Colorado State University GLOBAL CAMPUS

BIO121: ENVIRONMENTAL CONSERVATION

Credit Hours: 3

Contact Hours: This is a three-credit course, offered in accelerated format. This means that 16 weeks of material is covered in eight 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:

Environmental Conservation explores concepts in ecology and conservation biology. It starts with an introduction to ecosystems and the importance of biodiversity, then dives into different threats the environment is facing with a focus on the role of humans in creating and preventing those threats. Personal impacts on the environment and ways to reduce them are also explored. This is an approved gtPathways course. Appendix A, located at the end of this syllabus, reviews the gtPathways coverage for this GT-SC2 course.

Course Overview:

Welcome to BIO121: Environmental Conservation! This course starts by introducing the fundamental environmental challenge of our time: human population growth. An opening project, which runs for five weeks, will challenge you to calculate your ecological, carbon, and water footprints and pursue actions aimed at reducing them. The course next provides you with a foundation in ecology, focusing on ecosystems, the importance of biodiversity, and how all organisms are connected. Major issues facing the environment, including climate change, pollution, habitat loss, energy use, and food consumption are addressed. Assessments, such as discussions and assignments, will ask you to analyze topics by exploring threats, creating hypotheses about them, and determining the data needed to assess their impact, or synthesizing the material covered and exploring a specific aspect of it, often with a focus on an area or species of particular interest to you. Focus then moves on to the players involved in creating and helping mitigate these threats and how your own actions affect the environment. The final Portfolio Project pulls together elements from different modules, focusing on an environmental topic of your choice, in which you will implement an action that will have a positive effect on the environment to help remedy an issue associated with your topic. Data are required to show the effect of the action with a discussion of how continued implementation of the change might impact the environment.

Course Learning Outcomes:
1. Describe how interconnected organisms on Earth are.
2. Analyze the causes of threats facing the natural environment.
3. Compare the effects of different solutions to environmental threats.
4. Assess the role humans play in threats to the environment and their solutions.

5. Analyze personal impacts on the environment and ways to reduce that impact.

COLORADO GTPATHWAYS

Colorado Guaranteed Transfer (GT) Pathways Course: The Colorado Commission on Higher Education has approved BIO121: Environmental Conservation for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-SC2 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to http://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html

The table in **Appendix A** details the specific alignment of Course Learning Outcomes and Assessments to gtPathways Content and Criteria requirements.

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 seven days of this course may result in your withdrawal. If for some reason you would like to drop a course, 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

Required:

Miller, G.T., & Spoolman, S. (2019). *Environmental science* (16th ed.). Pacific Grove, CA: Brooks/Cole.

NOTE: All non-textbook required readings and materials necessary to complete assignments, discussions, and/or supplemental or required exercises are provided within the course itself. Please read through each course module carefully.

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 at 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:** Assignments are due Sunday at 11:59 p.m. MT.

WEEKLY READING AND ASSIGNMENT DETAILS

Module 1

Readings
- Chapter 1 in *Environmental Science,* pages 2-18 (through "People are Increasingly Isolated from Nature")
- Chapter 5 in *Environmental Science,* section 5.3 only (pp. 97-101)
- Chapter 6 in *Environmental Science*
- Chapter 11 in *Environmental Science* ("Water Use is Increasing, pp. 264-265, only)
- Population Reference Bureau. (n.d.). Human population: Population growth. *Population Reference Bureau.* Retrieved from http://www.prb.org/Publications/Lesson-Plans/HumanPopulation/PopulationGrowth.aspx

Recommended Readings

- Alexander, J. S., Gopalaswamy, A. M., Shi, K., Hughes, J., & Riordan, P. (2016). Patterns of snow leopard site use in an increasingly human-dominated landscape. *Plos ONE*, *11*(5), 1-15. doi:10.1371/journal.pone.0155309
- Laurance, W. F., Campbell, M. J., Alamgir, M., & Mahmoud, M. I. (2017). Road expansion and the fate of Africa's tropical forests. *Frontiers in Ecology and Evolution*, *5*, 75.

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Critical Thinking (70 points)

Option #1 Population Trends in Developed and Developing Nations

Developing countries tend to grow at a much faster rate than developed countries. Much effort has gone into reducing this growth rate, not always with much success. For this exercise, download the 2018 factsheet from the Population Reference Bureau. The population data tables begin on page 8 of the document. Locate the column labeled *Rate of Natural Increase (%)*, which is the fourth from the left. Choose two nations from somewhere in these data tables: one with a **rate of natural increase below 0.2%** (a nation with little to no population growth, or possibly even population decline if the number is negative), and one with a **rate of natural increase above 2%** (a nation with rapid population growth). In your paper, consider the differences between the two nations. What might account for the dramatic discrepancy in their population growth rates? What might be the long-term impacts on the environment of continued rapid population growth in the developing nation? What policies or programs might that nation adopt to reduce population growth?

In your paper you should:
- Provide basic demographic data on the two nations that you are comparing (current population, population growth rate in percent, net migration rate, and projected population by 2050).
- Identify the major challenges facing the developing nation you selected by 2050 as a result of its continued rapid population growth.

- Imagine that a population growth expert from the developed nation you have chosen visits the developing country you have selected. Based on the developed nation's successful curbing of population growth, propose at least two policies or programs that the developing nation might implement to lower its growth rate.

Requirements:
- Your written paper should be 3-4 pages, not counting the title and reference pages, which you must include.
- Your paper should be in standard essay format, including an Introduction with thesis statement (central argument of paper), body, and conclusion (including restatement of the thesis).
- You need to cite at least three sources for this assignment, outside of the textbook. The CSU-Global Library is a great place to find resources.
- Your paper must be formatted according to CSU-Global Guide to Writing & APA requirements.

If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Option #2: Population Trends in Developed and Developing Nations PowerPoint

Developing countries tend to grow at a much faster rate than developed countries. Much effort has gone into reducing this growth rate, not always with much success. For this exercise, download the 2018 factsheet from the Population Reference Bureau. The population data tables begin on page 8 of the document. Locate the column labeled *Rate of Natural Increase (%)*, which is the fourth from the left. Choose two nations from somewhere in these data tables: one with a **rate of natural increase below 0.2%** (a nation with little to no population growth, or possibly even population decline if the number is negative), and one with a **rate of natural increase above 2%** (a nation with rapid population growth). In your PowerPoint presentation, consider the differences between the two nations. What might account for the dramatic discrepancy in their population growth rates? What might be the long-term impacts on the environment of continued rapid population growth in the developing nation? What policies or programs might that nation adopt to reduce population growth?

