

# GEOSC 303: INTRODUCTION TO ENVIRONMENTAL GEOLOGY

FALL 2002 ~32 classes

## Course Summary

Earth materials and processes, geohazards, natural resources, and human interactions with the environment

**Instructor:** Dr. Tony Foyle  
**Class Time and Location:** WF 12:00 – 12:50 in 165 Nick; T 2:00 – 3:50 in 110-Science  
**Contact Information:** H24 (under Computer Center); Ph 898-6277; E-mail amf11@psu.edu  
**Office Hours:** H24: WF 11:00 – 12:00 & by appointment  
**Website:** Pending!

## COURSE GRADING SCHEME

• 2 three-page essays @ 85 pts each	170 pts
• 1 East Side Access Hwy Environmental Assessment Project	140 pts
• Homework/Switch-Report assignments	080 pts
• 2 in-term examinations @ 120 pts each	240 pts
• 1 final comprehensive examination	240 pts
• Quizzes, RATs, field trip journals	130 pts
• Best 11 out of 12 lab reports (95% for lab; 5% for lab pre-quiz)	660 pts
• 2 mid-term lab exams	340 pts
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• TOTAL	2000 pts
• Extra-credit opportunities: Newspaper, magazine, or date- stamped web page clips on current environmental issues; Environmental videos; +/- GE or WM fieldtrip	50 pts
Note Card surveys, MSEs	20 pts

Letter grade scores for the course will be based on the following scale. I may lower (but not raise) the scale: **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.

## **COURSE DESCRIPTION & LEARNING OUTCOMES**

This course is designed for students majoring in fields inside and outside of science who have an interest in how humans interact with, and are beneficially and adversely impacted by, their physical environment. We'll cover the geology and processes active on the outer skin of the earth, and the energy and natural resources available to the human race. Completion of the course will enhance your scientific literacy and numeracy skills as they relate to the environment, and you will also benefit by becoming a better-informed earth inhabitant. A basic knowledge of algebra is assumed.

You will become an expert in everyday environmental issues by playing an **active role** in:

- (1) Examining the outer structure of the earth.
- (2) Seeking out, critically evaluating, and understanding geoprocess-human response relationships.
- (3) Synthesizing information and forming educated opinions on environmental issues.
- (4) Using real-world data to understand how environmental systems work and impact our daily lives.
- (5) Demonstrating your ability to learn, retain, and discuss environment-related concepts and issues.

There are three major recurring *THEMES* that run through this course that we will return to on a regular basis:

(1) **FUNDAMENTAL PROCESSES:** Natural and physical processes active at the earth's surface impact humans and vice versa. We need to understand how these processes work in order to have meaningful discussion on their potential human impacts.

(2) **TIME & SPACE:** Natural and physical processes at the earth's surface have geographic and temporal distributions. Their impacts on humans, and vice versa, therefore have certain spatial and temporal limitations and characteristics that we need to be aware of.

(3) **USES & NEEDS:** Humans use and need the environment for a multitude of reasons – recreation, habitation, commerce, industry, energy supplies, water supplies, waste disposal, etc. To be decent forward-looking earth citizens, we have to balance these uses and needs with the broader goal of long-term sustainability of the environment.

## **ACADEMIC INTEGRITY**

Academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. It is one of the guiding principles for all academic activity at Penn State and is one of the four Penn State Principles to which all students must abide. Any violation of academic integrity will receive academic and possibly disciplinary sanctions, including the possible awarding of an XF grade (which is recorded on your transcript and states that failure of the course was due to academic dishonesty). All acts of academic dishonesty will be recorded so that repeat offences can be sanctioned accordingly. For more information, see:

<http://www.pserie.psu.edu/faculty/academics/integrity.htm>

## PRELIMINARY SCHEDULE

### TOPIC

### PRE-CLASS M / F READING ASSIGNMENT

<b>(1) COURSE PREVIEW (2-3 classes)</b>		<b>W08/28</b>
Syllabus and textbook; labs overview + field options; Pre-Course Assessment		
The Earth's skin: rocks, sediments and their resource relevance		33-41;505-510
Population pressures and environmental impacts		12-22;229-230
08/27 LAB I-3: Do outside lab time and turn in as Homework 1 by SEPT 13		F31-38
09/03 LAB I-1B: Common rocks and 4-Mile Creek		F3;Appx B
 <b>(2) INTERNAL PROCESSES AND EXTERNAL IMAGES (3-4 classes)</b>		 <b>W09/04</b>
Plate Tectonics I		5,44-46
Plate tectonics II		F39-42;56-65
Sediment Analysis shortie		Lab?
09/10 LAB: Local-area environmental trip: Erie Wastewater Treatment Plant + journal		382-385
09/17 LAB I-2: Earth maps, aerial photographs, and satellite images A,B,C		F19;Appendix B
 <b>(3) INTERNAL PROCESSES AND EXTERNAL EFFECTS (4 classes)</b>		 <b>W09/18</b>
Volcanoes I: Processes		96-112
Volcanoes II: Human Response		112-123
Earthquakes I: Processes		www.iris.com/seismon 68-81
Earthquakes II: Human Response		81-94
09/24 LAB II-2: Hazards of Mt. St. Helens		F55
10/01 LAB II-4: The Loma Prieta earthquake		F81
<i>SEPTEMBER 27: Essay 1 due: Present the case for "Where in the world you would live in order to be at the greatest risk of an earthquake strike." (hint: IRIS and USGS resources)</i>		<i>SEPT 27</i>
 <b>(4) SELECTED SURFACE PROCESSES (4 classes):</b>		 <b>W10/02</b>
Mass movements: Processes and Human Responses		(Thipaisha) 171-195
Streams and flooding: Processes and Human Responses		www.sciencecourseware.com 126-147
The coastal zone: Processes		150-162
The coastal zone: Human Responses		162-169
10/08 LAB II-6: Landslides		F101
10/15 NO LAB: Fall break		
<i>OCTOBER 11: MIDTERM LAB EXAM 1</i>		<i>(in lecture period)</i>  <i>OCT 11</i>
 <b>(5) WATER RESOURCES (4 classes):</b>		 <b>W10/16</b>
Groundwater I: Concepts and Darcy's Law		F159-161;234-244

Groundwater II: Supply, Use, and Sustaining the resource (Thipaisha)	245-261
Groundwater III: Case Study Savannah	F203-209/EnvGeology
10/22 LAB II-9: River floods A&B or UP Harrisburg / USGS data	F131
10/29 LAB II-10: GSA SOLO Coastal hazards	F149

<i>OCTOBER 16: MIDTERM LECTURE EXAM 1</i>	<i>OCT 16</i>
<i>OCTOBER 18: ENVIRONMENTAL ASSESSMENT STATUS</i>	<i>OCT 18</i>
<i>OCTOBER 25: Homework 2 due: Water-related hazards: Tabulate the hazards faced by a Mississippi floodplain versus a Hilton Head SC barrier island resident, both at +5' MS/MSL?</i>	<i>OCT 25</i>

**(6) CONVENTIONAL US ENERGY RESOURCES (6 classes & GSA):**

<b>GSA: DEP October 30 Online Coal Mine Tour</b>	<b>W10/30</b>
Reserves and resources	Comp Cntr/Library
COAL: Formation, Properties, Reserves, Recovery, and Use	F211-213;230-232
OIL & GAS: Formation, Properties, Reserves, Recovery, and Use	326-328
Environmental Effects of Fossil Fuel Recovery, Refining, and Use	314-321
11/05 LAB III-1: Groundwater hydrology	Team Class Pres
11/12 LAB III-3: Erie water treatment facility + journal	F163
11/19 LAB: Presque Isle monitoring data / lab model	F179
	Presque Isle
<i>NOVEMBER 1: Certificate due from Coal Mine Tour</i>	<i>NOV 01</i>
<i>NOVEMBER 04: LRC Essay 2 due: Tidal energy (global what, where, how much; US why/not &amp; future)</i>	<i>NOV 29</i>
<i>NOVEMBER 13: MIDTERM LECTURE EXAM 2</i>	<i>NOV 13</i>

**(7) SELECTED ALTERNATE US ENERGY RESOURCES (4 classes):**

<b>Nuclear Fission</b>	<b>W11/20</b>
Gas Hydrates	338-346
Solar / Hydroelectric Energy	321-322
Illustrated 2-page Switch-Report + 10 Min Summary	348-351;355-357
Wind Energy	357-361
11/26 LAB X: Detecting the water table with GPR @ Presque Isle / on campus / North East	DEP approv
12/03 LAB IV-3: Solid waste, urban ores, recycling	F231

**(8) WASTE DISPOSAL (2 classes)**

Conventional solid and liquid wastes	<b>W12/04</b>
Nuclear waste	368-386
	(Thipaisha) 386-397
<i>DECEMBER 10: MIDTERM LAB EXAM 2</i>	<i>DEC 10</i>

**(9) GLOBAL WARMING (2 classes)**

Global warming theory; data extrapolation NSF & V12	<b>W12/11</b>
ENV ASSESSMENT CLASS PRES – P ISLE GOLF COURSE / E-SIDE ACCESS HWY	213-227
	F12/13
<i>Final Exam Review Session; optional LRC essay re-submit</i>	<i>DEC ??</i>

**DECEMBER 16-20: FINAL COMPREHENSIVE EXAMINATION**

## **TEXTBOOK, RESERVE/ONLINE TEXT, OTHER MATERIALS:**

Course Text:                   **Environmental Geology (6<sup>th</sup> Ed.)** by C.W. Montgomery (2003)  
Published by McGraw Hill, Inc. This text forms the framework for  
this course and will be supplemented with web-based information  
The lab manual is **Investigations in Environmental Geology**  
**(2<sup>nd</sup> Ed.)** by Foley, McKenzie, and Utgard.

