

Environmental Geology
GEL/ENV 210
Spring 2016

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Class Meetings: Monday and Wednesday, 9:00 – 10:00 AM, Boehm Bldg. 126

Laboratory Meeting: Thursday, 2:00 – 5:00 PM, Boehm Bldg. 126

Course Objectives: Statistics say that college students today will likely have between 10 and 14 different *careers* in their lifetime. It is, therefore, difficult to predict, specific, disciplinary skill sets that will be continually useful. However, it is likely that many future job opportunities will focus on the societal “grand challenges” of this century and many of those “grand challenges” are related to our environment (e.g. changing climate, sustainable energy, declining water resources). In addition, it is almost certain that at some point in your personal, if not professional, life you will be faced with the need to make a decision relating to a number of environmental “issues”. The objective of this course is, therefore, **to prepare you to critically evaluate proposed action on current environmental issues such that you can clearly formulate a course of action.** Your evaluation and any proposed course of action will be **clearly supported with a factual basis.** This objective has the components of increasing your proficiency in the transferable skill sets of: **Critical Thinking, Decision Making, and Written and Oral Communication.**

In the pursuit of our primary objective, you will also learn or improve existing abilities in: Accessing large, public, databases and web archives, Assessing data quality, Using Excel, Solving problems quantitatively, and placing information within a large(r) context.

Course requirements: Environmental geology pulls together many facets of geology, so you’ll need to know some basic concepts on which we can build. Physical Geology (GEL100) is, therefore, a prerequisite for this class. The environment is, however, about a lot more than just geology, so, while not formal prerequisites, it is also expected that you have a working, basic (high school level) knowledge of physics, chemistry, biology and mathematics.

Textbook: In an effort to keep our information current and reduce costs on your end, there is no traditional textbook for this course. We will draw from the published literature with readings located on e-reserve at the Rohrbach Library – look under **GEL210 – Environmental Geology** for all required readings – or on the web.

Attendance/late policy: Given our relative lack of a text and that fact that “lab” activities take place in every scheduled meeting, lecture/lab attendance is strongly recommended as the activities that take place in the classroom are an integral part of the information you receive in this course. Fieldtrip attendance is **required** – there is no going back. Make-up exams will be given only by prior arrangement or in the case of documented emergencies. Labs/homework assignments will be accepted late **only** by prior (e.g. before the day they are due!) arrangement.

E-mail policy: E-mail is the primary mode of communication in many arenas today, e-mail correspondence, like all writing in this course, should be professional, clear, and grammatically correct. E-mail subject lines **must** contain the course number (**GEL/ENV 210**). The body of the e-mail should contain a greeting, a concise, clearly written description of the question, problem, or topic, and a closing. E-mail messages *that conform to this standard* will generally be answered within one business day.

Honor code: Strict accordance with the University policies concerning plagiarism, cheating, etc. is expected. Science, and particularly the science of our environment, is, however, a collaborative endeavor. You are encouraged to discuss homework/lab assignments with each other – just as active scientists do. You are, however, also (again, just like active scientists) expected to be responsible for your own answers or, if appropriate, give clear credit to the work of others.

Disabilities: If there is any student in this class who has special needs because of learning, physical or other disability, please contact me so I can accommodate your needs. You may also contact Disability Services at the Disability Services Office, 215 Stratton Administration Building, 610-683-4108.

Labs/Field trips: Lab exercises will be integrated into most meeting periods (“lecture” and “lab” blocks) and we will meet every “lab” block this semester. Some of the activities will take place in the lab room and others will involve a field component. The field component will strive to take only the three-hour lab period, however, it is possible that some field exercises will require more time.

Assessment of Outcomes:

Assessment of your progress on primary and secondary course outcomes will be via:

- In-class data collection, processing, synthesis and quantitative problem solving exercises
- Written position and response pieces in D2L
- In-class presentations and discussions
- Final Projects

Tentative Grading Breakdown:

There will be no curving of grades in this course. Assignments and their associated keys will set a standard and your grade will reflect how you measured against that standard, not your fellow classmates. It is, therefore, possible for everyone in the class to achieve an “A”. Your final grade will be determined based on your total points: A = 93-100, A- = 90-92, B+ = 87-89, B = 83 – 86, B- = 80-82, C+ = 77-79, C = 70-76, D = 60-69, F = 0-59.

Much of the lab work in this course will be group work. Each group will turn in one completed paper and the names of all group members **who participated in that exercise** (i.e. if someone was absent, their name doesn’t go on the paper) will receive equal credit on the assignment.

Written position and response pieces will always be individual endeavors and, although labs comprise the majority of graded points, will be the main tool for assessing individual performance. The procedure for written assignments will be as follows:

- Questions will be administered as writing prompts via D2L.
- You will have one week to complete your writing (500 words) on the assigned prompt.
- The next week, all writings will be made visible to all members of the class and you will have one week to write a “response” (250 words) to one of your classmate’s (you pick) pieces.