In your PowerPoint presentation, you should:
- Provide basic demographic data on the two nations that you are comparing (current population, population growth rate in percent, net migration rate, and projected population by 2050).
- Identify the major challenges facing the developing nation you selected by 2050 as a result of its continued rapid population growth.
- Imagine that a population growth expert from the developed nation you have chosen visits the developing country you have selected. Based on the developed nation's successful curbing of population growth, propose at least two policies or programs that the developing nation might implement to lower its growth rate.

Requirements:
- Your PowerPoint should be approximately 10-12 slides, not counting the title and reference slides, which you must include.
- Slides should include appropriate visual elements, cited in your references.
- Slides should include bullet points highlighting key ideas. Use speaker notes or a separate Word document for the details on each slide.
- You need to cite at least three sources for this assignment, outside of the textbook. The CSU-Global Library is a great place to find resources.

If you need assistance with your presentation text writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Journal (5 pts)

In a journal post of at least one full page, reflect on what you have learned in class this week. What surprised you? What fascinated you? What did you find disconcerting or troubling in some way? Looking ahead to the topics in the next week of class, what are you particularly curious about? In your journal submission, you should also include your list of five ideas for reducing the size of your ecological, carbon, and/or water footprints that you will be implementing in the coming weeks. Write in clear, complete sentences in well-crafted paragraphs. It is not necessary to include any outside sources, but if you choose to do so, follow APA format for your citations and references.

Module 2

Readings

· Chapters 3 & 4 in *Environmental Science*
· Whitman, M. (2016). Maintaining biodiversity: Native plants do provide critical ecosystem services. *Wild Ones Journal*, *29*(1), 1.

Recommended Readings

· Chapter 5 in *Environmental Science*
· Johnson, C. N., Balmford, A., Brook, B. W., Buettel, J. C., Galetti, M., Lei, G. C., & Wilmshurst, J. M. (2017). Biodiversity losses and conservation responses in the Anthropocene. *Science*, *356*(6335), 270-274. Retrieved from https://science.sciencemag.org/content/356/6335/270.full

Opening Exercise (0 points)

Discussion (25 points)

Journal (5 points)

Mastery Exercise (10 points)

Critical Thinking Assignment (70 points)

Option #1: Threats to Biodiversity: U.S. vs. Developing Countries

Although species extinctions are part of the evolutionary process, current extinction rates are much greater than at any time in the last several million years. Current extinction rates are about 2,500 times the background rate at which species have disappeared due to evolution—that is approximately two species lost in every hour of every day! To address this issue, we need to recognize the major threats to biodiversity.

Many human activities threaten biodiversity either directly or indirectly, and virtually all current extinctions are due to human activities. While a myriad of threats potentially undermines biodiversity, each species faces its own specific suite of threats. Moreover, species in different regions of the world are more prone to some threats than others. If we are to mitigate these threats, we must first understand what specifically is threatening biological diversity in a particular region.

The World Conservation Union (IUCN) maintains a list of imperiled and extinct species, known as the Red List of Threatened Species. The list can help us to understand just what threatens biodiversity around the world. In this exercise, you will obtain a list of threatened species for your country and then contrast the causes of species imperilment in your country with that in the world at large. From this

assessment, you will develop an understanding of the primary threats to biodiversity both locally and globally.

There are a variety of reasons why species become threatened with extinction. Threats to biodiversity are often grouped into five basic categories: ecosystem loss, unsustainable (human) use, invasive species, pollution, and climate change. Note that these are very general classes of threats. The IUCN provides a far more detailed breakdown of threats, which is available on their website (see "Threats authority file" at the bottom of the search screen). Become familiar with these categories.

In your paper, answer the following questions:
- What are the major threats to wild species in the United States?
- What are the major threats to species in the developing nation you have selected?
- Based upon your threat rankings, are there any noteworthy differences between the two lists of threats? What might account for these differences?
- Based upon the results of your analysis of threats to species in the United States, what conservation actions would you recommend to prevent future species extinctions? Suggest at least two specific steps that might be taken, and why they might be effective.
- Based upon the results of your analysis of threats to species in the developing country you selected, what conservation actions would you recommend to prevent future species extinctions? Suggest at least two specific steps that might be taken, and why they might be effective.

How to Complete this Assignment
To answer these questions, you will repeatedly query the IUCN database using different search criteria. Each search will enable you to determine the number of species in a particular region that are facing a particular threat. You will compare your results to determine if there is any evidence of differences in the importance of each threat in your country versus globally. Lastly, you will interpret and make inferences about the relative importance of each threat at the scale of your country versus globally.

Step 1. Searching the IUCN database

Go to: http://www.iucnredlist.org/ and choose "Search" (you can do an "Expert search" but start with a basic search for now.)

Look over all the search criteria. You can query this database by Red List category (or species status), Country, Region of the World, Marine Region of the World, Major Habitat Type, and/or Major Threat Type. This is an extraordinary database for analyzing patterns of threats to biological diversity around the world.

Under "**Select one or more countries,**" choose the United States.

Under "**Major threat types**" you can limit your search to particular threats to species or select one or more threats. Because we are interested in general classes of threats, you should search the major categories one at a time. So, start with: 1. **Habitat Loss/Degradation (human induced)**. This will select all those species at risk from any type of human-induced habitat loss or degradation. Then select "Search."

Step 2. Interpreting the results of the search

You will now see a list of species that meet the search criteria you have selected, that is, that occur in the U.S. and are threatened by habitat loss and degradation. Because we want to contrast threats by region, you are primarily interested in tallying the total number of species that were located by the search (see top of results screen, e.g., "Viewing results 1 to 50 of 162"). Record the total.

Step 3. Performing the remaining searches for the United States.

You want to obtain and record the total number of species in the United States facing different threats. So, repeat the search process nine more times, changing the threat category each time. Use the following 10 categories:

1. Habitat Loss/Degradation [human induced]
2. Invasive Alien Species [directly affecting the species]
3. Harvesting [hunting/gathering]
4. Accidental Mortality
5. Persecution
6. Pollution [affecting habitat and/or species]
7. Natural Disasters
8. Changes in Native Species Dynamics
9. Intrinsic Factors
10. Human Disturbance

Record the total number of species for each threat category. Then rank the different categories from 1 to 10, with 1 being the biggest threat and 10 being the least significant one. Use the following table to organize the data:

IUCN Threat Category	United States	Ranking	Developing Nation	Ranking
Habitat Loss/Degradation				
Invasive Alien Species				
Harvesting				
Accidental Mortality				
Persecution				
Pollution				
Natural Disasters				
Changes in Species Dynamics				
Intrinsic Factors				
Human Disturbance				
Total species				

Step 4. Comparing With Developing Nations

Repeat steps 1 to 3 but now for "Select one or more countries," choose a developing country. A list of developing nations as of 2018 can be found here. On the IUCN Threat Table, replace the words "Developing Country" with the name of the one you chose. Record totals for each major category of threat, as you did for the United States. Rank the different categories from 1 to 10, with 1 being the biggest threat and 10 being the least significant one.

