

## **Narrative - GEOL110 and GEOL110L: Introduction to Environmental Science**

This course introduces students to basic concepts and ideas in environmental science. It is an interdisciplinary science course that uses real examples as case studies to link course content to current global environmental issues. GEOL110L was designed to give students hands-on experience to better facilitate the learning of concepts introduced in lecture. Both courses were planned with many of the Foundational Studies goals in mind. GEOL110/GEOL110L has also been developed as an online course. Annotations are listed in italics on both course syllabi.

*GEOL110: Articulate how data are acquired, and how hypotheses and theories are constructed and use the scientific method to formulate and test hypotheses.* Several topics in the course illustrate the historical context of using scientific data and observations to evaluate hypothesis and eventually formulate scientific theories, including evolution and natural selection, plate tectonics, and climate change. In addition, students participate in a class field trip where they collect samples and data. Some of the samples will later be used in GEOL110L. In other cases, students will work in small groups to formulate their own hypotheses and interpret real, authentic data to evaluate their hypotheses, for example, geochemical data based on samples collected from their field trip and climate data.

*GEOL110: Apply scientific theories to predict the nature and behavior of new systems, environments, or scenarios.* In this course, students are introduced to scientific theories and concepts and then asked to consider how they apply to particular regions in the past, today, and in the future as a result of global change.

*GEOL110: Articulate how current issues in science and technology intersect with populations, institutions, and societies.* The foundation of this course is based on the use of real current issues to make real linkages between course content and current events. In addition, students have regular writing assignments linking course content to current news articles.

*GEOL110L: Engage in laboratory experiences that reinforce and augments the theoretical content of the lecture course.* Lab experiences have been selected and designed to match lecture content as closely as possible. For example, when students are learning about biodiversity, evolution, and extinctions in lecture, they have a fossils identification lab. When students are learning about environmental health, they have labs designed to evaluate water quality.

*GEOL110L: Use the scientific method to formulate and test hypotheses.* While some of the labs involve learning how to read maps or identify fossils or minerals, other labs include real experiments that ask the students to formulate hypotheses at the beginning and then evaluate those hypotheses at the end. These labs include assessments of soil compaction, water quality, and the evaluation of climate data.

*GEOL110L: Use the tools and techniques of the discipline to gather and analyze data.* Environmental science is a broad field that includes ecology, chemistry, geography, and geology among other disciplines. An effort has been made to include many different types of labs that introduce students to multiple methods of collecting data. For example, samples from the field trip are studied as well as chemistry kits and macroinvertebrates for water analysis, wave tanks for erosion studies, soil samples for compaction studies, etc.

*GEOL110L: Present the analysis and findings of the lab experience.* For all lab exercises, students are expected to turn in a lab report that includes their data and the interpretations of their experiments.

## **GEOL 110: Introduction to Environmental Science (Sample Syllabus)**

Instructor: Dr. Jennifer Latimer

Office: Science 159G

Phone: 812-237-2254

E-mail: Jen.Latimer@indstate.edu

Office Hours: Wednesdays 1 – 3 pm and by appointment

Textbook: Environment: The Science Behind the Stories (3rd edition) by J. Withgott and S. Brennan – also available for purchase as an e-textbook through the publisher and at a reduced cost

Publisher Website:

[http://wps.aw.com/wps/media/access/Pearson\\_Default/4893/5010916/login.html](http://wps.aw.com/wps/media/access/Pearson_Default/4893/5010916/login.html)

*NOTE: For those students needing to complete a science lab course, GEOL110 and GEOL110L do meet the general education requirement for a science course with a lab.*

### **Course Description:**

GEOL 110 is an introductory, interdisciplinary science course for students wishing to satisfy their general education requirement for a science course with or without a lab [GE2000: Scientific and Mathematical Studies – Foundational (SMS:F,E) and FS2010 Science and Laboratory].

This course presents the environment as a complex, highly interrelated system of physical and biological processes that impacts virtually every sphere of human activity. We depend on the environment for basic necessities such as food, water and the raw materials that we transform into shelter; we rely upon large-scale environmental processes that provide ecosystem services, such as the climate regulation and the natural flood control provided by forests and wetlands; and yet we also incur the sometimes catastrophic consequences of major environmental events, such as earthquakes, hurricanes and drought. Increasingly, human activity is altering these basic physical and biological environmental processes; the human population has more than doubled since 1960, and our economic activity in developed and developing countries has heightened our demand for limited environmental resources, such as arable land and clean water. Other consequences of increased human activity are less obvious, but no less consequential. It clearly benefits us to acquire a better understanding of this environment that we depend upon and influence so dramatically.

