiji Seamount
   d. Oahu Island.
3. Given that the hotspot does not move, suggest a reason for the kink in the Hawaii-Emperor Chain.
4. Describe the difference between the Mercalli Scale and Richter Scale.
5. How many times more ground shaking happens with a 6.0 earthquake over a 4.0 earthquake?
6. How many times more energy is released with a 6.0 over a 4.0 earthquake?
7. Describe the P waves, S waves, and surface waves.

Part 2. Use your textbook and interactive lab lecture to answer the following questions in your own words.

1. In a compressional regime, would we find more normal or more reverse faults, and why.
2. Would we find normal faults in a compressional regime or tensional regime, and why?
3. Describe the differences between a normal fault and a reverse fault.
4. Describe the differences between anticlines and synclines.
5. Describe the difference in the rock unit age relationship between domes and basins.
6. Describe a strike slip fault. Provide an example of one.
7. Which of these structures are the result of brittle deformation?
8. Which of these structures are the result of ductile deformation?
9. Using the diagrams below, which of these are the result of ductile deformation?
10. Which of these diagrams are brittle deformation?
11. Identify the type of fault or fold in each of the diagrams below.
Lab Exercise: The Scientific Process (20 points)

Module 2

Lab Module 2: Mineral and Rock Identification Lab; Geologic Time (40 points)

Part 1: Mineral and Rock Identification

In this part of the lab, you will identify the minerals and rocks included in your Mineral and Rock boxes. Use the provided identification guide to assist you. You will create a list of the minerals and rocks identified by number, and explain the properties and characteristics of the sample that allowed you to identify that sample. 15 minerals, and 15 rocks, 5 of each rock type. You will choose from the following:

- Calcite
- Feldspar - Microcline
- Fluorite
- Graphite
- Gypsum - Alabaster
- Gypsum - Satin Spar
- Gypsum - Selenite
- Halite
- Hematite
- Magnetite
- Mica - Biotite
- Mica - Muscovite
- Milky Quartz
- Pyrite
- Talc

Igneous Rocks
- Basalt
- Granite
- Obsidian
- Pumice
- Rhyolite
Sedimentary Rocks
- Calcareous Tufa
- Conglomerate
- Limestone
- Sandstone
- Shale

Metamorphic Rocks
- Gneiss
- Marble
- Quartzite
- Schist
- Slate

http://www.hometrainingtools.com/mineral-study-kit
http://www.hometrainingtools.com/rock-study-kit

Answer the following questions:

1. Explain the rock cycle.
2. What did you find the most useful property to identify your minerals?
3. What was different about the components of your conglomerate and granite?
4. What was similar between your limestone and marble?
5. What was different between your sandstone and quartzite?
6. Describe the differences between the conglomerate, sandstone, and shale.
7. What is similar and what is different about your granite and gneiss?

Part 2: Geologic time

Relative dating methods:

Using the diagram below, and the rules of relative dating, answer the following questions.

1. Which unit was being deposited when the fault happened?
2. Explain why the funny line between units 3 and 4 is a disconformity, and not an angular unconformity.
3. Hypothetically, if the trees and ground at the top were covered by the ocean, and deposition resumed, what type of unconformity would be above unit 12, and why?
4. Would unit 11 likely to be present when the fault happened? Why or why not?
5. Explain why units 1-5 were not deposited in this position.
6. In some areas, faults are known to act as a petroleum trap. If unit 2 has oil, and unit 3 is shale, what part of unit 2 would you drill into, above or below the fault, and why?
Radiometric dating:

Answer the following questions.

1. In order to ascertain useful dates on rock units to help determine the age of major events. Your mission is to date what is thought to be a very old fossil with a volcanic ash layer immediately above the fossil. We do know the fossil is at least more than 300 million years old. Should we use carbon 14 to date the fossil, or uranium 238 to date the volcanic ash layer, and why?

2. We find samples of an igneous rock demonstrate it has been through 3 half-lives. The test element has a half-life of 300 million years. How old is the rock?

3. If the parent isotope starts with 100 grams, but your samples yield only 6.25 grams of the parent isotope, how many half-lives have passed?

4. What unstable isotope would be best to refine the date of bones found in a cave hearth built by humans between 20,000 and 40,000 years ago?