Requirements:

- Your written paper should be 3-4 pages, not counting the title and reference pages, which you must include. It also does not include any visual elements, such as tables, diagrams or photographs.
- You need to cite at least three sources for this assignment, outside of the textbook. The CSU-Global Library is a great place to find resources.
- Your paper must be formatted according to CSU-Global Guide to Writing & APA requirements.
- If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Note

This assignment was modified from:

Gibbs, J.P. (2004). Threats to global biodiversity: Local versus global perspectives. Retrieved from https://ncep.amnh.org/index.php/Detail/DownloadRepresentation/representation_id/422/object_id/409/download/1/version/original

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Option #2: Threats to Biodiversity: Comparative Analysis of Two Countries

Although species extinctions are part of the evolutionary process, current extinction rates are much greater than at any time in the last several million years. Current extinction rates are about 2,500 times the background rate at which species have disappeared due to evolution—that is approximately two species lost in every hour of every day! To address this issue, we need to recognize the major threats to biodiversity.

Many human activities threaten biodiversity either directly or indirectly, and virtually all, current extinctions are due to human activities. While a myriad of threats potentially undermines biodiversity, each species faces its own specific suite of threats. Moreover, species in different regions of the world are more prone to some threats than others. If we are to mitigate these threats, we must first understand what specifically is threatening biological diversity in a particular region.
The World Conservation Union (IUCN) maintains a list of imperiled and extinct species, known as the Red List of Threatened Species. The list can help us to understand just what threatens biodiversity around the world. In this exercise, you will obtain a list of threatened species for your country and then contrast the causes of species imperilment in your country with that in the world at large. From this assessment, you will develop an understanding of the primary threats to biodiversity both locally and globally.

There are a variety of reasons why species become threatened with extinction. Threats to biodiversity are often grouped into five basic categories: ecosystem loss, unsustainable (human) use, invasive species, pollution, and climate change. Note that these are very general classes of threats. The IUCN provides a far more detailed breakdown of threats, which is available on their website (see "Threats authority file" at the bottom of the search screen). Become familiar with these categories.

In your paper, answer the following questions:
- Which two countries did you select to compare for this assignment, and why did you choose them?
- What are the major threats to wild species in the two different countries that you selected?
- Based upon your threat rankings, are there any noteworthy differences between the two lists of threats? What might account for these differences?

- Based upon the results of your analysis of threats to species in each of the countries, what conservation actions would you recommend to prevent future species extinctions? Suggest at least two specific steps that might be taken **for each country**, and why they might be effective.

How to Complete this Assignment

To answer these questions, you will repeatedly query the IUCN database using different search criteria. Each search will enable you to determine the number of species in a particular region that are facing a particular threat. You will compare your results to determine if there is any evidence of differences in the importance of each threat in your country versus globally. Lastly, you will interpret make inferences about the relative importance of each threat at the scale of your country versus globally.

Step 1. Searching the IUCN database

Go to: http://www.iucnredlist.org/ and choose "Search" (you can do an "Expert search" but start with a basic search for now.)
Look over all the search criteria. You can query this database by Red List category (or species status), Country, Region of the World, Marine Region of the World, Major Habitat Type, and/or Major Threat Type. This is an extraordinary database for analyzing patterns of threats to biological diversity around the world.

Under "**Select one or more countries,**" choose your first country.

Under "**Major threat types**" you can limit your search to particular threats to species or select one or more threats. Because we are interested in general classes of threats, you should search the major categories one at a time. So, start with: 1. **Habitat Loss/Degradation (Human Induced)**. This will select all those species at risk from any type of human-induced habitat loss or degradation. Then select "Search."

Step 2. Interpreting the results of the search

You will now see a list of species that meet the search criteria you have selected, that is, that occur in your chosen country and are threatened by habitat loss and degradation. Because we want to contrast threats by region, you are primarily interested in tallying the total number of species that were located by the search (see top of results screen, e.g., "Viewing results 1 to 50 of 162"). Record the total.

Step 3. Performing the remaining searches for the United States.

You want to obtain and record the total number of species in your chosen country facing different threats. So, repeat the search process nine more times, changing the threat category each time. Use the following ten categories:
1. Habitat Loss/Degradation [human induced]
2. Invasive Alien Species [directly affecting the species]
3. Harvesting [hunting/gathering]
4. Accidental Mortality
5. Persecution
6. Pollution [affecting habitat and/or species]
7. Natural Disasters
8. Changes in Native Species Dynamics
9. Intrinsic Factors
10. Human Disturbance

Record the total number of species for each threat category. Then rank the different categories from 1 to 10, with 1 being the biggest threat and 10 being the least significant one. Use the following table to organize the data:

IUCN Threat Category	Your First Country	Ranking	Your Second Country	Ranking
Habitat Loss/Degradation				
Invasive Alien Species				
Harvesting				
Accidental Mortality				
Persecution				
Pollution				
Natural Disasters				
Changes in Species Dynamics				
Intrinsic Factors				
Human Disturbance				
Total species				

Step 4. Comparing With Another Country

Repeat Steps 1 to 3 but now for "Select one or more countries," choose a different country to investigate. Record totals for each major category of threat, as you did for the first country. Rank the different categories from 1 to 10, with 1 being the biggest threat and 10 being the least significant one. Requirements:

- Your written paper should be 3-4 pages, not counting the title and reference pages, which you must include. It also does not include any visual elements, such as tables, diagrams or photographs
- You need to cite at least three sources for this assignment, outside of the textbook. The CSU-Global Library is a great place to find resources.
- Your paper must be formatted according to *CSU-Global Guide to Writing & APA* requirements.
- If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Note
This assignment was modified from:
Gibbs, J.P. (2004). Threats to global biodiversity: Local versus global perspectives. Retrieved from https://ncep.amnh.org/index.php/Detail/DownloadRepresentation/representation_id/422/object_id/409/download/1/version/original

Journal (5 pts)

In a journal post of at least one full page, reflect on what you have learned in class this week. What surprised you? What fascinated you? What did you find disconcerting or troubling in some way? Looking ahead to the topics in the next week of class, what are you particularly curious about? Finally, mention progress you have made this week, if any, toward the Portfolio Project due in Module 8. Write in clear, complete sentences in well-crafted paragraphs. It is not necessary to include any outside sources, but if you choose to do so, follow APA format for your citations and references.