In this class we will explore the various processes that contribute to the functioning of the environment, as well as the ways we interact with it. We will introduce topics using a case-studies approach, in which we use current news stories as a launching point for our science-

based investigations. We will investigate the science of the environment, delving into how environmental issues and problems can be understood and addressed using the scientific method. Most importantly, we will focus on how you, whether a scientist or lay citizen, can take a scientific and informed approach to real-life decision making, whether in the workplace, marketplace or voting booth. Throughout, we emphasize the importance of using critical thinking and evidence to draw conclusions and suggest actions.

**Course Goals** (*abbreviated S&L 1-4 for Science and Laboratory Learning Objectives and SAL 1-3 for Skill Applied Learning Requirements*)

- Increase our knowledge about the scientific process and the importance of science in making informed and reasonable choices. (S&L 4)
- Formulate hypotheses and interpret authentic data to evaluate those hypotheses. (S&L 1 and 2)
- Develop critical thinking skills and critical analysis through problem solving of practical problems associated with the physical and biological environment. (SAL 1)
- Advance our understanding of environmental science by applying basic principals of physics, chemistry, geology, biology and ecology as they relate to the environment. (SAL 2)
- Improve our knowledge of human-environment interaction in order to predict and plan for future sustainability. (S&L 3 and 4)
- Build a global awareness that emphasizes the importance of understanding the natural world as an integrated system with many interacting parts. (S&L 4 and SAL 2)
- Increase communication skills through class discussions, writing short essays, reading assignments, and note-taking assessments. (SAL 3)
- Upon completion of this course, students should be knowledgeable and skilled enough to explain verbally and in writing the basic principles of environmental science to any member of the community. This includes applying knowledge to novel situations which may arise in the future. (SAL 1 and 3, S&L 1- 4)

**Foundation Studies Learning Objectives Met By This Course:**

**FS-1** - Locate, critically read, and evaluate information to solve problems;

**FS-2** - Critically evaluate the ideas of others;

**FS-3** - Apply knowledge and skills within and across the fundamental ways of knowing (natural sciences, social and behavioral sciences, arts and humanities, mathematics, and history);

**FS-5** - Demonstrate the skills for effective citizenship and stewardship;

**FS-7** - Demonstrate the skills to place their current and local experience in a global, cultural, and historical context;

**FS-8** - Demonstrate an understanding of the ethical implications of decisions and actions;

**FS-10** - Express themselves effectively, professionally, and persuasively both orally and in writing.



## Tentative Schedule

Week	Topic	Chapter
26-Aug	Introduction	1
31-Aug	Environmental Ethics and Policy	2,3
7-Sep	Chemistry and Energy	4
14-Sep	Evolution, Biodiversity, and Population Ecology	5
21-Sep	Community and Ecosystem Ecology	6,7
28-Sep	Human Population	8
5-Oct	Soil, Agriculture, and the Future of Food	9, 10
12-Oct	<b>Review and Midterm</b>	
19-Oct	Conservation Biology and Resource Management	11, 12
26-Oct	Urbanization and Waste Management	13, 22
2-Nov	Environmental health	14
9-Nov	Water Resources	15, 16
16-Nov	Air Pollution	17
23-Nov	Energy Resources	19, 20, 21
30-Nov	Global Change and Sustainable Solutions Thanksgiving - no class on Thursday	18, 23
4-Dec	Global Change and Sustainable Solutions and Review	18, 23
<b>Dec 15 @ 1 pm</b>	<b>Final Exam</b>	

## Attendance

I make **NO** distinction between excused or unexcused absences – an absence is an absence. You are expected to attend every class and participate when appropriate. If you miss class, it is your responsibility to obtain any handouts, notes, or assignments for that class. Attendance will be taken every day in some way. Often, you will be expected to sign an attendance sheet. If your legible signature does not appear on that sheet, you will be counted as absent. If you sign someone else's name, you will both be counted absent. If you are sleeping through class,

working on other course work, reading the newspaper, updating your facebook page, or otherwise are not mentally present, you will be considered absent. After four (4) absences, you will lose 25 points for each subsequent absence.

