MIDSTATE COLLEGE
411 W. NORTHMOOR RD. PEORIA, IL 61614
(309) 692-4092 (800) 251-4299
Summer 2016

Course: GEO 142 Environmental Issues
Credit: 6 Quarter Hours **Method of Delivery:** classroom
Course Description:
Environmental Issues is a course designed to study various ecosystems of the earth and the effects of humans on them. This course will include an introduction of the scientific method to help evaluate, interpret, and critique writings on environmental issues. Discussions will include environmental changes, their causes and effects, as well as preventative and remedial measures that may be utilized to allow humans to live harmoniously with their ecosystems.

Prerequisite: none

Text(s) & Manual(s): Essential Environment: The Science Behind the Stories 5th Edition
Author(s): Withgott, Laposta fifth edition
Publisher: Pearson, ISBN: 9780321984579

Materials needed for this course:
Textbook
Pencils or pens
Paper or notebook

Additional Supplies: (Note: This class consists of labs each week and will require extra work compared to the non-lab classes.)

No additional supplies are necessary

Hardware/Software and Equipment:
A computer with sound card, and speakers
Microsoft Office (which can be obtained from the college for your use to view and produce certain documents)
A printer only if you plan on printing out any of the documents

Topics: Environmental ethics, economics, ecosystems, ecology and evolution, population, agriculture, toxicology, atmosphere, water, conservation

Learning Objectives: Upon completion of this course, the student will be able to:
1. Describe natural resources and explain their importance to human life.
2. Explain the fundamentals of environmental economics.
3. Describe the nature of environmental systems.
4. Explain the process of natural selection, and cite evidence for this process.
5. Compare and contrast the major types of species interactions.
6. Assess the scope of human population's growth.
7. Explain the importance of soils to agriculture.
8. Characterize the scope of biodiversity on Earth.
9. Describe the scope of urbanization, and assess urban and suburban sprawl.
10. Identify the major types of environmental health hazards.

Midstate Grading scale:

90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
0 - 59	F

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In courses containing writing assignments, the College promotes the use of an electronic resource which compares the student's writing against previously submitted papers, journals, periodicals, books, and web pages. Students and instructors can use this service to reduce the incidence of plagiarism. This electronic resource has been found to conform to legal requirements for fair use and student confidentiality. It is able to provide a report to the student indicating the parts of the assignment that match.

Student Success:
The Office of Student Success is available to students seeking tutoring for individual classes or who need assistance with writing assignments. Information is also available on test taking techniques, how to take notes, developing good study skills, etc. Contact Student Success in Room 217 (in person); (309) 692-4092, extension 2170 (phone); studentsuccess@midstate.edu (email).

Instructor: Alan Paredes
Midstate email: aparedes@midstate.edu **Office Hours:** 12:00 to 1:00 Mon, Wed room 300.

Policies and Procedures: Final lab reports will be due in week twelve of the course

Attendance Requirements: Attendance required.

Participation Requirements: Participation is 5% of your grade.

Examination Information: Each exam is an individual effort. There will be three to four in class exams each worth 100 points each.

Instructor's Grading Scale:
All items are given 100 percentage point values, but the percentage or weight system below will be used with the combined scores

Total points	
• Test one	100
• Test two	100
• Test three	100
• Test four	100
• Laboratories	80
• Course Term Paper and Presentation	100
• Participation	30
Total Points	610

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RESEARCH PAPER GRADING GUIDELINES	
Statement and supporting items • Answers the minimal requirements of the question without supporting evidence = 10 point • Minimal posting (full paragraph) with less than three supporting items = 20 points • Complete (full paragraph) posting with three supporting items = 40 points	40%
Supporting statements and conclusion • Posting conclusion with no supporting statements (paragraphs) = 10 point • Supporting statements (less than three paragraphs) and no conclusion = 20 points • Complete conclusion (paragraph) with supporting statements (at least three paragraphs) = 40 points	40%
Correct spelling	10%
Correct grammar	10%
Total points for Research Paper	100%