5. Argue with the following: A stone tool fashioned from a chunk of obsidian yields a date of 3,000,000 years old, therefore, the tool was made by a human 3,000,000 years ago.

CRITICAL THINKING ASSIGNMENT (50 points)
Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

Option #1: Evaluating Earthquakes

Go to the USGS daily earthquake list and note the day and time you looked up the information. In the upper, right hand corner of the page, you will see an icon that looks like a wheel or gear. Click on it and select 7-days, 2.5+ Worldwide. Answer the following questions in complete sentences and paragraphs based on 7 days, worldwide (use zoom feature to zoom in or out). Your responses should demonstrate critical thinking. Provide justification for your analysis:

• How many earthquakes are listed on this map?
• How many earthquakes are over 6.0 over the week? How many between 4.5 and 6.0 over the week? Where was the largest?
• What country outside the U.S. or its territories had the most earthquakes during this time? Provide details.
• Where was the most recent earthquake over 4.5? What magnitude was it? How deep was it? Is this shallow, intermediate, or deep? Explain the type of plate boundary it was near. Why are earthquakes common to this area?
• Where was the deepest earthquake during the week? On what type of boundary was this?
Where was the most recent earthquake closest to you? Include the name of the city and state you reside in (or country if outside of the United States). Was it associated with a boundary?

Was there any relationship between the plate boundary where the largest, most numerous and deepest earthquakes occurred? Based on your knowledge of earthquakes, is this what you would have expected from that type of boundary(ies)? Be sure to explain your answer fully.

Using a map of the plate boundary types, which type of boundary has the most earthquakes on this list?

Put the settings on 7 days, 4.5+ worldwide. Find a region where there is a high concentration of earthquakes. What country(ies) are nearby? What type of boundary are the quakes on?

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

It is strongly recommended that you submit all assignments to the TurnItIn Originality Check prior to submitting the assignment to your instructor for grading. If you are uncertain how to submit an assignment to TurnItIn, please review the TurnItIn Originality Check—Student Guide for step-by-step instructions.

Option #2: Earthquakes and Society

Major earthquake and volcano eruptions have occurred long before there were humans on Earth. However, there have been many in recorded history that significantly impacted human civilization. Choose one significantly important earthquake or volcano and report on it. Be sure to cover how it affected the Earth, damages and death tolls, economic impact and any permanent consequences.

Along what type of plate boundary did this earthquake occur? Based on your knowledge of earthquakes, is this what you would have expected from that type of boundary? Be sure to explain your answer fully.

Deliverables:
Upon completion of this assignment, you are required to provide the following deliverables to your instructor:

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
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Module 3

Lab Exercise: Topographic and Geologic Lab (20 points)

Please note: maps are large, so it is recommended you use a computer, rather than a tablet, to work this lab. Use the maps linked below:

- Lake Wales, FL
- Blakley Island, WA
- Cordova, AK
- Lake McBride, KS
- Geologic Map, KY
- Geologic Map Jefferson, CO
Topographic Map of Lake Wales, FL

General Map Questions—use the border areas to answer the following questions.

1. What is the scale of this map?
2. What is the contour interval of this map?
3. Observe the numbers at each corner of the map area. At each corner is a longitude and latitude number. Explain how you can tell which is which.
4. On the bottom margin, there are two arrows together. One is geographic north, and the other is magnetic north. Suggest a reason why this would be included on this map.
5. Why is there purple on this map?
6. What is the date of this map?
7. At each corner, and midway through each of the sides of the map, there is a place name in parentheses. What do these represent?
8. This map is based on the 1929 datum (sea level). What major information would be altered if this was based on 2010 datum?
9. Which township and ranges are partly covered by this map?

Specific map questions—to be answered by information inside the map area.

1. What is the gradient between the bench mark at the north end if Iron Mountain and Mountain Lake?
2. What is the highest elevation on this map?
3. What are all those very round features with multiple hachured contour lines?
4. What is the elevation of Lake Pierce?

Blakely Island, WA

1. What is the highest elevation of Decatur Island?
2. What is the northern latitude of this map?
3. What is the elevation difference between Blakely Peak and Horseshoe Lake?
4. What is the funny line that is dashed with spots that wiggles through Blakely Island?
5. By what route does water move out of Horseshoe Lake to Lopez Sound?