## Reading Assignments

Each week, you should consult the **weekly learning unit** found under “course documents” in Blackboard to identify the chapter learning objectives and sample group discussion topics, assignments, and personal blog assignments.

**You are expected to read your textbook in advance of coming to class.** Your chapter reading assignments are listed in the tentative schedule. Online reading quizzes will be available for each chapter and should be taken by 12:00 pm on Tuesdays prior to coming to class. Each quiz will be worth 10 points. You can take each quiz up to three times, but it must be completed at least once by 12:00 pm on Tuesday of each week, and your final score is the one that will count.

## Class Participation

Each student will be assigned to a group, and participation grades will be based on each student’s contribution to group discussions and group assignments. Often these discussions are focused on case studies that are presented in the textbook or provided as additional reading assignments. We will often have small group discussion followed by a larger class discussion where groups report their ideas. In many cases, students will be expected to **seek additional information about the case study** that is not included in the textbook or supplementary reading. Groups will also periodically consider environmental issues, develop hypotheses, and interpret scientific data. Grades will be based partially on the additional content students bring to the discussion that was not provided by the instructor. Group discussions will also revolve around informal student presentations to their group. You will meet with your group for at least 15 minutes during every class meeting. You will either be discussing a case study/short writing assignment, working on a group assignment, or brain storming problems and solutions related to current environmental issues. For each class period, your group will submit a written summary (paragraph) describing the main points of your discussion.

*Each week, students will work in their groups to answer discussion questions, relate their short writing assignments to the course, and complete group assignments. These questions have been designed to address the science and laboratory learning objectives, skill applied learning requirements, and foundational studies learning objectives. While each faculty member may have different discussion questions, discussion of case studies and current events is an important component for all sections of the course. Each set of discussion questions is designed to meet S&L 3 and 4, SAL 1 and 2, and FS 1-3, 10. Group assignments are designed to meet S&L 1 and 2 SAL 1 and 2, and FS 1-3, 10. Samples assignments are listed below.*

*Sample Group Discussion Questions for Chapter 1: Introduction – How are the events at Easter Island related to modern day environmental pressures and concerns. Identify areas/regions of*

*the modern world that may face a similar fate. Also consider the role of perceptions and world view in environmental problems and solutions.*

*Sample Group Discussion Questions for Chapter 5 – Evolution and Biodiversity – Extinction is a natural part of evolution. However, some extinctions are preventable and related to human behaviors. What are some of the potential consequences of species richness and biodiversity?*

*Sample Group Discussion Questions for Chapters 9 & 10 – Soils, agriculture and the future of food. How do different farming practices impact the environment? Discuss the benefits and dangers of relying on genetically modified crops.*

*Sample Group Discussion Questions for Chapter 18 – Global Climate Change. Global temperatures are predicted to rise over the next several decades, but the worst case scenarios for global change are consequences of warming rather than the warming itself. Discuss how warming may impact the hydrologic cycle, soil fertility and food production, human health, biodiversity, and habitat loss.*

*Sample Group Assignment for Chapter 14 – Environmental Health. Recall where soil samples were collected during the class field trip. Brainstorm some potential types of pollutants that may have contaminated these soils. Develop at least one hypothesis about the sources and distribution of heavy metal contaminants in the Riverscape area. After you have written out your hypotheses, see the instructor for graphs of the data from the samples collected during the field trip and make some preliminary interpretations.*

## **Quizzes and Exams**

There will be two exams in this course. Each exam will be worth 150 points. Exams will consist of multiple choice questions taken on Blackboard outside of class and short answer questions completed individually and then with your group as a collaborative effort. You will only be given one chance to take the multiple choice portion of the exam. If you close your browser without completing the exam, refresh your browser, or lose your internet connection, you will be locked out, and will not be able to continue. You will also have a limited amount of time to take the exam (45 minutes). The scheduled exams can be made up; however, make-up exams will consist of a limited number of short-answer questions. It is highly advised that you do not miss any exams. We will also have regular in-class quizzes worth 15-30 points that may also be collaborative.