Module 3

Readings

· Chapters 7 & 15 in *Environmental Science*
· TED.com. (n.d.). Introductory essay. *TED Environmental Studies.* Retrieved from https://www.ted.com/read/ted-studies/environmental-studies/introductory-essay.

Recommended Readings

· Pecl, G. T., Araújo, M. B., Bell, J. D., Blanchard, J., Bonebrake, T. C., Chen, I. C., Clark, T. D., Colwell, R. K., Danielsen, F., Evengard, B., & Robinson, S. A. (2017). Biodiversity redistribution under climate change: Impacts on ecosystems and human well-being. *Science*, *355*(6332), eaai9214. Retrieved from https://science.sciencemag.org/content/355/6332/eaai9214
· Thom, D., Rammer, W., Dirnböck, T., Müller, J., Kobler, J., Katzensteiner, K., Helm, N., & Seidl, R. (2017). The impacts of climate change and disturbance on spatio-temporal trajectories of biodiversity in a temperate forest landscape. *Journal of Applied Ecology*, *54*(1), 28-38. Retrieved from https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2664.12644

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Critical Thinking Assignment (70 points)

Option #1: Solutions to Climate Change

Climate change is an environmental problem occurring on an immense scale extending to every natural area on Earth. Solutions have been presented to help stop climate change. Will they actually work? What could we do to help them? In this assignment research one concrete step that might be taken in order to mitigate climate change then write a paper covering the following:

1. Summarize the effects of climate change on global environments.
2. Present your specific solution to climate change and how it would work.
3. Present your hypothesis describing the exact impacts of your solution that may be observed and how that impact could be assessed. What data would need to be gathered and what would you expect things to look like to indicate that the solution is working?
4. What issues might prevent the solution from working? Will it work everywhere? Are there modifications that could be made to make it work better?
5. How can *you* help make the solution work?

Requirements:
· Your written paper should be 2-3 pages, not counting the title and reference pages, which you must include.
· You need to cite at least two sources for this assignment, outside of the textbook. The CSU-Global Library is a great place to find resources.
· Your paper must be formatted according to *CSU-Global Guide to Writing & APA* requirements.

If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Option #2: Climate Change around the World

The effects of climate change can be seen even in the far reaches of Antarctica. What are some of the effects being observed? How can we stop them? For this paper choose a location. It can be a country, a

state, a county, or even a city. Research the effects climate change is causing on that location. How are plants and animals impacted? How are humans impacted? Write a paper covering the following:

1. Summarize the general impacts of climate change on global environments.
2. Introduce your location by describing the climate, geography, species, and people who live there.
3. Discuss the issues this location is experiencing due to climate change. Are sea levels rising? What effects do the issues have on the environment? How are local species affected by that?
4. Is anything being done to reduce the impacts of climate change in your chosen location? Do you think the solutions will work? How could you assess the impact of one of them? Present a hypothesis describing the exact impacts that may be observed and how those impacts could be assessed. What data would need to be gathered? What would you expect it to look like to indicate the solution is working?
5. How can you help reduce the effects of climate change? Even if you are not focused on a local place your actions can make an impact!

Requirements:
- Your written paper should be 2-3 pages, not counting the title and reference pages, which you must include.
- You need to cite at least 2 sources for this assignment, outside of the textbook. The CSU-Global Library is a great place to find resources.
- Your paper must be formatted according to *CSU-Global Guide to Writing & APA* requirements.

If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Portfolio Project Milestone (50 points)

Option #1: Helping Save a Species

Define Your Project

After reading both of the Portfolio options, you need to choose which one you will complete. For Portfolio Option #1, submit a short (1- to 2-page) essay about your selection. In the essay, you should:

- Identify the species that you propose to use for your project
- Discuss some of the threats currently facing this species in the wild
- Explain why you chose this species
- Name and briefly discuss at least one non-government organization working to safeguard this species
- Propose two possible actions that you might take that would benefit this species in some way. Note how that action would aid your species.

This assignment will also be submitted for peer review in Week 4, in addition to instructor evaluation.

Option #2: Helping Save a Natural Area

Define Your Project

After reading both of the portfolio options, you need to choose which one you will complete. For Portfolio Option #2, submit a short (1-2 pages) essay about your selection. In the essay, you should

- Identify the local natural area that you propose to use for your project
- Discuss some of the threats currently facing area

- Explain why you chose this area
- Identify and briefly discuss the organization currently managing this natural area
- Propose two possible actions that you might take that would benefit this area in some way. Note how that action would aid your chosen area.

This assignment will also be submitted for peer review in Week 4, in addition to instructor evaluation.

Journal (5 pts)

In a journal post of at least one full page, reflect on what you have learned in class this week. What surprised you? What fascinated you? What did you find disconcerting or troubling in some way? Looking ahead to the topics in the next week of class, what are you particularly curious about? Finally, mention progress you have made this week, if any, toward the Portfolio Project due in Module 8. Write in clear, complete sentences in well-crafted paragraphs. It is not necessary to include any outside sources, but if you choose to do so, follow APA format for your citations and references.

Module 4

Readings

- Chapter 8 - section 8.3 only (pp. 173-184) in *Environmental Science*
- Chapter 11 - section 11.4 to end of chapter (pp. 280-299) in *Environmental Science*
- Chapter 16 in *Environmental Science*

Recommended Readings

- Avio, C. G., Gorbi, S., & Regoli, F. (2017). Plastics and microplastics in the oceans: From emerging pollutants to emerged threat. *Marine Environmental Research*, *128*, 2-11.
- Wilting, H. C., Schipper, A. M., Bakkenes, M., Meijer, J. R., & Huijbregts, M. A. (2017). Quantifying biodiversity losses due to human consumption: A global-scale footprint analysis. *Environmental Science & Technology*, *51*(6), 3298-3306.

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Peer Review for Portfolio Project (30 pts)

In this activity, you will be asked to review the Module 3 Portfolio Milestone of three of your fellow students. Please complete the rubrics and provide detailed, individualized feedback, following the process described here. The total of the three scores each student receives will be his or her final score on that assignment.

Instructors have the right to discard a review they feel lacks integrity and, if necessary, award a grade of their own choosing.