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LAB REPORT GRADING GUIDELINES					
	(30 %)	(20 %)	(10 %)	(5 %)	(0 %)
Results (data)	Results and data are clearly recorded, organized so it is easy for the reader to see trends. All appropriate labels are included	Results are clear and labeled, trends are not obvious,	Results are unclear, missing labels, trends are not obvious at all	Results are present, though too disorganized or poorly recorded to make sense of	
Analysis	The data and observations are analyzed accurately, trends are noted, enough data was taken to establish conclusion	Analysis somewhat lacking in insight, enough data, though additional data would be more powerful	Analysis lacking in insight, not enough data was gathered to establish trends, OR analysis does not follow data	Analysis poor, not enough data, inaccurate analysis	
Conclusions	1. Summarizes the essential data used to draw conclusions 2. Conclusions follow data (not wild guesses or leaps of logic), 3. Discusses applications of experiment ("real world" connections) 4. Hypothesis is rejected or accepted based on the data.	One of the "excellent" conditions is not met	Two of the "excellent" conditions is not met	Three of the "excellent" conditions is not met	
Format			Neat, organized with headings, few spelling/grammar errors	Somewhat lacking in organization, multiple spelling/grammar errors, not neat	

All labs will be prepared as stated in the lab manual. Simply download the document, and insert the missing information.

Week One

Topics:

Natural Resources, Human Population Growth, Perception of Problems, Scientific Method, Environmental Ethics

Objectives:

The student will be able to describe natural resources and explain their importance to human life.

Assignments:

Read Chapter One and Week 1 – Lecture
Lab: Overall Lab project as outlined at the end of syllabus

Week Two

Topics:

Environmental systems, Chemistry, Energy, Biomes

Objectives:

The student will be able to describe the nature of environmental systems.

Assignments:

Read Chapter Two and Week 2 – Lecture
Lab: Overall Lab project as outlined at the end of syllabus.

Week Three

Topics:

Ecology and Evolution, Natural Selection, Population Ecology, Community Ecology

Objectives:

The student will be able to explain the process of natural selection, and cite evidence for this process.

Assignments:

Read Chapter Three and Week 3 – Lecture
Test one

Week Four

Topics:

Competition, Resource Partitioning, Preditation, Parasitism, Mutualism

Objectives:

The student will be able to compare and contrast the major types of species interactions.

Assignments:

Read Chapter four and Week 4 – Lecture
Lab: Overall lab project as outlined at the end of syllabus

Week Five

Topics:
Environmental Economics, Adam Smith, Ecosystems, U.S. and International Environmental Policy.

Objectives:
The student will be able to explain the fundamentals of environmental economics.

Assignments:
Read chapter five and Week 5 – Lecture
Lab: Overall lab project as outlined at the end of syllabus

Week Six

Topics:
No additional topics will be covered for this week
Test two

Week Seven

Topics:
Human Population, demography, Wealth and Poverty.

Objectives:
The student will be able to assess the scope of human population growth.

Assignments:
Read Chapter Six and Week 7 – Lecture
Lab: Overall lab project as outlined at the end of syllabus

Week Eight

Topics:
Soil, Agriculture, Food

Objectives:
The student will be able to explain the importance of soils to agriculture.

Assignments:
Read Chapter Seven and Week 8 – Lecture
Lab: Overall lab project as outline at the end of syllabus

Week Nine

Topics:
Biodiversity, conservation, conservation Biology.

Objectives:
The student will be able to characterize the scope of biodiversity on Earth.

Assignments:
Read chapter eight and Week 9 – Lecture
Lab: Overall lab project as outlined at the end of syllabus

Week Ten

Topics:

Environmental Health Hazards, Epidemiology, Animal Testing, Risk Assessment, Risk Management

Objectives:

The student will be able to identify the major types of environmental health hazards.

Assignments:

Read chapter ten and Week 10 – Lecture
Lab: Overall lab project as outlined at the end of the syllabus
Test Three

Week Eleven

Topics:

Cities, Forests, Parks, Land Use, Resource Management

Objectives:

The student will be able to describe the scope of urbanization, and assess urban and suburban sprawl.

Assignments:

Read chapter 18 (yes it is a jump ahead in the text!) and Week 11 – Lecture
Lab: Overall lab project as outlined at the end of the syllabus

Week Twelve

Test Four

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Lab Manuel:

1. **Title**
   The title says what you did. It should be brief (aim for ten words or less) and describe the main point of the experiment or investigation. An example of a title would be: "Effects of Ultraviolet Light on Borax Crystal Growth Rate". If you can, begin your title using a keyword rather than an article like 'The' or 'A'.
2. **Introduction / Purpose**
   Usually the Introduction is one paragraph that explains the objectives or purpose of the lab. In one sentence, state the hypothesis. Sometimes an introduction may contain background information, briefly summarize how the experiment was performed, state the findings of the experiment, and list the conclusions of the investigation. Even if you don't write a whole introduction, you need to state the purpose of the experiment, or why you did it. This would be where you state your hypothesis.
3. **Materials**
   List everything needed to complete your experiment.
4. **Procedures and Methods**
   Describe the steps you completed during your investigation. This is your procedure. Be sufficiently detailed that anyone could read this section and duplicate your experiment. Write it as if you were giving direction for someone else to do the lab. It may be helpful to provide a Figure to diagram your experimental setup.
5. **Data or Observations**
   Numerical data obtained from your procedure usually is presented as a table. Data encompasses what you recorded when you conducted the experiment. It's just the facts, not any interpretation of what they mean.
6. **Results**
   Describe in words what the data means. Sometimes the Results section is combined with the Discussion (Results & Discussion).
7. **Conclusions**
   Most of the time the conclusion is a single paragraph that sums up what happened in the experiment, whether your hypothesis was accepted or rejected, and what this means.
8. **Figures & Graphs**
   Graphs and figures must both be labeled with a descriptive title. Label the axes on a graph, being sure to include units of measurement. The independent variable is on the X-

axis. The dependent variable (the one you are measuring) is on the Y-axis. Be sure to refer to figures and graphs in the text of your report. The first figure is Figure 1, the second figure is Figure 2, etc.

LABORATORY ONE

Corn (Bean) and Salt water experiment

Introduction / Purpose

Materials

Procedures

1) Take five pots and fill with soil. Plant a bean or corn seed in each pot.
2) Wait till the bean or corn plants germinate and start to grow. Add regular tap water to each pot of water.
3) Make up five solutions.

a) First solution is just regular tap water
b) In the second solution add 0.125 grams of salt to approximately one cup of water.
c) Third solution add 0.5 grams of salt to approximately one cup of water
d) Fourth solution add 1.0 grams of salt to approximately one cup of water
e) Fifth solution add 2.00 grams of salt to approximately one cup of water

4) Add each of the solutions to one plant every two to three days and see the effect of the salt water on the plant.

OBSERVATION

	W1	W2	W3	W4	W5	W6
Pot One Control						
Pot Two						
Pot Three						
Pot Four						
Pot Five						

	W7	W8	W9	W10	W11	W12
Pot One Control						
Pot Two						
Pot Three						

Pot Four						
Pot Five						

Results

Conclusions

Questions:

What is the dependent Variable?

What is the independent Variable?

What are the control Variables?

Why did the salt inhibit growth in the plants?

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LABORATORY TWO

Corn (Bean) and Acidic water experiment

Introduction / Purpose

Materials

Procedures

1) Take five pots and fill with soil. Plant a bean or corn seed in each pot.
2) Wait till the bean or corn plants germinate and start to grow. Add regular tap water to each pot of water.
3) Make up five solutions.

a) First solution is just regular tap water
b) In the second solution add 0.1 gram of vinegar to approximately one cup of water.
c) Third solution add 0.2 grams of vinegar to approximately one cup of water
d) Fourth solution add 0.5 grams of vinegar to approximately one cup of water
e) Fifth solution add 1.0 gram of vinegar to approximately one cup of water
f) Add each of the solutions to one plant every two to three days and see the effect of the acidic water on the plant.

OBSERVATION

	W1	W2	W3	W4	W5	W6
Pot One Control						
Pot Two						
Pot Three						
Pot Four						
Pot Five						

	W7	W8	W9	W10	W11	W12
Pot One Control						
Pot Two						
Pot Three						

Pot Four						
Pot Five						

Results

Conclusions

Questions:

What is the dependent Variable?

What is the independent Variable?

What are the control Variables?

Why did the acid solution inhibit plant growth?

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LABORATORY THREE

Corn (Bean) and Alkaline water experiment

Introduction / Purpose

Materials

Procedures

1) Take five pots and fill with soil. Plant a bean or corn seed in each pot.
2) Wait till the bean plants germinate and start to grow. Add regular tap water to each pot of water.
3) Make up five solutions.

a) First solution is just regular tap water
b) In the second solution add 0.1 gram of ammonia to approximately one cup of water.
c) Third solution add 0.2 grams of ammonia to approximately one cup of water
d) Fourth solution add 0.5 grams of ammonia to approximately one cup of water
e) Fifth solution add 1.0 gram of ammonia to approximately one cup of water
f) Add each of the solutions to one plant every two to three days and see the effect of the acidic water on the plant.

OBSERVATION

	W1	W2	W3	W4	W5	W6
Pot One Control						
Pot Two						
Pot Three						
Pot Four						
Pot Five						

	W7	W8	W9	W10	W11	W12
Pot One Control						
Pot Two						
Pot Three						

Pot Four						
Pot Five						

Results

Conclusions

Questions:

What is the dependent Variable?