*These assessments will meet S&L 1-4, SAL 1-3, and FS 3, 10.*

## **Short Writing Assignments (S&L 4, SAL 1-3, and FS 1-3, 7, 8, 10)**

During the course of the semester, you will be expected to submit four (4) short writing assignments (750 - 1000 words) based on a current news article (3 months or less since publication) that relates to class material. You will have two due prior to the midterm and two due after the midterm. You can use print and respectable online news sources (i.e. Time, CNN, etc.). You will decide on due dates for the writing assignments in your group. At least one member of your group will have a paper due each week and present the information to the

group. Each writing assignment is worth 40 points and should be related to a topic that was recently discussed or presented in the textbook.

The minimum requirements for each writing assignment should include: a complete bibliography and hyperlink if appropriate; a statement describing the goals and main point of the article; a summary of the evidence presented in your own words (paraphrasing rather than using direct quotes) in well developed sentences and paragraphs; at least one paragraph explicitly describing the relationship to course material; a list of any additional references you consulted. These writing assignments should be more than just reports, and you should provide as many links to course material as possible. It is highly advised that you describe as many connections to course material as possible. The objective of the assignment is to articulate your ideas about the news item and relate the item to the course and your peers.

Short writing assignments are abbreviated SWA 1-4 in the Blackboard gradebook. Late papers will not be accepted. Paper grades will be based on both content and readability: 50% on content (including appropriate scholarly resources) and 50% on grammar, spelling, punctuation, organization, and the proper use of the English language. You may use either APA or MLA for citations. You should proof read your paper and/or have a friend proof read your paper prior to turning it in. All papers should be double spaced in 12-point font with one inch margins. Plagiarism will not be tolerated, and will result in a **minimum** punishment of a zero (0) for the assignment. You are expected to use scholarly references (i.e. not websites unless they are known to be reputable and of high quality). Please note that Wikipedia is not a reliable or scholarly reference and should not be used in scholarly writing. If you use Wikipedia or other similar websites, you need to identify five additional sources to verify the information you present. Papers must be submitted electronically through Blackboard as a TurnItIn assignment, which means that each paper will be automatically checked for plagiarism once it has been submitted. The link for the assignments can be found under assignments, and you simply click on the assignment to complete it. Do NOT submit your papers using the Digital Dropbox. When saving and uploading your writing assignments you should use the following naming convention: SWA#\_last name, for example, SWA1\_Latimer. Papers must also be submitted as a hard copy. **If you turn in your paper, but do not present it to your group, you will lose 20 points.** You determine when your papers are due, so please do not select a day that you know you will miss class, for example due to a field trip for another class, athletic competition, or a performance. You also have the flexibility in your group to adjust due dates if something unforeseen occurs.

Examples of excellent, good, and poor writing assignments will be available for you to review on Blackboard.

*Note: Students will get substantial feedback on each of these writing assignments, with the goal that each writing assignment will improve. For classes with more than 50 students a reduced number of writing assignments may be necessary. This assignment encourages students to keep up with current events, relating current events to course content, and critically evaluating what the news media presents to the public. In addition, these assignments require that students be able to articulate their ideas and opinions formally (written) and informally (orally) to*

*their peers. Other instructors may use a different writing assignment that may be more traditionally developmental (i.e. require topic approval, submission of a draft, etc.). Short writing assignments meet S&L 1 and 4, SAL 1-3, and FS 1-3, 7, 8, 10.*

### **Personal Blogs/Journals**

Each student will have a personal blog/journal accessible through the course Blackboard website that can be viewed by the instructor and the student only. Several times throughout the semester, you will be expected to reflect on course material and how it relates to your personal experiences and community in your blog/journal. Grades for blogs/journals will be based on how completely you answer the questions that have been posed as well as the quality of your writing (similar to writing assignments). Each personal journal entry is worth up to 15 points, and should be similar to short writing assignments in length and formatting. There are six (6) blog entries to be completed during the semester. Also, your field notes and reflections from the field trip will each count as a blog.