Journal (5 pts)

In a journal post of at least one full page, reflect on what you have learned in class this week. What surprised you? What fascinated you? What did you find disconcerting or troubling in some way? Looking ahead to the topics in the next week of class, what are you particularly curious about? Finally, mention progress you have made this week, if any, toward the Portfolio Project due in Module 8. Write in clear, complete sentences in well-crafted paragraphs. It is not necessary to include any outside sources, but if you choose to do so, follow APA format for your citations and references.

Be sure to review the Portfolio Project description and Portfolio Project rubric in the Module 8 folder for details.

Module 5

Readings

·   Chapters 10 & 13 in *Environmental Science*

Recommended Readings

·   Clark, M., & Tilman, D. (2017). Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. *Environmental Research Letters*, *12*(6), 064016. Retrieved from https://iopscience.iop.org/article/10.1088/1748-9326/aa6cd5/meta

·   Nica, E., Manole, C., & Potcovaru, A. (2016). Environmentally sustainable economic growth, energy use, and CO_2 emissions in China. *Economics, Management and Financial Markets, 11*(2), 101-107.

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Critical Thinking Assignment (70 points)

Option #1: Approaching Zero Waste

Household waste production has a large impact on the environment. Much of it ends up in landfills, while some of it ends up in rivers and oceans. And the more we consume, the more raw materials we use, and the more habitats are polluted or even destroyed in the process of extracting those materials. In this paper you will investigate the concept of achieving a zero-waste lifestyle. Begin by viewing view these three short videos on reducing waste: *Disposability Consciousness*; *Two Adults, Two Kids, Zero Waste | Bea Johnson | TEDxFoggyBottom*; and The Business Logic of Sustainability \ Ray Anderson \ TED.

Write a paper addressing the following questions:

1.   Do you think it is possible for anyone to achieve a truly zero-waste lifestyle? Why or why not?
2.   What are some fundamental shifts in consciousness—in the way we think about our consumption and waste production—that would have to change on the path toward such a lifestyle?
3.   What do you see as some of the easiest steps one could make toward reducing waste production in the home?
4.   What do you consider to be the greatest obstacles to reaching zero waste, and why? What are some methods of tackling those obstacles?
5.   Do you think that you and your household would ever be able to reach zero waste? Why or why not?
6.   Looking beyond the home, do you think that corporations can attain zero waste? What are some of the pros and cons a company might consider before pursuing that goal?
7.   Can humans live sustainably on Earth and still produce waste? Why or why not?

Requirements:
•   Your written paper should be 3-4 pages, not counting the title and reference pages, which you must include.

- You need to cite at least four sources for this assignment, outside of the textbook. The CSU-Global Library is a great place to find resources.
- Your paper must be formatted according to CSU-Global Guide to Writing & APA requirements.

If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Option #2: Approaching Zero-Carbon Energy Production

In the Ecological Footprint Reduction Project that concluded this week, you may have taken steps to conserve energy. While it is certainly the case that the less conventional energy we use, the less carbon we tend to emit into the atmosphere, we aren't going to achieve zero carbon emissions from energy production until we stop burning fossil fuels altogether. We are still a long way from that; as you can see from this table of U.S. energy production by source, in 2018, 62.9% of the nation's energy still came from burning coal, oil, and natural gas. Given this situation, and the urgency of our global need to curb greenhouse gas emissions soon, what should we do from here? In your paper, propose **one action** that you feel would make the biggest impact toward realizing a zero-carbon energy future. That action might involve government at some level (national, state, local) and/or non-government organizations, and/or communities, and/or individuals. Provide a detailed plan for how that action might be accomplished most readily. Note any obstacles that might need to be overcome along the way, and how that might be done. Support your ideas with credible and/or scholarly sources.

Requirements:
- Your written paper should be 3-4 pages, not counting the title and reference pages, which you must include.
- You need to cite at least four sources for this assignment, outside of the textbook. The CSU-Global Library is a great place to find resources.
- Your paper must be formatted according to CSU-Global Guide to Writing & APA requirements.

If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Journal (5 pts)

In a journal post of at least one full page, reflect on what you have learned in class this week. What surprised you? What fascinated you? What did you find disconcerting or troubling in some way? Looking ahead to the topics in the next week of class, what are you particularly curious about? Finally, mention progress you have made this week, if any, toward the Portfolio Project due in Module 8. Write in clear, complete sentences in well-crafted paragraphs. It is not necessary to include any outside sources, but if you choose to do so, follow APA format for your citations and references.

Module 6

Readings
- Chapter 1 in "Differing Environmental Worldviews" (p. 18) only in *Environmental Science*
- Chapters 8 & 9 in *Environmental Science*

Recommended Readings
- Hinton, J. W., Brzeski, K. E., Rabon, D. R., & Chamberlain, M. J. (2017). Effects of anthropogenic mortality on critically endangered red wolf Canis rufus breeding pairs: Implications for red wolf recovery. *Oryx, 51*(1), 174-181.

· Stabach, J. A., Rabeil, T., Turmine, V., Wacher, T., Mueller, T., & Leimgruber, P. (2017). On the brink of extinction—Habitat selection of addax and dorcas gazelle across the Tin Toumma desert, Niger. *Diversity and Distributions*, *23*(6), 581-591.

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Critical Thinking Assignment (70 points)

Option #1: Annotated Bibliography

The end of class will be here soon. It is time to take some additional steps toward completing your Portfolio Project. For this option, create an annotated bibliography with at least 10 references that you will use in your paper and two images you may use in your presentation. You can use any source you would like, but at least five of them must be from peer-reviewed journals.

References:
For each reference provide the following information:
- State what kind of resource it is (e.g., peer-reviewed journal article, magazine article, website, or Ted Talk) and why you think it is a reliable source of information.
- Describe why you chose the resource.
- Discuss how you will use it in your paper.

Images:
For the images make sure you are not infringing on copyright. Use your own photos, or something available through creative commons. Provide the following information:
- A complete reference for the image in APA formatting.
- A description of how the image would be used in your presentation.

Follow APA format according to *CSU-Global Guide to Writing & APA* requirements. Include a title page, but you will not need a separate reference page. Simply put your annotations about each reference below the reference.

Requirements:
- Include a title page, but you will not need a separate reference page. Simply put your annotations about each reference below the reference.
- Your paper must be formatted according to CSU-Global Guide to Writing & APA requirements.

If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Option #2: Outline with references

For this option create a detailed outline of your paper. Include at least five references and two images that you will use in your pamphlet. You can use any source you would like, but try to stick to journal articles as much as possible. You will need at least 10 references in your final paper, and five of those must come from peer-reviewed journals.

Create the outline subdividing it by sections that correspond to each of the sections defined in the Portfolio paper instructions. Within each section list what you will cover and include your references where appropriate.