Cordova, AK

1. What is the morphology of Copper River south of Miles Lake?
2. What glacial feature is Nelson Bay?
3. What is the contour interval of this map?
4. What is all the white on this map?
5. Going north up the Copper River, there are several areas of purple next to some of the glaciers. What could this represent?

Lake McBride/Lake Scott, KS

1. What direction is Ladder Creek flowing?
2. Identify at least 3 ways to determine the direction of flow of Ladder Creek.
3. What is the drainage pattern on this map?
4. What is the elevation difference between the top of Morgan Draw to Ladder Creek?

Geologic Map, KY
1. Observe the elevations of the color changes in Kentucky on this map. What does this suggest about the attitude (orientation) of the rock units?
2. What is the oldest rock unit shown on this map?
3. What does the yellow indicate on this map?
4. What direction does the Ohio River flow on this map?

Geologic Map Jefferson, CO

1. What is the age of the unit in the middle of the syncline?
2. What type of fault is the Williams Range—Elkhorn Fault?
3. Are there any Paleozoic units on this map? If so, what are they?
4. In what section of this map are the Jurassic age units?
5. Are the units in the middle of the anticline older or younger than the units in the middle of the syncline?
6. What direction does Deadman Gulch flow?
7. Someone told you the Morrison Formation had dinosaur bones, so you decide to check it out. Where on this map would you go to hunt for them?

Geologic Map Yavapai, AZ

1. What is different about the attitude of the unit at Big Bug Mesa, compared to the other units around it?
2. Towards the NW corner of the map, there is a bright green unit labelled as smb. What type of fold is here?
3. This is an old map. There are some units shown as ‘Age relationship unknown.’ How can we determine what the ages of these units are?
4. Going by the cross section, what is the orientation of the Chaparral Fault?
5. Which unit on this map has the steepest slope?
6. What is the age of the Yavapai Series?

Your paper should meet the following requirements:

- 3-4 pages in length
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CRITICAL THINKING ASSIGNMENT (40 points)
Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

Option #1: Landscapes
Weathering and erosion are very closely related topics. Describe how these two processes can shape the landscape and be sure to provide examples. You may choose to discuss an individual form of weathering and erosion or concentrate on a given area such as deserts, glaciated areas, or river systems and the forms of weathering and erosion that occur there.

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
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Option #2: Mining

Mining for minerals and rocks is a very common, often lucrative, business across the world. Find out what minerals and/or rocks are mined in your area and why. (If you choose a common element, like aluminum or lithium, be sure to identify what minerals or rocks these are found in to be mined.) Be sure to include the characteristics of the rocks or minerals, method of mining operation, what the minerals are used for, and the economics associated with their collection.

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

Module 4

Lab Exercise: Water Use (20 points)

Locate a dripping water faucet (or set a faucet to drip). Collect the water that drips from the faucet over a selected period of time (in a container sufficient to hold the water). Calculate the amount of water (in gallons) lost per unit time. Calculate how much water would be lost in one year from this drip.

1. Determine the cost of water per thousand gallons of water (from local water board or a water bill). Calculate the cost of the drip per year from the information you have.
2. Determine the amount and cost of the water you use in taking your shower regularly. You will need to set the shower faucet as you normally do. Record the time in minutes it takes you to shower, determine the amount of water used (by catching it and measuring it somehow) in one minute, and then calculate the gallons used, the cost per shower, and the cost year using the procedure outlined above for the dripping faucet.
3. Next, you are to compare the amount of water used by taking your regular shower vs. the amount of water consumed in taking a “military shower” (alternately turn the water off and on to save as much water as you can).
4. Calculate the savings of water and cost for one year to take your regular shower vs. a military shower.
5. Calculate the flow rate of your kitchen sink per minute. Estimate how many minutes the faucet might be on over the course of one day. How much water would you estimate goes straight from tap to drain?
6. How many toilets are in your home? Are any of them low-flow toilets? Suggest a way to make a low-flow toilet out of a regular-flow toilet.
7. Identify at least three ways in which you can decrease water use anywhere in the home.
8. Assuming a use of 10,000 gallons per month per household, estimate how much water must be available to support your local town population?
9. What is the source(s) of your local water supply?
10. Are there any pollution issues with this water source?