*Note: Personal blog assignments ask students to reflect on their own ideas, opinions, and actions. For example, their first and last personal blog assignment is to write about their environmental footprint to evaluate how their opinions, attitudes, and actions change (or not) over the course of the semester. Personal blog assignments are designed to meet S&L 4, SAL 3, FS 1, 3, 5, 7, 8, 10.*

*Sample personal blog assignments:*

*Chapter 1 – Think about your own neighborhood or nearby city. Compare and contrast some of the environmental pressures facing your local community with pressures in other parts of the world. Also consider your personal influence on the environment (both positive and negative) and think about realistic ways you might increase your positive influence and limit your negative influences.*

*Chapter 4 – How did early life on earth alter the composition of the atmosphere and ultimately make earth a habitable planet? Also, consider James Lovelock’s Gaia Hypothesis and describe how positive and negative feedbacks in the climate system “regulate” earth.*

*Chapter 13 and 22 – How does urbanization contribute to environmental problems, such as flooding and pollution? Thinking about your home town, does your hometown have clear brownfields? How close do you live to a municipal landfill and what happens to your trash when it leaves your home? Does your home town have combined storm-sewer systems? How does the sewage treatment plant (if applicable) deal with high discharge during heavy rains or snow melt?*

### **Online Office**

In addition to contacting me via email, phone, or during office hours, you can also post questions to the discussion board in the online office forum. I will check the online office twice weekly (Tuesdays and Fridays) and reply to any questions that may have been posted. This is

a great place to post general questions about the course or assignments. This is also a great place to look for answers to your questions.

### **Extra Credit**

Extra credit opportunities are limited to those presented in the syllabus – the two items below. All extra credit must be completed by **December 1**. Extra credit assignments will only be accepted from students who attend class regularly and have completed the majority of their assignments.

1. Interview someone who works in an environmental field. Describe what this person's primary job responsibilities are, and how the job is related to material covered in class.
2. Visit the Indiana State Museum, a state/national park/forest, zoo, or aquarium. Describe some of the environmental and conservations issues discussed and presented. How does the material presented relate to course topics?

### **Pop Quizzes and Classroom Disruptions**

If necessary, random pop quizzes will be given. Pop quizzes may also be given for classroom disruptions. Classroom disruptions may include a cell phone ringing, instant messaging, inappropriate use of a laptop (surfing, doing other assignments, email, etc.) arriving late/leaving early, private conversations, etc. Proper classroom etiquette is expected by all students at all times.

### **Laptop Not Required for Course: Usage Permitted**

Your use of a laptop is generally permitted as long as such usage remains within the bounds of the Code of Student Conduct and it conforms to the provisions of its use as laid out in this syllabus. There may be occasions where laptop usage is forbidden and if that occurs, failure to comply with this direction will be viewed as a violation of the Code of Student Conduct. Use of your laptop for non-course related work during class time may result in a loss of laptop privileges during class.

### **Academic Dishonesty**

Academic dishonesty is a serious offense because it undermines the bonds of trust and honesty between members of the community and defrauds those who may eventually depend upon our knowledge and integrity. All students are expected to adhere to the Code of Student Conduct. Academic dishonesty (including plagiarism) in any portion of the academic work in this course shall be grounds for awarding a grade of F for the work or the entire course and Student Judicial Programs will be notified of the academic integrity violation.

Other University Policies can be found on the Office of General Education Website:

<http://www.indstate.edu/gened/docs/Foundational%20Studies/Info%20on%20Sycamore%20Standard%20and%20ADA%20and%20Laptops%20and%20Academic%20Freedom.pdf>

## Grades

Grades will be assigned based on the following distribution of points and percentages.

Exams (2)	150 points each
Writing Assignments (4)	40 points each
Reading Quizzes (14)	10 points each
Group Work (variable)	5-20 pts each
Personal Blog/Journal (8)	15 points each
In-class quizzes (variable)	15 – 30 points each

100% – 93% = A	82% - 80% = B-	69% - 67% = D+
92% – 90% = A-	79% - 77% = C+	66% - 63% = D
89% - 87% = B+	76% - 73% = C	62% - 60% = D-
86% - 83% = B	72% - 70% = C-	<60% = F

## Course Assessment

*In addition to the assessments describe above, students are also asked to take complete an online pre- and post-survey to evaluate their understanding of the scientific method and scientific principles (Science Education for New Civic Engagements & Responsibility {SENCER} survey). Students are also asked to take a Blackboard survey to evaluate their perceptions of the course and their learning. Both survey tools use a Likert Scale and the questions are included below:*