Insert images either at the end, or within the outline where they would be useful. Make sure you are not infringing on copyright with the use of images. Use your own photos, or something available through creative commons. Include a complete reference in the references section for each image.

Requirements:
- Include a title page, but you will not need a separate reference page. Simply put your annotations about each reference below the reference.
- Your paper must be formatted according to CSU-Global Guide to Writing & APA requirements.

If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Journal (5 pts)

In a journal post of at least one full page, reflect on what you have learned in class this week. What surprised you? What fascinated you? What did you find disconcerting or troubling in some way? Looking ahead to the topics in the next week of class, what are you particularly curious about? Finally, mention progress you have made this week, if any, toward the Portfolio Project due in Module 8. Write in clear, complete sentences in well-crafted paragraphs. It is not necessary to include any outside sources, but if you choose to do so, follow APA format for your citations and references.

Module 7

Readings

- Cooney, R., Roe, D., Dublin, H., Phelps, J., Wilkie, D., Keane, A., Travers, H., Skinner, D., Challender, D., Allan, J., & Biggs, D. (2017). From poachers to protectors: Engaging local communities in solutions to illegal wildlife trade. *Conservation Letters*, *10*(3), 367-374. Retrieved from https://onlinelibrary.wiley.com/doi/pdf/10.1111/conl.12294
- Fernández-Gil, A., Naves, J., Ordiz, A., Quevedo, M., Revilla, E., & Delibes, M. (2016). Conflict misleads large carnivore management and conservation: Brown bears and wolves in Spain. *Plos ONE*, *11*(3), 1-13.
- Wang, W., Liu, J., Kozak, R., Jin, M., & Innes, J. (2018). How do conservation and the tourism industry affect local livelihoods? A comparative study of two nature reserves in China. *Sustainability*, *10*(6), 1925.

Recommended Readings

- Cao, S., Shang, D., Yue, H., & Ma, H. (2017). A win-win strategy for ecological restoration and biodiversity conservation in Southern China. *Environmental Research Letters*, *12*(4), 044004. Retrieved from https://iopscience.iop.org/article/10.1088/1748-9326/aa650c/meta
- Shafie, N. J., Sah, S. A. M., Mutalib, A. H. A., & Fadzly, N. (2017). General perceptions and awareness level among local residents in Penang Island toward bats conservation efforts. *Tropical Life Sciences Research*, *28*(2), 31. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5584835/

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Journal (5 pts)

In a journal post of at least one full page, reflect on what you have learned in class this week. What surprised you? What fascinated you? What did you find disconcerting or troubling in some way? Looking ahead to the topics in the next week of class, what are you particularly curious about? Finally, mention

progress you have made this week, if any, toward the Portfolio Project due in Module Eight. Please write in clear, complete sentences in well-crafted paragraphs. t is not necessary to include any outside sources, but if you choose to do so, please follow APA format for your citations and references.

Module 8

Readings

·   Chapter 17 in *Environmental Science*

Recommended Readings

·   Dahlmann, F., Branicki, L., & Brammer, S. (2017). Managing carbon aspirations: The influence of corporate climate change targets on environmental performance. *Journal of Business Ethics*, 1-24. Retrieved from https://link.springer.com/article/10.1007/s10551-017-3731-z

·   Islam, M. M., Shamsuzzaman, M. M., Mozumder, M. M. H., Xiangmin, X., Ming, Y., & Jewel, M. A. S. (2017). Exploitation and conservation of coastal and marine fisheries in Bangladesh: Do the fishery laws matter? *Marine Policy*, *76*, 143-151.

Opening Exercise (0 points)

Discussion (25 points)

Mastery Exercise (10 points)

Portfolio Project (250 points)

Option #1: Helping Save a Species Paper and Presentation (250 points)

Paper (135 points)

Conservation is an interdisciplinary subject where everyday actions of humans have an impact on species in foreign countries. To help solve these impacts it is important to understand how our actions affect the environment. For this Portfolio option you will choose one species that you want to ensure will be around for many generations. It can be any plant or animal naturally found in the wild (i.e., no humans, domestic cats, or domestic dogs). You will produce a paper about the threats your chosen species is facing and how we can help overcome them. You will also create a presentation that you could use to spread the word about the issues your species is facing and encourage people to help them. Your paper will address the following elements:

1. Describe your species, including where they are found, what they eat, who eats them, and how they interact with humans.
2. Discuss the IUCN Red List status of your species (is it endangered?) and research the threats to its survival. Use the IUCN Red List (http://www.iucnredlist.org/) as one of your sources for this section.
3. Describe the threats facing your species and how these threats affect other species as well. Are humans or organizations one of the threats?
4. Discuss solutions to the threats facing your species. What solutions have been presented by people in the field? What solutions can your think of based on what you know?
5. Initiate contact with one person knowledgeable about the species. This could be a university scientist, or perhaps a researcher at a non-profit working to protect the species. In your interview (via email or phone or in person), ask the person to share about what threats the species faces, why it is important to conserve the species, and what actions he or she would recommend to those eager to help with the conservation effort. Document your interview with a transcript or summary paragraph in an appendix page at the end of your paper.
6. Choose two ways you can help save your species. These might be the ideas suggested to you by the researcher, or could be other approaches you came up with on your own. Try them out

during part or all of the last three weeks of the course and record data to show how your changes had or did not have an impact. Help an organization working to protect the species (ideally, volunteer to do something, instead of just sending money). Launch a social media campaign about the status of your species. If the species is local, educate your community in some way about the species. Make a lifestyle change that will benefit the species—just make sure it is not one of the five steps you already took in your footprint-reduction project. What else can you think of to do? Whatever actions you take, you will need to figure out a way to gauge whether or not they were effective to any degree.

Then address the following:

1. Discuss why you chose the method to help that you did and how it went.
2. Present the data you collected from before and after the change to show the impact your change had.
3. Is this something you could continue to do? What would be the impact on the environment if you did continue to implement this change?

Requirements:

- Your written paper should be 6-8 pages, not counting the title and reference pages, which you must include.
- You need to cite at least three sources for this assignment, outside of the textbook. One of these sources must come from academic journals. The CSU-Global Library is a great place to find resources.
- Your paper must be formatted according to *CSU-Global Guide to Writing & APA* requirements.
- If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Class Presentation (100 points)

In addition to the paper you also need to prepare a brief presentation (approximately 3-5 minutes) about your project to deliver to the class in Module 8. This presentation could take the form of a video recording, a PowerPoint presentation, or an audio recording with accompanying visual elements. If you have another idea beyond these, email your instructor to obtain approval for that delivery method. You will need to upload your presentation by midnight on Thursday of Module 8.