What is the independent Variable?

What are the control Variables?

Why did the alkaline solution inhibit plant growth?

LABORATORY FOUR

Corn and Lead (Heavy Metal) water experiment

Introduction / Purpose

Materials

Procedures

1) Take five pots and fill with soil. Plant a bean or corn seed in each pot.
2) Wait till the bean plants germinate and start to grow. Add regular tap water to each pot of water.
3) Make up five solutions.

a) First solution is just regular tap water
b) In the second solution add 0.1 gram of pencil lead to approximately one cup of water.
c) Third solution add 0.2 grams of pencil lead to approximately one cup of water
d) Fourth solution add 0.5 grams of pencil lead to approximately one cup of water
e) Fifth solution add 1.0 gram of pencil lead to approximately one cup of water
f) Add each of the solutions to one plant every two to three days and see the effect of the acidic water on the plant.

OBSERVATION

	W1	W2	W3	W4	W5	W6
Pot One Control						
Pot Two						
Pot Three						
Pot Four						
Pot Five						

	W7	W8	W9	W10	W11	W12
Pot One Control						
Pot Two						
Pot Three						

Pot Four						
Pot Five						

Results

Conclusions

Questions:

What is the dependent Variable?

What is the independent Variable?

What are the control Variables?

Why did the lead inhibit plant growth?

LABORATORY FIVE

Corn and Alka Seltzer water experiment

Introduction / Purpose

Materials

Procedures

1) Take five pots and fill with soil. Plant a bean or corn seed in each pot.
2) Wait till the bean plants germinate and start to grow. Add regular tap water to each pot of water.
3) Make up five solutions.

a) First solution is just regular tap water
b) In the second solution add a quarter tablet of Alkaseltzer to approximately one cup of water.
c) Third solution add a one-half a tablet of Alkaseltzer to approximately one cup of water
d) Fourth solution add three quarters tablet of Alkaseltzer to approximately one cup of water
e) Fifth solution add 1 tablet of Alkaseltzer to approximately one cup of water
f) Add each of the solutions to one plant every two to three days and see the effect of the acidic water on the plant.

OBSERVATION

	W1	W2	W3	W4	W5	W6
Pot One Control						
Pot Two						
Pot Three						
Pot Four						
Pot Five						

	W7	W8	W9	W10	W11	W12
Pot One Control						
Pot Two						
Pot Three						

Pot Four						
Pot Five						

Results

Conclusions

Questions:

What is the dependent Variable?

What is the independent Variable?

What are the control Variables?

Why did the alkaseltzer enhance plant growth?

LABORATORY SIX

Corn (Bean) and Nicotine water experiment

Introduction / Purpose

Materials

Procedures

1) Take five pots and fill with soil. Plant a bean or corn seed in each pot.
2) Wait till the bean plants germinate and start to grow. Add regular tap water to each pot of water.
3) Make up five solutions.

a) First solution is just regular tap water
b) In the second solution 1 ml of tobacco solution to approximately one cup of water.
c) Third solution add a 10 ml of tobacco solution to approximately one cup of water
d) Fourth solution add 50 ml of tobacco solution to approximately one cup of water
e) Fifth solution add 100 ml of tobacco solution to approximately one cup of water
f) Add each of the solutions to one plant every two to three days and see the effect of the acidic water on the plant.

OBSERVATION

	W1	W2	W3	W4	W5	W6
Pot One Control						
Pot Two						
Pot Three						
Pot Four						
Pot Five						

	W7	W8	W9	W10	W11	W12
Pot One Control						
Pot Two						
Pot Three						

Pot Four						
Pot Five						

Results

Conclusions

Questions:

What is the dependent Variable?

What is the independent Variable?

What are the control Variables?

Why did the nicotine solution inhibit plant growth?

LABORATORY SEVEN

Corn (Bean) and Caffeine water experiment

Introduction / Purpose

Materials

Procedures

1) Take five pots and fill with soil. Plant a bean or corn seed in each pot.
2) Wait till the bean plants germinate and start to grow. Add regular tap water to each pot of water.
3) Make up five solutions.

a) First solution is just regular tap water
b) In the second solution add 10 ml of a coffee solution to approximately one cup of water.
c) Third solution add 20 ml of a coffee solution to approximately one cup of water
d) Fourth solution add 50 ml of a coffee solution to approximately one cup of water
e) Fifth solution add 100 ml of a coffee solution to approximately one cup of water
f) Add each of the solutions to one plant every two to three days and see the effect of the acidic water on the plant.