*SENCER Survey:*

*The student response options are, “not sure”, “not at all”, “just a little”, “somewhat”, “a lot”, or “a great deal”*

*Questions:*

*Presently I understand:*

- 1. How to think like a scientist*
- 2. How scientific research is carried out*
- 3. The scientific issues and processes discussed in the science-related stories in the media*
- 4. The scientific content that will be the subject of this course*
- 5. The power of science to affect my life*
- 6. The connections between science and the civic issues relevant to my community*
- 7. The limits of science as a problem-solving system*

*Presently, I am:*

- 8. Interested in science*
- 9. Interested in civic issues*
- 10. Confident in my ability to understand scientific concepts and procedures*
- 11. Confident that I can do the kind of science we will be doing in this class*
- 12. Aware of the complexity of the problems we will be working on in class*
- 13. Persistent when working on complex problems*
- 14. Interested in taking additional science courses after this one*
- 15. Interested in majoring in science, technology, engineering or mathematics (STEM) or a related field*
- 16. Interested in exploring career opportunities in STEM fields (including teaching them)*

*Presently, I am in the habit of...*

- 17. Discussing science-related issues informally with friends and/or family*
- 18. Discussing civic or political issues informally with friends and/or family*
- 19. Reading science-related articles not required for class*
- 20. Critically analyzing science findings reported in the media*
- 21. Taking PUBLIC action related to scientific or civic issues (e.g blogging, interacting with public officials, working with student or community groups, etc.)*
- 22. Connecting what I know about science with what I am learning in other classes*
- 23. Applying my knowledge of science and scientific reasoning to civic and/or social issues*
- 24. Using systematic, scientific reasoning to solve problems*
- 25. Critically analyzing data and arguments in my daily life*
- 26. Voting in local, state, and national elections*
- 27. Researching and analyzing issues and candidates carefully before I vote*

*What are the most important reasons why you took this course?*

- 28. I am interested in the topic of the course*
- 29. It is required (or is a prerequisite for another course)*
- 30. The course fits my schedule*
- 31. I heard good things about the teacher*
- 32. I was drawn to a science course that promised to address civic issues*
- 33. I was drawn to a course that promised to apply science to real world issues*

*Blackboard Survey*

*The student response options are, “strongly agree”, “agree”, “disagree”, or “strongly disagree”*

- 1. I needed significant effort to learn the content in this course.*
- 2. I was motivated to do my best work to meet the instructor’s standards.*
- 3. I needed to spend a significant amount of time on class material to be successful in this course.*
- 4. I felt the instructor was approachable to discuss course-related issues.*
- 5. The learning environment created by the instructor had a positive influence on my class performance.*

6. *I receive useful feedback on my ability to meet course assignments.*
7. *The teaching strategies actively engaged me in learning the content.*
8. *I spent time thinking deeply about a number of course topics.*
9. *I have a stronger understanding of the content compared to the beginning of this course.*
10. *I developed knowledge and skills that can be applied outside of the course.*
11. *I was challenged to reconsider my point of view on some course topics.*
12. *I developed positive relationships with other students from this class.*
13. *Appropriate technology was used in the course.*
14. *The course field trip enhanced the course.*
15. *Group discussions were useful.*
16. *The course helped me to evaluate the ideas of others.*
17. *This course helped me to improve my writing skills.*
18. *This course increased my understanding of global environmental issues.*
19. *This course helped me to better understand the environmental issues facing my own community.*

## Geol 110L: Environmental Science – Fall 2009

CRN 59022—Geol 110L-001 Instructor: Windy McBride Class Meets: Thursday Time: 2:00-3:50 Office Hours: Office: Holmsted Hall Phone:	CRN 59023—Geol 110L-002 Instructor: David Bohnert Class Meets: Wednesday Time: 11:00-12:50 Office Hours: Office: Holmsted Hall Phone:	CRN 59024—Geol 110L-001 Instructor: Windy McBride Class Meets: Wednesday Time: 3:00-4:50 Office Hours: Office: Holmsted Hall Phone:
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### Required Course Materials

- GEOL110L Laboratory Manual – available for purchase in S159 for \$15
- Access to Blackboard for supplemental material for labs

### Course Objectives

GEOL 110L is a laboratory course designed to be taken in conjunction with the lecture class GEOL 110. You may enroll in GEOL 110L and GEOL 110 to satisfy your general education requirement for a science with a lab; GEOL 110L credit hours satisfy the general education program GE89:A3 and GE 2000: Scientific and Mathematical Studies – Foundational (SMS:F,E) as well as FS2010: Science and Laboratory Requirements.