Portfolio Project Presentation Discussion (15 points)

Upload your completed Portfolio Project PowerPoints in the Portfolio Project Presentation Discussion thread.

By Sunday of this week, respond to three or more of your classmates in one of postings in any of the following ways:

- Build on something your classmate said
- Explain why and how you see things differently
- Ask a probing or clarifying question
- Share an insight from having viewed your classmate's presentation
- Offer and support an opinion
- Expand on some facet your classmate's presentation

Refer to the Portfolio Project Presentation Discussion rubric for details on how this will be evaluated.

Portfolio Option #2: Helping Save a Natural Area

Paper (135 points)

Conservation is an interdisciplinary subject where everyday actions of humans have an impact on environments around the world. To help solve these impacts it is important to understand how our actions affect the environment. For this Portfolio option your will choose a local natural area that you want to ensure will be around for many generations. It can be a park (national, state, county, municipal) or other protected land (e.g., Nature Conservancy site). You will produce a paper about the threats your natural area is facing and how we can help overcome them, as well as document two specific actions that you have taken. You will also create a presentation sharing your project with the other members of this class. Your paper will address the following elements:

1. Describe your natural area including what species live there, the climate is like, the geography, and the role of humans in your natural area.
2. Discuss the threats facing your natural area. Is climate change causing problems there? Is there a problem with habitat loss? Is pollution causing problems? What else affects your area?
3. Describe how these threats facing your area affect other natural areas as well. Are the threats strictly local ones or do other places experience them as well?
4. Discuss solutions to the threats facing your natural area. What solutions have been presented by others? What solutions can you think of based on what you know?
5. Initiate contact with one person knowledgeable about the natural area. Your best bet would me someone working for the organization currently managing the site. If it is a state park, for instance, see if you can talk to the park naturalist or perhaps even the park manager. In your interview (via email or phone or in person), ask the person to share about what threats the natural area faces, why it is important to conserve the natural area, and what actions he or she would recommend to those eager to help with the conservation effort. Document your interview with a transcript or summary paragraph in an appendix page at the end of your paper.
6. Choose two different ways you could help to protect your natural area. These could be ideas suggested during your interview in the previous step, or could be ideas you came up with on your own. Note that any activities at the natural area that involve any interventions beyond picking up litter should first be approved by agency managing the site. Try the two ways out during part or all of the last three weeks of the course, and record data to show whether or not your actions had an impact. Collect trash there. Volunteer to weed out invasive plants in the natural area, or perhaps lead community walks there to raise awareness of the dangers it faces. You might also consider lifestyle changes that might benefit the park in some way; just make sure that whatever you do does not repeat one of the five actions you took for the footprint-reduction project. What else can you think of to do? Whatever actions you take, you will need to figure out a way to gauge whether or not they were effective to any degree.

Then address the following:
1. Discuss why you chose the method to help that you did and how it went.
2. Present the data you collected from before and after the change to show the impact your change had.
3. Is this something you could continue to do? What would be the impact on the environment if you did continue to implement this change?

Requirements:
- Your written paper should be 6-8 pages, not counting the title and reference pages, which you must include.
- You need to cite at least three sources for this assignment, outside of the textbook. One of these sources must come from academic journals. The CSU-Global Library is a great place to find resources.
- Your paper must be formatted according to *CSU-Global Guide to Writing & APA* requirements.

If you need assistance with your writing style, start with the links under the Research Help and Writing Help tabs on the CSU-Global Library's homepage.

Class Presentation (100 points)
In addition to the paper you also need to prepare a brief presentation (approximately 3-5 minutes) about your project to deliver to the class in Week 8. This presentation could take the form of a video recording, a PowerPoint presentation, or an audio recording with accompanying visual elements. If you have another idea beyond these, email your instructor to obtain approval for that delivery method. You will need to upload your presentation by midnight on Thursday of Module 8. You should also upload your presentation to the Portfolio Project location in the gradebook.

Portfolio Project Presentation Discussion (15 points)

Upload your completed Portfolio Project PowerPoints in the Portfolio Project Presentation Discussion thread.

By Sunday of this week, respond to three or more of your classmates in one of postings in any of the following ways:
- Build on something your classmate said
- Explain why and how you see things differently
- Ask a probing or clarifying question
- Share an insight from having viewed your classmate's presentation
- Offer and support an opinion
- Expand on some facet your classmate's presentation

Refer to the Portfolio Project Discussion rubric for details on how this will be evaluated.

Journal (5 pts)

In this final journal post of at least one full page, reflect on your overall experience in this course. What has surprised you? What hast fascinated you? What have you found disconcerting or troubling in some way? Looking ahead to the future beyond this course, do you plan to continue with any of the lifestyle changes or other actions that you took in this course? Has your outlook on the environment changed as a result of taking this class? If so, in what way(s)? Write in clear, complete sentences in well-crafted paragraphs. It is not necessary to include any outside sources, but if you choose to do so, follow APA format for your citations and references.

Grading Scale	
A	95.0 - 100
A-	90.0 - 94.9
B+	86.7 - 89.9
B	83.3 - 86.6
B-	80.0 - 83.2
C+	75.0 - 79.9
C	70.0 - 74.9
D	60.0 - 69.9
F	59.9 or below

Course Grading

18.5% Discussion Participation
3%   Journal
4.5%   Peer Review
8%   Mastery Exercises
36%   Critical Thinking Assignments
30%   Final Portfolio Project

IN-CLASSROOM POLICIES

For information on late work and incomplete grade policies, 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 /repurposing your own work (see CSU-Global Guide to Writing & APA 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 & APA* when citing in APA (based on the most recent APA style manual) for all assignments. A link to this guide 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, let your instructor know.

