12:179 (GEOS 4790) - Engineering Geology Fall 2012 Semester

CLASS MEETINGS: Lecture: TR, 09:30-10:20, 231 Trowbridge Hall

Lab: F, 10:30-13:20, 136 Trowbridge Hall

INSTRUCTOR: Dr. Adam S. Ward
OFFICE: 36 Trowbridge Hall
EMAIL: adam-ward@uiowa.edu

PHONE: 319-353-2079

OFFICE HOURS: Tuesdays, 10:30-14:00, or by appointment

TEXTS: Hencher, S. 2012. *Practical Engineering Geology*, 1st edition. CRC Press.

ISBN-13: 978-0415469098

FREE E-book RESOURCES

(free access from on-campus computers or when connected via VPN)

Maund, J. G. & Eddleston, M. (eds) 1998. *Geohazards in Engineering Geology*. Geological Society, London, Engineering Geology Special

Publications, 15.

http://egsp.lyellcollection.org.proxy.lib.uiowa.edu/content/15/1.toc

Price, D.G., 2009. Engineering Geology: Principles and Practice.

Springer.

http://www.springerlink.com/content/l4g551/#section=129818&pa

ge=1&locus=0

or search "Engineering Geology: Principles and Practice" at:

http://www.lib.uiowa.edu/

GRADING: Participation 10%

Reading Quizzes 10%
Homework 20%
Site Report 20%
Case Study 20%
Exams (2) 15%
Final Exam 5%

Final grades will be based on the weighted average outlined above and assigned using the following grading scale:

• $A+ \ge 100\%$

• $A \ge 92\%$

• $92 > A - \ge 90\%$

• $90 > B + \ge 88\%$

• $88 > B \ge 82\%$

• $82 > B - \ge 80\%$

• $80 > C+ \ge 78\%$

• $78 > C \ge 72\%$

• $72 > C - \ge 70\%$

• $70 > D \ge 60\%$

• 60 > F

COURSE GOALS & OBJECTIVES

The primary goal of 12:179 is to provide a background in how geologic features can have short- and long-term consequences in the performance of various engineering and natural resource management applications. After taking this course:

- Students will correctly classify soil samples, and describe their basic engineering properties, using multiple classification systems.
- Students will develop GIS databases and extract information about specific sites relevant to construction projects.
- Students will demonstrate critical design or selection conceptual soil erosion and sediment control plans for proposed construction sites.
- Students will demonstrate the ability to identify natural and man-made hazards associated with a site from a variety of data sources.
- Students will write a technical report summarizing site conditions and hazards relevant to a major engineering project.
- Students will synthesize course topics with their educational background, describing role of geology in engineering applications.
- Students will demonstrate professional communication in discussions, presentations, and written reports.

PREREQUISITES

The prerequisites for this course are one of: 012:003 (Earth History and Resources), 012:005 (Introduction to Geology), 012:008 (Introduction to Environmental Science), or 053:105 (Engineering Geology, in the CE department). If your record does not reflect that you have passed one of these courses, please consult the instructor prior to the drop date (31-Aug-2012 is the last date to drop without a "W" on your transcript).

CLASS MANAGEMENT

All course materials and web postings will be made using the ICON course management software. You are responsible to regularly login (https://icon.uiowa.edu/) to check course announcements, download lecture materials, and access posted information.

LECTURE & IN-CLASS PARTICIPATION

Lectures will be the primary form of teaching and learning in this class. Most material will be presented using PowerPoint, and slides will be posted the evening before class. You are responsible to print copies, if you choose. Please bring your textbook, notes, a calculator, and scrap paper to each class. During lectures you may be assigned in-class exercises (to work as a group or individual), or have the opportunity to participate in group discussions. In small group work, each group will submit their work with all names on the paper. Credit will be given for your participation in these activities.

READING OUIZZES

For lectures and labs where readings are assigned, a short multiple choice quiz (3-5 questions) will be administered via ICON. The quiz will be available for at least 24 hours prior to the start of each lecture or lab for which reading is assigned, and will close at the start of lecture or lab. Make-up quizzes will only be offered in accordance with

arrangement made prior to the due date, and only for University approved absences. Your lowest grade on a reading quiz will be dropped when final grades are calculated.

SITE REPORT

Each student will produce a site evaluation report. The report will serve as an example of what you may be asked to complete in practice, and will emphasize the application of course material to your future careers. Specifics of this assignment will be provided during the semester.

CASE STUDY

Each student will present a case study of an engineering geology triumph or tragedy. Presentations will provide a description of the site (geological perspective) and a summary of the triumph or tragedy. Specifics of this assignment will be provided during the semester.