The laboratory experience is essential in order for you to understand and appreciate the role of science in your life. The GEOL 110L laboratory is designed to give you hands-on learning experiences in environmental science, as well as to teach you the ability to apply the learned concepts to real world problems and issues. You will build your critical and independent thinking skills and develop the ability to formulate and scientifically evaluate hypotheses concerned with environmental problems and issues.

- Demonstrate and use the scientific method when conducting basic environmental science investigations.
- Demonstrate the role of hypothesis-formulation, hypothesis testing and basic data analysis in environmental science.
- Develop your problem-solving and critical thinking skills through experiential and collaborative activities in the lab.
- Develop your communication skills through class discussions of results and their relevance.
- Advance your understanding of environmental science.
- Increase your awareness of the impact of human activity on the environment.



## Tentative Course Schedule

Week	Dates	Topic
1	Aug 26-27	Introduction
2	Sept 2-3	Global Change and Alternative Energy
3	Sept 9-10	Alternative Energy Presentations
4	Sept 16-17	Population and Land-Use using Topographic Maps
5	Sept 23-24	Fossils
6	Sept 30- Oct 1	Minerals
7	Oct 7-8	Rocks
8	Oct 14-15	Soils
9	Oct 21-22	Shoreline Erosion
10	Oct 28-29	Water Quality
11	Nov 4-5	Water Quality using Macroinvertebrates
12	Nov 11-12	Groundwater
13	Nov 18-19	Convection
14	Nov 25-26	No Classes
15	Dec 2-3	Paleoclimatology
16	Dec 9-10	Climate/Weather projects due Weather Forecast (Class)

### **FS Laboratory Learning Objectives:**

1. Engage in laboratory experiences that reinforce and augment the theoretical content of the lecture course.
  - All of the labs have been designed to provide hands-on experience with information presented in lecture. While it is not possible to have a one on one correlation between activities in the lab and lecture content, all lab sections will follow the same schedule and it is hoped that labs and lecture will stay as “in sync” as possible.
2. Use the scientific method to formulate and test hypotheses
  - Students are explicitly asked to formulate hypotheses prior to the experiment for the shoreline erosion, water quality, groundwater, convection, and paleoclimatology labs. Students are also asked to evaluate their initial hypotheses and revise them based on their observations.
3. Use the tools and techniques of the discipline to gather and analyze data
  - Students participate in a class field trip where they use equipment for collecting environmental samples, including water samplers, soil augers, and tree corers. In the lab, students will use online GIS tools, water testing kits, authentic macroinvertebrate samples from the Wabash River and tree cores they collected on the field trip.
4. Present the analysis and findings of the lab experience
  - Following all laboratory activities and experiments, lab results and lab reports are turned in.

## **Class Attendance and Participation**

You are expected to be on time, attend every class, participate, and pay attention. You cannot make-up any of the labs. Authorization to attend a different lab section due to absence must be obtained from Dr. Jennifer Latimer. Authorization will only be given for extreme circumstances. After authorization has been obtained, you may, with permission from the instructor whose lab you wish to attend, attend one of the other lab sections that are offered. If you are unable to attend one of the other lab sections, you will earn a ZERO for the missed lab. **If you do not complete three or more of the lab activities, you will earn an “F” as your final grade for the semester.**

## **Participation**

Class participation is vital to your success in this class. Most often you will be working in groups of 2-4 students; however, you are expected to turn in your own work. A student who does not participate throughout the lab activity and voluntarily permits the other students in their group to do most or all of the work will be asked to leave and will earn a **ZERO** for the lab activity.

## **Class Field Trip**

There will be a mandatory field trip for all lab classes on September 12 (rain date is 9/19). We will be traveling off campus to a nearby wetland site. The bus will leave at 9 am and return in the late afternoon. You should plan to spend all day in the field, and you will need to dress appropriately for active field work (i.e. clothes and shoes that can get dirty and muddy). We will only cancel the field trip if conditions are dangerous, which means we will go into the field during most weather conditions, except torrential rain or flash flooding. ***This field trip is required of all students.*** If you are unable to attend this field trip you need a documented excuse, and you will be required to make-up the experience on your own. If you miss the field trip and do not have a documented excuse, this will count as two of your lab absences. You will also receive a zero for assignments in lab and lecture.