Deliverables:
You will submit a properly formatted paper for this lab. Please submit a discussion of your experience with this activity including a description of the data that you gathered, all of the calculations that you performed and answers to the questions. Please include a data log or table of all of the data that you collected and include all calculations.
Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

It is strongly recommended that you submit all assignments to the Turnitin Originality Check prior to submitting the assignment to your instructor for grading. If you are uncertain how to submit an assignment to Turnitin, please review the Turnitin Originality Check—Student Guide for step-by-step instructions.

Module 5

CRITICAL THINKING ASSIGNMENT (50 points)
Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

Option #1: Coastlines

The coastlines of the world are constantly being impacted by waves, currents and tides. Choose your favorite coastline (or least favorite) and describe how it is affected by those factors. How might these factors affect the coastline as sea level rises? You should include introductory information about how those processes are formed.

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

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Option #2: Oceanic Impacts

Humans have been utilizing the ocean for millennia, but also causing problems in the oceans. Choose one of these negative issues, such as overfishing, plastic trash, marine dumping, habitat destruction, acidification, dead zones, or other, and describe what the problem is, how humans caused the problem, where the problem is, and how is it destructive. Suggest possible solutions for this problem.

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

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Module 6

Lab Exercise: Analyzing and Mapping Historic Weather Data (30 points)

For this lab, you will analyze weather data for one city or region over a 50-year period. You will use Microsoft Excel to create a spreadsheet and graph.
1. Using the following website, select a city or region. http://www.ncdc.noaa.gov/cag/time-series/us
2. In the attached spreadsheet, record the high annual temperatures, low annual temperatures, and the annual precipitation since 1965.
3. Determine the average for the 50-year period (see instruction attachment for help) for each variable.
4. Determine the difference from the 50-year average for each year.
5. Create a graph for the difference.
6. In a Word document, explain your assessment of the differences from 1965 to 2015 for each of the three variables.

Answer the following questions:

1. View the animation at http://apod.nasa.gov/apod/ap130731.html. Assess the differences from 1884 to 2011. What areas of the world seem to have changed the most?
2. How has it changed in your part of the world?
3. Review the anomaly map at https://www.ncdc.noaa.gov/sotc/global/201513. Choose one anomaly outside the US and explain the situation, when, where, and why it was abnormal.
4. In your birthplace, where ever in the world it is, briefly describe the major weather anomalies in the past decade.

Attach both the Microsoft Word and Excel files in the assignment area.

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

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CRITICAL THINKING ASSIGNMENT (50 points)
Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

**Option #1: Atmosphere and Clouds**


Compare current CO2 levels to the concentrations from the past 450,000 years. Based on these websites and the textbook, answer the following questions:

- Explain how the carbon cycle works.
- What is the current CO2 concentration in parts per million (ppm)?
- How does this compare to the highs or lows over the past 450,000 years?
- What are the three most abundant sources from which humans add CO2 to the atmosphere?
- Explain the two main natural carbon sinks that remove CO2 from the atmosphere.
- Explain in detail two ways deforestation contributes to the increase in CO2 levels.
- What are some other greenhouse gases, and how do their concentrations compare to the past 450,000 years?
Based on the data, are humans contributing to climate change, or is it strictly a natural part of the cycle? Defend your answer. You must weigh all of the data, and use them to formulate your conclusion.

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

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Option #2: Weather Disasters

Like earthquake and volcano eruptions, major hurricanes and tornadoes have occurred long before there were humans on Earth. Choose one hurricane or tornado that significantly impacted humans and report on it. Be sure to cover how it affected the Earth, damages and death tolls, economic impact and any permanent consequences.

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

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Module 7

Lab Exercise: Atmospheric Heating (30 points)

We will construct a model of the earth’s surface/atmosphere to explore how energy drives weather.

Read Chapter 11 of the textbook.

Part 1. Please answer the following questions in your own words:

1. Explain the water cycle.
2. What is dew point?
3. Which source would evaporate faster, lake water or groundwater, and why?
4. How do plants contribute to moisture in the air?
5. Climatically, what can happen to a region when there is heavy loss of forestland?
6. How is water vapor removed from the air?