Interesting Reading:       **The Little Ice Age – How Climate Made History, 1300-1850**  
by B. Fagan (2000). Published by Basic Books.

**The Prize: The Epic Quest for Oil, Money, and Power** by D.  
Yergin (1991). Published by Simon and Schuster. Documents the  
history of oil exploration in NW Pennsylvania.

## **HOW CAN I DO WELL IN THIS COURSE?**

This is a one-semester course. Your final grade will be fair and will reflect the amount of effort you (and for several learning exercises, your team-mates) put into the learning process.

Your grade will reflect your ability to conduct specific assignments outside of the classroom (to include a team environmental assessment, switch-reports, essays, homeworks, assigned readings, optional proof of "currency" in environmental issues, and participation in note card surveys) and in the laboratory (and occasionally in the field) which will make up ~50% of your final grade.

Your final grade will also reflect your ability to understand facts and concepts and how to apply critical thinking skills to develop informed and educated opinions on environmental issues (2 intra-semester lecture exams, 2 intra-semester lab tests, 1 final comprehensive lecture exam, several quizzes) which will also make up ~50% of your final grade.

Quizzes, Readiness Assessment Tests (RATs), and examinations will consist of multiple-choice, short-essay, short-calculation, and true/false questions designed to test your understanding of key concepts, ideas, and processes relating to human interactions with the environment.

Unless indicated otherwise, all quizzes, homeworks, and essays are due in class (by hand and in person) on the due-date indicated and should reflect individual work done by you. Late turn-ins will cause the worth of the product to decrease by 20% for each day (or part of a day) it is late. Only documentable proof of legitimate curricular and extracurricular commitments/emergencies will alleviate the penalty for late turn-ins. Examinations and laboratory practicals will be given once only: If you miss an examination or laboratory, only documentable proof of legitimate curricular and extracurricular commitments/emergencies will be considered.

With regard to attendance, Penn State policy states that *"a student should attend every class ... and should be held responsible for all work covered in the courses taken. A student whose irregular attendance causes him or her, in the judgment of the instructor, to become deficient scholastically, may run the risk of receiving a failing grade or receiving a lower grade than the student might have secured had the student*

*been in regular attendance."* From my point of view, it is to your definite benefit to attend all classes and be prepared to participate. Topics covered in class (which may not necessarily be covered in as much detail in the text book nor in the order presented in the text book) will be examinable and will also be useful for homeworks, essays, etc. To benefit from class participation and to do well in this course, you must attend class.

This course covers a lot of new material quickly, and you will have a lot of reading! To do well, attend all classes, take notes on the key points discussed in class and in the assigned pre- and post-class readings, review and annotate your notes each evening after each class, be prepared to participate in class discussions, and meet or otherwise communicate with the instructor if you have any questions on any matter related to the course. Study regularly and for at least 2 hours for each hour of class, and review the end-of-chapter summary, key terms, review questions, and online additional-information directions. Complete all home and in-class assignments (individual and team-based) punctually and thoroughly, and take charge of your learning. For group assignments, put in your best effort because you and your group peers will be evaluating your (and their) contributions to the group effort ... if you let the team down, they will know it and consequently I will! Lastly, monitor your e-mail on a regular basis as there may be times when I need to contact the class outside of class periods (for example, to distribute an assignment).

## **GUIDELINES FOR THE THREE ESSAYS (AND THE SWITCH-REPORTS):**

All essays must use SI units unless indicated otherwise. The essays must be double spaced, single sided, and "typed up" with an 11pt Times font. The Title Page must have your name, your co-authors' names (if a team assignment), the title of the paper, and your estimate of your and your co-authors' contributions to the paper (in percent). The essay must incorporate an Introduction, a Discussion (which may have sub-headings such as Problems, Solutions, Environmental Concerns, etc.), Conclusions, and a Reference List. Numbered Figures, Illustrations, and/or Tables must appear on separate (extra) pages and be referred to in the text. References must be properly cited (ask me if you don't know how to do this), and at least one reference must be a real science/engineering/business journal article. Any quoted material in your essays must not exceed two sentences. Review the *Behrend College Style Manual* or see me if you need any clarification. Essay #2 should theoretically be your best essay as you will have had an earlier essay to perfect your techniques! In Essay #2, I will be looking for evidence of critical thinking on the tidal energy issue. Because of this added emphasis, you will have the opportunity to resubmit the essay for a revised grade in early December provided that you meet with a tutor at the Learning Resource Center (LRC) and make concrete, critical-thinking-related, changes to your essay.