EART 142: Soil Properties and Mechanics
Spring 2003

Course Parameters:

Class: TuTh 2-3:45PM
Lab: W 1-4 PM
Where: All in EMS D226

Instructor:

Dr. Slawek Tulaczyk, EMS A208, phone: 9-5207, tulaczyk@es.ucsc.edu
Dr. Jerry Weber, A347, 9-5429, jweber@es.ucsc.edu
Office hours: Slawek Tulaczyk -> TuTh 1-2 PM
TAs: Ian Howat (ihowat@es.ucsc.edu), John Cook (jcook@es.ucsc.edu)

Text:

Perry H. Rahn, *Engineering Geology - An Environmental Approach*, Prentice Hall, NJ

Course Objectives

Soils represent an important boundary layer. Their properties put important constraints on human activities and help control a number of fundamental geological processes (e.g., mass movement on slopes, faulting). The main goal of this course is to teach you about properties and mechanics of soils in the context of applied problems (e.g., landslide mitigation) and basic geologic problems (e.g., sediment compaction, faulting).

Course Structure

Lectures will constitute ~65% of this class. The remaining time will be spent on laboratory and field exercises. Each of the planned exercises will have a report due one week after the exercise is over. We will have two weekend field exercises. To make your learning more complete and to let you practice your writing skills, there will be different types of written assignments. There will be two exams, a midterm and a comprehensive final.

Evaluations

Evaluations will be based on:

(1)	Exams	30%	
	Midterm		10%
	Final		20%
(2)	Six lab reports (5% each)	30%	
(3)	Eight homeworks (2% each)	16%	
(4)	Two field trip reports	20%	
	Content (6% each)		
	Structure (2% each)		
	English (2% each)		
(5)	Course participation	4%	

For clarity, here are the due dates for the written assignments.

(1) Exams - due at the end of the exam period;
(2) Homework assignments - due one week after being handed out;
(3) Lab/trip reports - due one week after the field/lab exercise;

Schedule

Instructors = JW and ST

		TOPIC:	CHAPTER:
WEEK 1			
JW+ST 04/01	-	Introduction to Soil Mechanics, maps, aerial photographs and remote sensing	Ch. 1
JW+ST 04/02	-	Lab #1: Formulating an investigation – maps and photographs	Ch. 2

ST	04/03	-	Weathering and soil-forming processes	Ch. 3
WEEK 2				
ST	04/08	-	Geophysical techniques	Ch. 12
ST	04/09	-	Lab #2: Ground Penetrating Radar – on campus exercise	
ST	04/10	-	Rock mechanics	Ch. 4
WEEK 3				
JW	04/15	-	Soil characterization and classification	Ch. 5
JW	04/16	-	Lab #3: Field classification of soils	
ST	04/17	-	Soil-water interactions – ground water	Ch. 7
WEEK 4				
ST	04/22	-	Soil-water interactions – surface water	Ch. 8
ST	04/23	-	Lab #4: Lab analysis of soil properties and consolidation	
ST	04/24	-	Soil compaction, consolidation, and subsidence	Ch. 5, 9
WEEK 5				
ST	04/29	-	Shear strength of soils	Ch. 5
ST	04/30	-	Lab #5: Laboratory tests of soil strength	
ST	05/01	-	MIDTERM	
WEEK 6				
JW	05/06	-	Properties and description of landslides	Ch. 6
JW	05/07	-	Lab #6 – Landslide lab	
ST	05/08	-	Mass wasting	
WEEK 7				
ST	05/13	-	Quantitative analysis of slope stability	Ch. 6
	05/14	-	Lab #7 – no lab (weekend field exercise 1)	
CR	05/15	-	Faults and fault mechanics	Ch. 11

weekend exercise 1 = drilling a landslide

WEEK 8				
JW	05/20	-	Seismic hazard characterization	Ch. 11
	05/21	-	Lab #8 - no lab (weekend field exercise 1)	
JW	05/22	-	Seismic safety and hazard assessment	Ch. 11
WEEK 9				
JW	05/27	-	Coastal hazards	Ch. 10
	05/28	-	Lab #9 – no lab (weekend field exercise 2)	
JW	05/29	-	Hazard analysis and mitigation, geologic hazard maps	

weekend exercise 2 = subsurface mapping with a GPR

WEEK 10			
ST	05/03	-	Soil mechanics and civil engineering – stability of foundations and structures
	05/04	-	Lab #10 – no lab (weekend field exercise 2)
JW+ST	05/05	-	Summary – Formulating and executing an investigation

FINAL 05/09, Monday, 7:30 – 10:30 PM

What can you expect from us in this course

You should expect us to care about teaching and to work sincerely on engaging you in this course. The material we cover should be relevant and interesting. We should be open to questions in class and outside of class. You should expect to be treated fairly and not be ridiculed or embarrassed. You should expect that your work will be evaluated in a timely fashion.

Please, let us know at some point during the semester if you feel that as we fail these or any other reasonable expectations.

What we will expect from you

We expect that you are taking this course because you have a sincere desire to learn about its subject and that you are ready to put in the work necessary to achieve new knowledge and skills. We expect that you will treat us fairly as your teachers and that you will help us to make this course a good one by providing feedback about the course.

How to do well in the different aspects of this class

ATTENDANCE - This is self explanatory, you have to be there to learn.

PARTICIPATION - Here you have to go beyond just being there. Even if you are shy by nature, do participate actively in the discussions and exercises. Keep up with the material, ask questions, express your opinions, use your knowledge to agree or disagree with what others (including me) are saying. Participation includes also turning to me for help in class and outside of class (e.g., during office hours). Come to me if you have relevant questions or if you get stuck trying to solve a problem or to address an issue. If you do all or most of these things your participation will be excellent. One of the goals of this class is to help you learn how to be active.

TRIP/LAB REPORTS - Written technical presentations are somewhat different from essay-type write-ups. Brevity, clarity, and plain English are all good trades in technical writing. To write an excellent technical paper or report, you want to make it as informative as possible. To do this you need to thoroughly research your topic. Anticipate the questions that those who read your paper or abstract may be asking. You write to explain things, not to be suspenseful. Use of a standard framework for the structure of your paper is also advisable (e.g., Introduction, Literature Review, Methods, Results, Discussion, Conclusion). A report does not have to have this structure.

Only a few lucky people have a natural ability to write well. The rest of us must work on it. I encourage re-writes if the written assignments are not of very good quality.

HOMEWORK PROBLEM SETS - There are several stages of generating excellent answers to problem sets: (1) thorough understanding and analysis of the questions asked, (2) selection of the right pieces of knowledge or mathematical/physical tools that are needed to address the problem, (3) logical application of the knowledge and tools to the solution of the problem, and (4) verification of the quality of your approach. Best performance on solving a problem set will require that you get the correct answers. However, partial credit will be given if you demonstrate the ability to go through some of the stages, (1) through (4), but fail to get the right answers. Generation of solutions to the problem sets must be your independent work. If you need to clarify something, it is best if you come and ask me or the TA.