## **Lab Safety**

Safety rules must be followed at all times. Failure to adhere to all safety instructions may result in the student being administratively removed from the lab. A grade of zero will be recorded for any labs not completed for this reason, and if this happens more than once, you will receive a grade of “F” for the course. Clean-up of your work area and all common areas in the lab is required and is the responsibility of everyone, failure to do so, will result in a 5 (five) point deduction for everyone.

**\*\*The general rule is to leave the laboratory in better condition than when you found it!!!**

## **Quizzes and Exams**

There will be 12 (twelve) Pre-Lab Quizzes during the course of the semester, each worth 10 points. You are required to read and understand the lab activity that you will be performing prior

to entering the class. If you are unable to answer the pre-lab quiz questions, you may be asked to leave the lab session and you will receive a ZERO for the lab. No exams will be given.

### **Homework**

All questions, graphs, and sketches for the lab activity will be due the week following the lab activity. Turning in homework late will result in a penalty of 10% per calendar day late.

**Weather Observation Project** (We will discuss the details of the final project throughout the semester)

During each lab period, time will be set aside for a few individuals to go outside to conduct weather observations. Ideally we will do this during the first five minutes of class. 2-3 students will collect the weather data each lab period and then share (write it on the chalkboard) this information with the entire class, each student will then record this data onto their weather observation sheets. Each student must collect the weather data at least once during the semester.

#### *Weather Observation Write-up*

The final project will be in the form of a written report to be accompanied with graphs. This report will be done individually.

- I. Weekly data: Complete a graph for each variable (temperature, precipitation, and relative humidity); use the data collection date as your x-axis data. (3 graphs)
- II. Daily data: Complete three graphs for each variable (temperature, precipitation, and relative humidity); use the data collection date as your x-axis data. \*Daily weather data will be provided. (3 graphs)
- III. Compare and contrast respective graphs (weekly temperature measurements vs. daily temperature measurements)
- IV. Include the answers to the following questions in your report.
  1. Are weekly vs. daily measurements sufficient to predict trends in weather? Why or why not?
  2. Using the temperature data provided by instructor, compare and contrast it with the daily data from the current year.
  3. Think about Fall 2011, will trends of Fall 2009 replicate themselves? Why or why not?

### **Laptop Required for Course-Regular Usage**

For the purposes of this course, it will be assumed that you are in compliance with the mandatory laptop policy of the university. You will be expected to bring your laptop and be ready to use it for every class period. Usage of the laptop must conform to the provisions of this course as laid out in this syllabus as well as the Code of Student Conduct.

### **Academic Dishonesty**

Academic dishonesty is a serious offense because it undermines the bonds of trust and honesty between members of the community and defrauds those who may eventually depend upon our knowledge and integrity. All students are expected to adhere to the Code of Student Conduct. Academic dishonesty in any portion of the academic work in this course shall be grounds for awarding a grade of F for the work or the entire course.

## Grades

Grades will be assigned based on the following distribution of points and percentages.

→ Quizzes	10 points each
→ Lab Activities	20 points each
→ Final Weather Observation report	100 points
→ Class Participation	75 points (5 points each lab period)
→ Field Experience	50 points

100% – 93% = A

82% - 80% = B-

69% - 67% = D+

92% – 90% = A-

79% - 77% = C+

66% - 63% = D

89% - 87% = B+

76% - 73% = C

62% - 60% = D-

86% - 83% = B

72% - 70% = C-

<60% = F

For class concerns and issues contact Dr. Latimer:

Dr. Jennifer Latimer

Science 159G

812-237-2254

[Jen.Latimer@indstate.edu](mailto:Jen.Latimer@indstate.edu)

Other University Policies can be found on the Office of General Education Website:

<http://www.indstate.edu/gened/docs/Foundational%20Studies/Info%20on%20Sycamore%20Standard%20and%20ADA%20and%20Laptops%20and%20Academic%20Freedom.pdf>