Each writing or response will be worth the same amount of points (~19 pts each).

Both your original writings and your responses will be graded using the following rubric:

- Clearly express your opinion/response to the prompt or writing (3 pts).
- Be well and clearly written with logical reasoning (4 pts).
- Contain/reference at least 3 documented lines of factual support (provide links or sources if needed) (12 pts).

Because so much of this class is “hands on” and involved and your group depends on your input, there is also a participation segment of the grade (determined by me) – people who coast on the efforts of their teammates will not score as well as those who pull their weight.

The other part of your participation grade will be participation in class discussions. There are approximately 16 classes where readings are flagged with a **(D)**. On those days you should be sure to not only do the reading, but also to come with three (3) discussion points (something that particularly struck you, a question, a comment, a disagreement etc.) related to the reading. Your discussion points will be turned in at the end of class. Each discussion point (its presence and quality) will be worth one point. Your participation in the discussion will be worth an additional three points.

Finally, all groups will participate in the final class project. The project will take place during the last 4 – 5 weeks of the semester and be broadly divided into 5 parts. 1) Identify an environmental challenge of particular interest or importance (60 pts); 2) Develop potential societal changes that could address that challenge (90 pts); 3) Quantify the potential gains and losses for both the environment and society as a result of your proposed changes (90 pts); 4) Produce a final report and presentation that outline your findings and suggestions (60 pts); 5) Present your findings to the class (47 pts).

Probable Points Totals

Assignment	#	points each	total points	% of grade
Participation	--	---	45	4.5%
Class Discussions	16	6	96	9.6%
D2L Discussion Posts	8	19	152	15.2%
Labs	9	45	360 + 45	36.0%
Final Projects	1	347	347	4.5%
Total			1000	100%

GEL/ENV 210 Topic Outline and Reading Assignments

All readings will be on electronic reserve unless otherwise noted (e.g. web link).

TOPIC	COURSE WEEK and DAY	READING
Unit 1: Introduction to “the” Environment	1 - 2	
Class Introduction	1:Wednesday	
Modern Environmental Thought	1: Thursday	Sustainable Materials Management (D) Which Anthropocene? (D) Environmental Thought, Attitudes Towards the Environment
Population and Environmental Impact	2:Monday	Sustainability and Wilderness (D) Value and Want (D) Cultural evolution and the human predicament
Unit 2: Predicting and Managing Impacts	2 - 3	
Rivers and Flooding	2:Wednesday	Science and Society(D) Nuisance Flooding
Exploratory Modeling	3:Monday	Exploratory Modeling (D)
Unit 3: Food Supply	4	
Erosion and Agriculture	4:Wednesday	Soil and Human Security (D)
Unit 4: Water Resources	5	
Contamination	5: Monday	Benbrook,2012: http://www.enveurope.com/content/24/1/24 (D)
	5: Wednesday	http://www.pnas.org/content/early/2013/06/19/1221635110.full.pdf (D)
Resource Availability	5: Thursday	http://www.dni.gov/files/documents/Newsroom/Press%20Releases/ICA_Global%20Water%20Security.pdf (D) (pages i – vi) http://www.ceres.org/resources/reports/hydraulic-fracturing-water-stress-growing-competitive-pressures-for-water (D)

Unit 5: Energy and Mineral Resources	6 - 8	
Fossil Fuel Resources and Impacts	6: Monday	EROI Of Global Energy Resources p. 1 - 13 (D)
	6: Wednesday	EROI Of Global Energy Resources p. 14- 24 (D)
Alternative Energy	7: Monday	EROI Of Global Energy Resources p. 25 - 27 (D) Biofuels Overview (D)
	7: Thursday	Glicksman, 2008 (D)
Mineral Resources	8: Thursday	http://www.sciencefriday.com/segment/05/04/2012/is-thorium-a-magic-bullet-for-our-energy-problems.html (Note: This is a “listening” rather than a “reading”) (D)
Unit 6: The Fallout	8 - 9	
Municipal Waste	8: Thursday	Advancing Sustainable Materials Management: 2013 Fact Sheet (D)
Climate Change	9: Wednesday	IPCC AR5 Paleoclimate Chapter - <i>At least</i> the Executive Summary (D)
	9: Thursday	IPCC AR5 Working Group 1: Summary For Policy Makers (D)
Class Projects	10 - 15	
Identification and Reporting of Environmental Challenge	10	
Development and Reporting of Potential Societal Changes	11	
Quantification of Costs and Gains associated with Societal Change	12 - 13	
	13: Thursday: Farm Field Trip	
Develop Report and Presentation on Challenge, Solution, and Impact Changes	14	
Final Presentations	15 May 2, 8:00	