OBSERVATION

	W1	W2	W3	W4	W5	W6
Pot One Control						
Pot Two						
Pot Three						
Pot Four						
Pot Five						

	W7	W8	W9	W10	W11	W12
Pot One Control						
Pot Two						
Pot Three						

Pot Four						
Pot Five						

Results

Conclusions

Questions:

What is the dependent Variable?

What is the independent Variable?

What are the control Variables?

Why did the coffee solution inhibit plant growth?

LABORATORY EIGHT

Corn (Bean) and Osmocote (nitrogen and phosphate) water experiment

Introduction / Purpose

Materials

Procedures

1) Take five pots and fill with soil. Plant a bean or corn seed in each pot.
2) Wait till the bean plants germinate and start to grow. Add regular tap water to each pot of water.
3) Make up five solutions.

a) First solution is just regular tap water
b) In the second solution add 0.1 grams of Osmocote to approximately one cup of water.
c) Third solution add 0.2 grams of Osmocote to approximately one cup of water
d) Fourth solution add 0.3 grams of Osmocote to approximately one cup of water
e) Fifth solution add 0.4 grams of Osmocote to approximately one cup of water
f) Add each of the solutions to one plant every two to three days and see the effect of the acidic water on the plant.

OBSERVATION

	W1	W2	W3	W4	W5	W6
Pot One Control						
Pot Two						
Pot Three						
Pot Four						
Pot Five						

	W7	W8	W9	W10	W11	W12
Pot One Control						
Pot Two						
Pot Three						

Pot Four						
Pot Five						

Results

Conclusions

Questions:

What is the dependent Variable?

What is the independent Variable?

What are the control Variables?

Why did the Osmocate enhance plant growth?

Experiment 9: Making a Natural pH Indicator

In this experiment you will make your own pH indicator from red cabbage. Red cabbage contains a chemical that turns from its natural deep purple color to red in acids and blue in bases. Litmus paper, another natural pH indicator, also turns red in acids and blue in bases. The red cabbage pH indicator can be obtained by boiling the cabbage.

Materials
- sliced red cabbage
- stainless steel or enamel pan or microwave casserole dish
- 1 quart water
- stove, microwave, or hotplate
- white vinegar
- ammonia or baking soda
- clear, non-cola beverage
- 3 glass cups (preferably clear)
- measuring spoons
- 3 clean teaspoons for stirring
- measuring cup (1/4 cup)
- notebook and pencil

Instructions
- Boil cabbage in a covered pan for 30 minutes or microwave for 10 minutes. (Don't let water boil away.)
- Let cool before removing the cabbage.
- Pour about 1/4 cup of cabbage juice into each cup.
- Add 1/2 teaspoon ammonia or baking soda to one cup and stir with a clean spoon.
- Add 1/2 teaspoon vinegar to second cup, stir with a clean spoon.
- Add about 1 teaspoon clear non-cola to the last cup and stir with a clean spoon.
- After answering the first two questions for this experiment, pour the contents of the vinegar cup into the ammonia cup.

Related Experiment: Neutralizing Acids or Bases Using a Garden Soil pH Tester Kit
- Pour 1/4 teaspoon of the contents of the vinegar cup into the test container, and add 1/4 teaspoon of the test solution. Seal the top of the test container with your finger, shake once or twice, or stir if necessary, and compare with the color chart. Then pour about 1/4 teaspoon of the contents of the ammonia cup into the test container. Mix it and compare with the color chart. What happens to the pH ? What would happen if you added more of the ammonia mixture? (For answers: see questions 3 and 4.)

Questions and Answers What color change took place when you added vinegar to the cabbage juice? Why?
The vinegar and cabbage juice mixture should change from deep purple to red, indicating that vinegar is an acid.

Did the ammonia turn the cabbage juice pH indicator red or blue? Why?
The ammonia and cabbage juice mixture should change from deep purple to blue, because ammonia, like baking soda, is a base, which reacts chemically with the pH indicator, turning it blue.

What happens to the color if you pour the contents of the vinegar cup into the ammonia cup?
You should find that the acid and base are neutralized, changing the color from blue or red to purple, which is the original, neutral color of the cabbage juice

If you were to gradually add vinegar to the cup containing the baking soda (or ammonia) and cabbage juice, what do you think would happen to the color of the indicator? Try it, stirring constantly.
As you add more vinegar, the acid level increases and the color becomes red.

Is the non-cola soft drink acidic or basic?
It is acidic and turns the cabbage juice pH indicator red.