Materials:

1. Three clear glass jars or drinking glasses
2. Three small plates or bowls to be a ‘lid’ on top of the jar or drinking glass
3. Chilled water, room temperature water, and hot tap water
4. Ice

Procedure:

1. In one jar, put chilled water to fill about ⅔ of the jar.
2. In the second jar, put room temperature water to fill about ¼ of the jar.
3. In the second jar, put hot tap water to fill about ¼ of the jar.
4. Cover jars with the plate or bowl with ice.
5. Monitor the inside of the jars every ten minutes until the water temp in all jars is similar; make note of any changes you see.

Answer the following questions:

1. How long did it take for moisture to accumulate on the inside of any of the jars, and which one was first?
2. Did you observe any ‘rain’ in any of the jars, and if so, which jar(s)? If not, suggest a reason why not.
3. What parts of Planet Earth might each of these jars mimic?
4. Explain how the evaporation and condensation processes are at work in this experiment.

Part 2. In this experiment you will observe how entrapped water moves from land to the atmosphere, and determine how weather conditions affect this movement.

Materials:

1. (4) one-gallon size zipper baggies
2. 6 cups of dirt (sand, soil, potting soil, whatever is available)
3. 3 cups of room temperature water
4. 3 small twigs with leaves off a living plant
5. Tape

Procedure:

1. Place about 2 cups of dirt into 3 separate baggies.
2. Place 2 cups of water in one bag, and 1 cup of water in a second bag.
3. Place the three leafy twigs in the third bag. Seal each bag.
4. Place the last bag over a leafy part of a living plant; use tape to prevent moisture leaving the bag.
5. Place the three bags with dirt in a warm area, either in the sun, a sunny window, heat lamp, or heater vent for 8 hours, monitoring every 2 hours.
6. Record the type of soil used, and the ambient temperature for all bags.
7. Observe and record any changes to each bag every 2 hours.

Answer the following questions:

1. Report your observations of this experiment.
2. Explain how this experiment relates to drought conditions.
3. What would happen if you increased the ambient temperature? What would happen if you decreased the ambient temperature?
4. Compare what you found between the twig bag and the taped bag around the living branch? Were these the results you were expecting? Why or why not?
5. Explain how you could set up a terrarium to account for the following; evaporation, condensation, precipitation, runoff, infiltration, and percolation.

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

It is strongly recommended that you submit all assignments to the TurnItIn Originality Check prior to submitting the assignment to your instructor for grading. If you are uncertain how to submit an assignment to TurnItIn, please review the TurnItIn Originality Check—Student Guide for step-by-step instructions.
Module 8

Lab Exercise: Light, Stars, and the Solar System Lab (30 points)

Please follow the instructions to construct a refractometer and answer the corresponding questions. The instructions below describe how to build a spectroscope. Here is a link if you wish to view the site where the instructions are from: https://www.youtube.com/watch?v=sVWWDevUtIs http://sci-toys.com/scitoys/scitoys/light/cd_spectroscope/spectroscope.html

Part 1. How to Make a Spectroscope

What you will need:

1. A CD or DVD that can be sacrificed to this project. Old software CDROMs work great.
2. A cereal box. Any size that can hold a CD or DVD disk will do.
3. A sharp knife or razor blade to cut into the cereal box.

Our spectroscope has three main parts. There is a slit made from a razor blade to make a path for the light, a diffraction grating made from a CD disk, and a viewing port.

To construct your spectroscope, you need to put a slice in one side of the box at roughly a 30-degree angle. This will hold the CD. Place the CD in the slot to determine where to place the other two cuts. On the top of the box, cut a hole about half an inch to an inch square above the CD. On the side opposite the CD, make a very narrow slit opposite the CD. Alternatively, you can cut a larger slit and cover it with 2 pieces of foil to control the size of the slit. Spectroscope complete.

Once you have assembled your spectroscope with the instructions in the lecture and above, use it to examine the spectra of three different light sources. Make sure that at least one of them is the sun or moon, but the others can be incandescent lights, compact fluorescent bulbs, LED lights, halogen or xenon bulbs, televisions, computer screens, candles, fireplaces, for example. Aim the slit towards the light source you are investigating, then look through the viewing hole to see the spectrum on the disk.

Answer the following questions:

1. Describe the differences in appearance among the three spectra, including colors, if they are blended together or separated, and fuzzy or distinct.
2. What feature of the light source do the spectra represent? In other words, what is it that you are actually analyzing?
3. Why do you think spectrometers are so valuable for studying celestial objects?