HOMEWORK ASSIGNMENTS

Selected homework problems will be assigned related to the material in each lecture and lab. Homework assignments are weighted equally in calculation of final grades, although some assignments will be longer than others. Problems from each two-week period will be collected *at the beginning of class on Tuesdays on even weeks*. Please note the following important points:

- 1. The primary role of these problems is to reinforce concepts learned in class. They are intended to provide practice in setting up and solving problems.
- 2. Assignments are due at the start of class. Please drop them off in the front of the room before class begins.
- 3. *No late submittals will be accepted* without arrangement made prior to the date and time at which assignment are due (i.e., provide notification before you miss a deadline; email is fine) and for University excused absences.
- 4. You are encouraged to work with other students in class, but the work you submit must be your own. There is a fine line between collaboration and academic misconduct, please do not cross it. Note that referring to or copying solutions from previous semester or the internet will be considered academic misconduct and treated accordingly.
- 5. Please submit your assignments in accordance with the following general guidelines:
 - a. Work on 8.5x11-inch paper, on one side only. Feel free to recycle paper.
 - b. Staple all pages together, number pages, and include your name on each page.
 - c. Present all questions in the order they are asked in the assignment.
 - d. Handwritten submittals should be legible. If handwriting is not clear, no points will be given for the response.

EXTRA CREDIT

You may submit one write-up, as described below, with each homework assignment to earn 10% extra credit on that assignment.

Engineering Geology in the News: This course introduces you to the importance of

geological features to engineering, with an emphasis on the application of geology to engineering and natural resource management. You can earn an additional 10% on each of the homework assignments by finding examples in newspapers, magazines, or on the internet of real-world examples where the topics covered in this course play a vital role. To earn this credit, you will need to submit a 1-2 paragraph, well written synopsis with your homework assignment that provides:

- Summary of the issue (in your own words)
- Brief discussion of how the problem relates to this class (what principles covered in class are important in solving the problem?)
- A copy of the story
- Articles must have been published within the last 3 years
- You must turn these in with each homework assignment throughout the semester (i.e., due with each assignment, and cannot be submitted after homework deadlines). No late submittals or make-up will be accepted.

LABS

Lab periods will be held in TILE classrooms. These labs are primarily intended for handson, interactive learning. Activities will include presentations from and discussion with guest lecturers, field visits to local sites, and hands-on experience with materials and equipment.

EXAMS

This course includes two exams during the course of the semester. Each exam will be designed for students to complete in 50 minutes or less. Exams are closed book and closed notes. Any required information (for example, equations) will be provided. All material in lectures, labs, and reading assignments is subject to examination. Exams are equally weighted in calculation of final grades.

FINAL EXAM

The final exam for this course will be a take-home exam, due at the end of the final exam period scheduled for this course. Details will be provided during the semester.

MISC. BUISINESS

Please respect your fellow students by arriving on time, keeping side-conversations to a minimum, focusing your attention on the lecture and problem solving, not packing your things to leave before class is over, and by turning cell phone ringers off and keeping phones put away during class.

If you find yourself having difficulty early in the semester please see me ASAP. I enjoy office hours and helping students understand the material. Often times a few conversations to help explain the material in another way is all that students need to be highly successful in this course.

Feel free to email me with questions related to lecture, homework, or in class exercises. Please do understand that I will attempt to reply in a reasonable amount of time (24-

hours), but that the reply may not be immediate. Please practice professionalism in your communications via email; this will be required in your future careers and now is a good time to start.

For help with homework assignments or to discuss course material in greater detail, office hours are highly encouraged (as opposed to emailed questions). The learning process in this course is centered around your effort. I am happy to help you master the material, but note that explanations via email are difficult and can lead to more confusion than help in some cases.

DEPARTMENTAL AND UNIVERSITY ITEMS

Department Office: 121 Trowbridge Hall **Department Chair** (DEO): Prof. M.K. Reagan

Telephone: 319-335-1818

DEO Office: 121C TH

DEO Telephone: 319-335-1820 DEO Email: geology-deo@uiowa.edu

Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at http://clas.uiowa.edu/students/handbook.

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences. (*Operations Manual*, III.15.2. k.11.)

Accommodations for Disabilities

A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See www.uiowa.edu/~sds/ for more information.

Academic Honesty

All CLAS students have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS Final Examination Policies

The final examination schedule for each class is announced around the fifth week of the semester by the Registrar. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students

should plan on being at the UI through the final examination period. Once the Registrar has announced the dates and times of each final exam, the complete schedule will be published on the Registrar's web site.

Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit the instructor, then the course supervisor, and then the departmental DEO. Complaints must be made within six months of the incident (CLAS Student Academic Handbook.)

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety web site.

Rights and responsibilities in the classroom

The College's statement on student rights and responsibilities can be found at: http://www.clas.uiowa.edu/students/handbook/x/.

COURSE SCHEDULE (subject to change – see ICON for updates)

Week	Lecture		Topic	Reading
TTOOK	1	21-Aug	Introduction to Engineering Geology	Reduing
1	2		Hazard, Risk, & The Engineering Geologist	Ch. 1
			TILE Introduction and activities.	Supplemental #1
2	3		Intro to Civil Engineering projects	2.1-2.2
	4		Intro to design	2.3-2.5
	L2		Intro to design	Supplemental #2
	5	4-Sep	Site Investigation I	4.1-4.4
3	6	6-Sep	Site Investigation II	4.6-4.10
3	L3	7-Sep	Guest Lecture: Ryan Clark. Subsurface Sampling	3.8, Supplemental #3
4	7		Intro to Geophysics. Guest Lecture by Dave Campbell	4.5
	8		Natural hazards	4.11
	6 		Geophysics hands-on experience	Supplemental #4
	9		Material Properties	5.1-5.3
5	10		Material Testing	5.4
5	L5		GIS-based Hydrology. GAAB Visitor Discussion.	3.4
	11	25-Sop	Soil Properties	5.5
6	12		Rock Properties	5.6-5.7
"	L6		Soils and geology databases, hands-on classification	3.0-3.7
	13			
7	14	2-Oct	Exam I (Lecture 1-12, Labs 1-5)	Cupplemental #F
7			Soil Erosion and Sediment Control SESC Plans, calculations	Supplemental #5
	L7 15			Supplemental #6
		9-Oct	Calculation of loads	6.1-6.3
8	16 L8		Foundations + Foundation Design	6.4
	17		SESC Guest Lecture: Darice Baxter + Site Visit	6.5
9	18	18-Oct	Tunnels + Caverns	
9	18			Supplemental #7
			Case Study Panel: Deer Creek	27.66
10	19		Slope Stability I	3.7, 6.6
10	20		Slope Stability II	Supplemental #8
	L10		Slope stability calculations, analysis.	Supplemental #9
4.4	21 22		Ground Improvement, Surface Mining	6.8-6.9
11		1-Nov	Earthquakes	6.10-6.11
12	L11 23	2-Nov 6-Nov	Guest Lecture: James Goodrich + Site Visit	Complemental #10
			Soil Hazards (liquefaction, expansive clays, etc.) Groundwater fundamentals	Supplemental #10
	24 L12	8-Nov 9-Nov	Groundwater hands-on	-
12				
	25 26		Flooding + Floodplains	
13	L13		Guest Lecture: Lon Drake Exam II (Lectures 13-26, Labs 6-12)	
THANK			Exam II (Lectures 13-26, Labs 6-12)	
THANKSGIVING BREAK			Takes desking to the Consulting Design	
14	27		Introduction to the Consulting Business	
	28		Case Study Presentations	
	L14		Case Study Presentations	
15	29	4-Dec	Guest Lecture: Melissa Ward (Agricultural Engineering)	
	30	6-Dec	Guest Lecture: Mary Skopec (Iowa Water Quality)	
	L15	7-Dec	Final Project Work	

Supplemental Readings

Supple	Supplemental Readings				
1	The Vaoint Reservoir Disaster. G.A. Kiersch. Civil Engineering, March 1964.				
2	Loschberg tunnel disaster, 100 years ago. T. Waltham. Quarterly Journal of Engineering Geology and Hydrogeology 2008; v. 41; p. 131-136				
3	Chapter 7 from Price textbook				
4	Chapter 5 from Price textbook				
5	"About RUSLE" and "Erosion Factors" sections of: http://www.iwr.msu.edu/rusle/about.htm				
6	Chapter 1 of Iowa Construction Site Erosion Control Manual.				
7	Chalk solution features at three sites in southeast England: their formation and treatment by SJ Rhodes and IM Marychurch (in the Geohazards and Engineering Geology textbook).				
8	USGS Slope Stability Fact Sheet				
9	Inspection and risk assessment of slopes associated with the UK canal network by GJ Holland and ME Andrews (in the Geohazards and Engineering Geology textbook).				
10	Subsidence hazards caused by the dissolution of Permian gypsum in England: geology, investigation, and remediation by AH Cooper (in the Geohazards and Engineering Geology textbook).				