Environmental Geology
GEL/ENV 210
Fall 2018

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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. There is also the very real potential (as we will see) that the world-as-we-know-it will cease to exist/function in your lifetime; some of the more extreme estimates suggest we will have to get by on ~20% of our current levels of resource consumption. Given this potential for disruption and change in either our current 'gig' economy or our next economy (whatever *that* looks like) it is difficult to predict specific, technical, disciplinary skill sets that will be continually useful. However, we can be reasonably certain that more abstract talents like flexibility, creativity, listening, empathy, and thoughtful reflection will be universally useful. It also seems likely that, whatever the exact future looks like, many job opportunities will focus on societal "grand challenges" related to our changing resource base (a.k.a. our environment) such as renewable energy, declining water resources, climate change, and food security. Whether you work as an environmental professional or not, these are issues that will influence your life and, as both an individual and a member of a community, it is almost certain that you will be asked to make decisions regarding them.

The objective of this course is, therefore, **to provide you with some of the tools that will help you thrive and lead as our society grapples with future realities that may be alternately frightening and inspiring, but will all be very different from what we have experienced previously.** Along the way we will work on your ability to:

- recognize and shape narrative
- identify the role of narrative in data interpretation
- gather, process, and analyze data
- identify problems
- imagine, create, and evaluate potential solutions
- communicate your findings

Whatever our future holds, and whatever your role in it is, these skills will provide you with the foundation to deal with change creatively and help your community move forward.

Course requirements: Environmental geology. Environment: "the complex of physical, chemical, and biotic factors (such as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival."(Merriam-Webster) Geology: "The science which deals with the physical structure and substance of the earth, their history, and the processes which act on them." (Oxford Dictionary). Taken together, "Environmental Geology" pretty much

translates as "our planet," also known as "our resource base." The course, therefore, pulls together many facets and fields of knowledge, but you'll certainly need to know some basic planetary concepts so Physical Geology (GEL100) is a prerequisite for this class. In addition, 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 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.

Gender- Based Crimes
Educators must report incidents of gender-based crimes, including sexual assault, sexual harassment, stalking, dating violence, and domestic violence. If a student discloses such incidents to me during class or in a course assignment, I am not required to report the disclosure, unless the student was a minor at the time the incident occurred. Regardless of the student's age, if the incident is disclosed to me outside the classroom setting or a course assignment, I am required by law to report the disclosure, including relevant details, such as the names of those involved in the incident, to Public Safety and Police Services and to Mr. Jesus Peña, Title IX Coordinator.

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 narratives and reflections
In-class presentations and discussions
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.

Everyone is expected to complete the assigned readings and come prepared to participate in lab exercises and class discussions. All readings are required and linked to some course content. The readings are grouped into modules (e.g. "Energy") and within those modules there are subgroupings of readings. When each group of readings is assigned, you should:

a) Read them.
b) Write a response to the readings (**one** response for each **group** of readings) based on the following prompt.

1. **What is the most interesting thing you learned from this reading assignment?**
2. **Describe the narrative that provides a foundation and context for this reading assignment.**
   Initially, identifying the underlying narrative may be easier if you consider some, or all, of the following questions:

   What is implicit in the text— what does the author already expect you to know or believe? What is the text telling you about the state of your environment (planet)? What is it telling you about how you should interact with your environment? What role should you take and how active should that role be? How do you think this author views the future? What do you think their perspective on the present is? How do you think the author intended you to feel after reading this piece? Do you think the author wants you to do anything after reading this? If so, what? If not, why do you think they wrote it?

For the first, introductory, module, we will only consider those first two parts of the prompt. You should respond to both of them and your writing should be in the ballpark of a half to three-quarters of a page for each part of the prompt.

As the semester progresses, you will also need to respond to the following prompt:

3. **Do you agree with this narrative?**
   If yes, what can you do to promote it? What other data and experiences do you have that support this narrative?
   If no, what is an alternative narrative that fits the data the authors have presented? What other data and experiences do you have that support this alternative narrative?

c) Come to class prepared to engage in lively discussion.

Your written response to each part of the prompt will be worth 5 points. Your participation in the discussion will be worth an additional 5 points.

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.

Finally, everyone will participate in open-ended exploratory projects. These projects will occupy the end of the semester and constitute the "final exam" for this course.

Probable Grade Breakdown

Assignment	**% of grade**
Participation	10%
Readings and Class Discussions	30%
Activities	30%
Final Projects	30%

GEL/ENV 210 Topic Outline and Reading Assignments

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

TOPIC	COURSE WEEKS	ASSIGNMENTS
Introductory Module	1-3	**Readings** Environmental Thought --- Value and Want Cultural Evolution and the Human Predicament Sustainable Materials Management --- Which Anthropocene? Sustainability and Wilderness Pleistocene Park -- https://dir.princeton.edu/pdf_dir/2006_RubensteinDR&DI_BioCons.pdf --- Science and Society Nuisance Flooding --- Exploratory Modeling Is it Feasible to Build New Land in the Mississippi River Delta?
		Activities Milk cap brainstorming and narrative development. Journaling exercise. Reading discussions. Narrative comparison and reconciliation exercise. Sacony Creek Flood Survey Flood Model Development Presentation of Model Results and Predictive Narrative

Agricultural Resource Module	4	**Readings** Soil and Human Security --- Losing Ground Benbrook, 2012-- http://www.enveurope.com/content/24/1/24
		Activities Reading Discussions. Soil Erosion Exercise. Natural Fertilizer Exercise. Agricultural Chemicals Exercise.
Water Resource Module	5	**Readings** http://www.pnas.org/content/pnas/110/28/11250.full.pdf http://www.pnas.org/content/112/18/5750.full.pdf --- Water Use in Fracking https://www.dni.gov/files/documents/Special%20Report_ICA%20Global%20Water%20Security.pdf
		Activities Reading Discussions. Embodied water exercise: Part I (Food), Part II (Energy) Colorado River exercise.

Energy Resource Module	6-7	**Readings** EROI of Global Energy Resources p. 1 – 24 --- U.S. Fossil Fuel Resources --- IPCC AR5 WG1: Summary for Policymakers --- EROI of Global Energy Resources p. 25 – 27 Biofuels Overview
		Activities Reading Discussions. Petroleum Resource Exercise. Petroleum Use Exercise. CO_2 Emissions Exercise. Future Climate/Paris Accord Exercise. Power Storage Exercise. Passive Solar Exercise.
Solution Space	8-9	**Readings** Zeroenergyproject.org; https://insteading.com/blog/earth-sheltered-homes/; Straw Bale Building --- https://energy.gov/energysaver/planning-home-solar-electric-system http://www.resilience.org/stories/2017-04-03/passenger-trains-can-move-more-than-people-in-a-sustainable-transportation-system/ --- https://www3.epa.gov/region9/water/recycling/ http://www.phillywatersheds.org/whats_in_it_for_you/residents/rain-gardens --- slowmoney.org; mainefarmlandtrust.org

Solution Space	8-9	**<u>Activities</u>** Reading Discussions. Insulation materials activity. Home solar array activity. Commuter gym activity. Drip irrigation activity. Soil Testing Field Trip (Rainbow Farm).
Final Projects	10-14	
	Final Exam 8:00A.M Dec. 14	