Geotechnical Engineering 1
CVEN 3708, Spring 2010
lectures: MWF 11-11:50 ECCR 245, labs: M2-4, M4-6, R2-4 ECCE 1B53
https://culearn.colorado.edu
REFER TO CULEARN FOR UPDATED OFFICE HOURS, FOR POSTING QUESTIONS, ETC.
As much as possible, this will be a “paperless” class, so refer to CULearn for handouts

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ECCE 1B53
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Course Objective:
To introduce the terminology, basic principles, analytical methods, and laboratory techniques in soil mechanics for geotechnical and foundation engineering.

Prerequisite: CVEN 3161, Mechanics of Materials

Lab text: (on reserve) J.-P. Bardet, Experimental Soil Mechanics, Prentice Hall, 1997

Books on reserve at Engineering Library:

Course Outline (Craig)
Basic characteristics of geologic materials (Ch1)
Soil classifications (Ch1)
Seepage theory (Ch2)
Effective stress principle (Ch3)
Stresses and displacements (Ch5)
Theory of consolidation (Ch7)

Grading:
Quizzes (in-class) 40%
Lab reports 20%
Final exam (in-class, 5/3, 4:30-7pm) 40%

Quizzes:
Problem sets will be given almost weekly and are NOT collected and graded. Their purpose is to help you prepare for the in-class quizzes, one following each problem set. The motivation for the quizzes is twofold: (1) to have each student learn the material as the course progresses, rather than just before an exam, and (2) to provide feedback on your progress. There will be approximately 7 problem sets, and thus 7 in-class quizzes. The quizzes are closed book, closed notes, with equations/tables/etc provided.
Labs: no late lab reports accepted
The labs are required for the course and will help in understanding the principles presented in lecture. Read a description of the lab before your lab session (Craig, Bardet, and handout). You will work in groups of about 5, with one report per group (same group throughout semester). Reports should discuss relation between theory presented in class (and covered in problem sets and quizzes) and measurements made in the lab. A required format for reports will be provided, and reports are due typically one week after the lab was held (unless you share data from all lab sessions).

Tentative lab schedule (to be updated on CULearn): approximately every other week; readings in Bardet, and handout posted
Lab 1 (particle-size analysis: mechanical method, 1.1-1.2) M 1/25, R 1/28
Lab 2 (specific gravity, 3.3) M 2/8, R 2/11
Lab 3 (particle-size analysis: hydrometer method, 1.3-1.7) M 2/22, R 2/25
Lab 4 (liquid and plastic limits of soils, 2.1-2.9) M 3/8, R 3/11
Lab 5 (moisture-unit-weight relationship: compaction test, 3.1-3.5) M 3/29, R 4/1
Lab 6 (consolidation test, 6.1-6.2) M 4/12, R 4/15

Conduct in lecture:
Please conduct yourself in a respectful and professional manner in class. Please refer to the campus webpage: http://www.colorado.edu/policies/classbehavior.html

Honor Code:
Violation of the honor code will not be tolerated. Please refer to the following webpage for details: http://www.colorado.edu/policies/honor.html
If you are found to violate the honor code, you will receive an “F” for the course, regardless of the degree of academic dishonesty: i.e., copying another student’s problem set, or cheating on an exam.

Special considerations:
• If you have a disability and require special accommodations, please provide Prof. Regueiro with a letter from Disability Services outlining your needs. Refer to the webpage http://www.colorado.edu/disabilityservices
• If you have a conflict as a result of religious observances, please notify Prof. Regueiro at least 2 weeks in advance of the exam, quiz, or assignment due date. http://www.colorado.edu/policies/fac_relig.html
CVEN 3708 Course Objectives

The course objectives listed below are based on the desired program outcomes identified for engineering education by the Accreditation Board for Engineering and Technology (ABET). For each course objective, the related ABET outcome(s) is listed. See the attached page for more information on ABET.

1. Ability to classify soils based on lab tests
   You will gain knowledge of the nature of soils and use it for their classification for engineering applications. (This objective maps to ABET outcomes "a", "b", "d" and "g")

2. Ability to develop and apply knowledge of phase relations in soils
   You will gain knowledge of the different phases of soil constituents and express it in mass-volume relations. (This objective maps to ABET outcome "a")

3. Ability to apply theory of compaction and to conduct soil compaction test
   You will gain knowledge on densification of soils through the different compaction techniques and its relation to moisture content. (This objective maps to ABET outcomes "a", "d" and "g")

4. Ability to conduct permeability test and seepage analysis
   You will gain knowledge on the flow of water through porous soils and apply seepage theory to analyze flow through earth structures. You will also learn to apply seepage theory to groundwater hydrology. (This objective maps to ABET outcomes "a", "b", "c", "e" and "g")

5. Ability to calculate stress distribution under applied foundation loads
   You will gain knowledge on the theory of stress distribution and apply it to obtain the stresses in the foundation soil due to different boundary loads. (This objective maps to ABET outcomes "a", and "e")

6. Ability to apply knowledge of soil compressibility obtained from oedometer testing to settlement calculations
   You will gain knowledge on the soil compressibility and study it by oedometer testing. You will then apply this knowledge to the calculation of surface settlement due to the compressibility of the underlying soils. (This objective maps to ABET outcomes "a", "b", "d" and "e")

7. Ability to apply theory of consolidation to analyze consolidation testing and time rate of settlement
   You will gain knowledge of effective stresses and to apply it in developing a theory of consolidation. You will then apply the theory to conduct and analyze consolidation testing, and to analyze consolidation settlement. (This objective maps to ABET outcomes "a", "b", "d" and "e")

Accreditation through ABET

The Accreditation Board for Engineering and Technology (ABET) is a professional accrediting organization that accredits specific academic programs to assure quality in education. Accreditation is a voluntary, non-governmental process of peer review. It requires an educational program to meet certain, defined standards or criteria. More information on ABET and accreditation can be found on the ABET website at http://www.abet.org.
ABET a-k outcomes

As part of the accreditation process, ABET sets general criteria for students, faculty, facilities, educational objectives, and institutional support, as well as program criteria for specific engineering disciplines. One major criterion established by ABET is a set of desired program outcomes, the so-called “a-k” outcomes. These are listed in their entirety below. Specific objectives for individual courses in the CEAE Department are mapped to these ABET outcomes.

Engineering programs must demonstrate that their graduates have:
(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Mapping of CVEN 3708 objectives against ABET outcomes:

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