Part 2. Estimating the Number of Visible Stars in the Night Sky

For this, you will need an empty toilet roll and a clear, dark night. Before you start, jot down the number of stars that you think you can see in the night sky.

Aim your toilet roll at a part of the sky well above the horizon to avoid any haze pollution. Hold your roll steady and allow your eyes to get used to the light for a few seconds.

Count the number of stars that you can see within through the roll. Do this four more times in other parts of the sky, and average the five counts.

The viewing diameter of a toilet roll is about 1/135th of the entire sky, at least for a relatively flat area. Mountains, buildings, or large trees will obscure some of the sky. To determine the number of visible stars, multiply your average by 135.
Answer the following questions:

4. What is the average number of stars you observed through the toilet paper roll?
5. How similar is this number to your original estimation?
6. What percentage of our galaxy do you think we can see with the naked eye from Earth?

Part 3. Solar System

Review Chapter 15 on Atmospheres of the Planets.

Answer the following questions:

7. Why do you think that the inner planets are relatively close together, but the outer planets are spaced so widely apart?
8. Why do you think that the gaseous planets are gaseous, but the inner planets are not?

Your paper should meet the following requirements:

- 3-4 pages in length
- 1-2 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

It is strongly recommended that you submit all assignments to the TurnItIn Originality Check prior to submitting the assignment to your instructor for grading. If you are uncertain how to submit an assignment to TurnItIn, please review the TurnItIn Originality Check—Student Guide for step-by-step instructions.

PORTFOLIO PROJECT (350 points)
Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

Option #1: Weather Anomalies

We will be discussing atmosphere and weather in Modules 6 and 7. Choose a weather anomaly, such as El Nino and La Nina, climate change, hurricanes, tornadoes, floods, drought, heat waves, ice storms, or other. Be sure to define them, compare them to normal conditions and discuss the consequences of each. Include the economic impact damage to the Earth, and any long term consequences. If applicable, include the way that volcanoes, meteorite impacts, ice cap size fluctuation, or nuclear explosions might change them as well.

Your final paper should meet the following requirements:

- 8-10 pages in length (Does not include title page, reference page, images, diagrams, charts, or graphs.)
- 8-10 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

Option #2: Geologic Processes

Planet Earth has many processes that affect the surface where we live. Choose a process such as earthquakes, volcanoes, plate tectonics, weathering and erosion, mass wasting, stream processes, coastal processes, compare desert and glacial landscapes and their processes, or other. Explain how the processes work, causes and effects, and long-term impacts to the Earth. Include problems it poses to humans, economic impacts, and mitigation efforts. Provide real life examples.
Your final paper should meet the following requirements:

- 8-10 pages in length (Does not include title page, reference page, images, diagrams, charts, or graphs.)
- 8-10 outside sources
- Formatted according to the CSU-Global Guide to Writing and APA Requirements.

Course Policies

Course Grading

20% Discussion Participation
0% Opening Exercises
8% Mastery Exercises
19% Critical Thinking Assignments
18% Labs
35% Final Portfolio Project

Grading Scale and Policies

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In-Classroom Policies
For information on late work and incomplete grade policies, please refer to our In-Classroom Student Policies and Guidelines or the Academic Catalog for comprehensive documentation of CSU-Global institutional policies.

Academic Integrity
Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /re-purposing your own work (see CSU-Global Guide to Writing and APA Requirements for percentage of repurposed work that can be used in an assignment), unauthorized possession of academic materials, and unauthorized collaboration. The CSU-Global Library provides information on how students can avoid plagiarism by understanding what it is and how to use the Library and Internet resources.

Citing Sources with APA Style
All students are expected to follow the CSU-Global Guide to Writing and APA Requirements when citing in APA (based on the APA Style Manual, 6th edition) for all assignments. For details on CSU-Global APA style, please review the APA resources within the CSU-Global Library under the “APA Guide & Resources” link. A link to this document should also be provided within most assignment descriptions in your course.

Disability Services Statement
CSU–Global is committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Disability Resource Coordinator at 720-279-0650 and/or email ada@CSUGlobal.edu for additional information to coordinate reasonable accommodations for students with documented disabilities.

Netiquette
Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom.

If you have concerns about something that has been said, please let your instructor know.