APPENDIX A

Colorado General Transfer Pathways Alignment

Course Learning Outcomes	GT Pathways Competencies & Content Criteria	Assessment Methods
CLO1. Describe how interconnected organisms on Earth are.	**CC1a. Develop foundational knowledge in specific field(s) of science.**	**CC1a.** The module 1 critical thinking assignment helps form foundational knowledge in ecology by asking students to explore different types of diversity or environmental factors that could contribute to speciation.
	CC1c. Demonstrate the ability to use scientific methodologies.	**CC1c.** In the module 1 critical thinking assignment students are asked to either plan a way to perform an assessment or to actually perform an assessment of diversity found in the environment. They create an idea, form a hypothesis, plan the data collection, and then either collect data or predict what the data would look like, and form a conclusion.
	CC1d. Examine quantitative approaches to study natural phenomena.	**CC1d.** In the module 1 critical thinking assignment students are asked to collect data or predict the data that would be collected and create a table about environmental factors that influence diversity.
	IA5b. Utilize multiple representations to interpret the data.	**IA5b.** In the module 1 critical thinking assignment students are asked to collect data or predict the data that would be collected about environmental factors that influence diversity, and create a table to depict it. They are also asked questions about the data to discuss it.
	IA6a. State a conclusion based on findings.	**IA6a.** In the module 1 critical thinking assignment students explore diversity in the environment and form conclusions about the importance of diversity.
	QL1a. Explain information presented in mathematical	

| | forms (e.g., equations, graphs, diagrams, tables, words). | **QL1a**. In the module 1 critical thinking assignment students are asked to collect data or predict the data that would be collected about environmental factors that influence diversity, and create a table to depict it. They are also asked questions about the data to discuss it. |

CLO2. Analyze the causes of threats facing the natural environment.	**CC1a. Develop foundational knowledge in specific field(s) of science.**	**CC1a.** The module 3 discussion and critical thinking assignments explore climate change, including what causes it and how to decrease our impact. The discussion in module 4 explores how pollution and habitat loss affect species in the wild.
	IA4a. Select or develop elements of the methodology or theoretical framework to solve problems in a given discipline.	**IA4a.** The module 3 critical thinking assignment explores the implications of climate change and ways to reduce the impact it has on the environment. The module 4 discussion asks students to research a species of interest and post the issues contributing to habitat loss or pollution in the species' habitat to assess similarities in what causes habitat loss and pollution for different environments.
	QL2a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).	**QL2a.** In the module 1 critical thinking assignment students are asked to collect data or predict the data that would be collected about environmental factors that influence diversity, and create a table to depict it. They are also asked questions about the data to discuss it.

CLO2. Analyze the causes of threats facing the natural environment.

CC1a. Develop foundational knowledge in specific field(s) of science.

CC1a. The module 3 discussion and critical

CLO3. Compare and contrast the effects of solutions to environmental threats.	CC1a. Develop foundational knowledge in specific field(s) of science.	CC1a. The module 5 critical thinking assignment focuses on the impact energy use and different types of food production processes have on the environment and how to decrease that impact.
	CC1b. Develop an understanding of the nature and process of science. CC1c. Demonstrate the ability to use scientific methodologies.	CC1b, CC1c. In the module 2 critical thinking assignment students explore human population growth and are asked to design a test to assess the impact of a solution to population growth. They are asked to provide a hypothesis, what data would be needed to assess it, and what the results might look like.

CC1b, CC1c. In the module 3 critical thinking assignment students explore climate change and are asked to design a test to assess the impact of a solution to it. They are asked to provide a hypothesis, what data would be needed to assess it, and what the results might look like. |
| | IA5a. Examine evidence to identify patterns, differences, similarities, limitations, and/or implications related to the focus. | IA5a. The module 6 discussion asks students to explore the implications of their action on the environment by identifying something they can do to help reduce their impact. |

CLO4. Assess the role humans play in threats to the environment and their solutions.	**CC1a. Develop foundational knowledge in specific field(s) of science.**	**CC1a.** The module 7 discussion focuses on the importance of getting local people involved in conservation efforts to have a sustainable plan.
	IA5a. Examine evidence to identify patterns, differences, similarities, limitations, and/or implications related to the focus.	**IA5a.** The module 2 discussion asks students to identify one effect of human population growth on the environment and discuss different effects with their classmates.
	IA6a. State a conclusion based on findings.	**IA6a.** In the module 7 discussion students form conclusions about why it is important to have locals involved in conservation efforts.
CLO5. Analyze personal impacts on the environment and ways to reduce that impact.	**CC1a. Develop foundational knowledge in specific field(s) of science.**	**CC1a.** The module 7 discussion focuses on the importance of getting local people involved in conservation efforts to have a sustainable plan.
	CC1d. Examine quantitative approaches to study natural phenomena.	**CC1d.** The module 5 discussion asks students to perform an assessment of their carbon footprint by inputting data about their food and energy use into a carbon footprint calculator. They can compare their level of carbon dioxide released to other families of similar size.
		CC1d. In the module 6 discussion students are asked to talk about how they plan to collect data to assess the change an environmental conservation effort they plan to implement will have.
		CC1d. The module 7 portfolio milestone and the final portfolio project ask students to implement a change in their daily routine and record data before and after the change to assess how what they did decreases their impact on the environment.
	IA5b. Utilize multiple representations to interpret the data.	**IA5b.** In the module 7 portfolio milestone students are asked to collect data about a change they made and how it affects the environment. They create a figure with the data they collect and discuss the data.

	IA6a. State a conclusion based on findings.	**IA6a.** In the portfolio project students are asked to implement a change to their routine that could impact the environment and after assessing their data, conclude whether it is effective and personally sustainable.
	QL1a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).	**QL1a.** In the module 7 portfolio milestone students are asked to collect data about a change they made and how it affects the environment. They create a figure with the data they collect and discuss the data.
	QL2a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).	**QL2a.** In the module 7 portfolio milestone students are asked to collect data about a change they made and how it affects the environment. They create a figure with the data they collect and discuss the data.

CLO – Course Learning Outcome

CC – gtPathways Content Criteria

IA – gtPathways Inquiry and Analysis Competency

QL – gtPathways Quantitative Literacy Competency

Content Criteria for Designating a Natural & Physical Sciences Course as GT Pathways:

1. The lecture content of a GT Pathways science course (GT-SC1 or GT-SC2):

Students should be able to:

    a.   Develop foundational knowledge in specific field(s) of science.

    b.   Develop an understanding of the nature and process of science.

    c.   Demonstrate the ability to use scientific methodologies.

    d.   Examine quantitative approaches to study natural phenomena.

Inquiry and Analysis Competency

4.   Select or Develop a Design Process (required for GT-SC1 & GT-SC2)

    a.   Select or develop elements of the methodology or theoretical framework to solve problems in a given

        discipline.

5. Analyze and Interpret Evidence (required for GT-SC1 & GT-SC2)

   a. Examine evidence to identify patterns, differences, similarities, limitations, and/or implications related to the focus.

   b. Utilize multiple representations to interpret the data.

6. Draw Conclusions (required for GT-SC1 & GT-SC2)

   a. State a conclusion based on findings.

Quantitative Literacy Competency

Students should be able to:

   1. Interpret Information (required for GT-MA1, GT-SC1 & GT-SC2)

      a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).

   2. Represent Information (required for GT-MA1, GT-SC1 & GT-SC2)

      a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).