Geotechnical Engineering 2
CVEN 3718, Fall 2018
lectures: MWF 11-11:50, ECCR 155, **labs:** F 2-4, 4-6, ECCE 1B53

Instructor:
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Course Objective:
To learn the fundamental principles of soil mechanics pertaining to *shear strength and failure analysis*, and how to apply these principles to current design procedures for geotechnical structures, such as retaining walls, foundations, and slopes.

Prerequisites:
CVEN 3708, Geotechnical Engineering 1; CVEN 3161, Mechanics of Materials
Required text: J. Knappett, R.F. Craig, *Soil Mechanics*, 8th ed., CRC Press, 2012
https://ebookcentral.proquest.com/lib/ucb/detail.action?docID=1449548
Lab text: (on reserve) J.-P. Bardet, *Experimental Soil Mechanics*, Prentice Hall, 1997

Books on reserve at Engineering Library:
- J.-P. Bardet, *Experimental Soil Mechanics*, Prentice Hall, 1997.
- D.P. Coduto, *Geotechnical Engineering: Principles and Practice*, Prentice Hall, 1999, 2010.
- R.F. Craig, *Soil Mechanics*, 7th ed., Chapman & Hall, 2004.
- B.M. Das, *Principles of Geotechnical Engineering, 5th ed*., Brooks Cole/Thompson Learning, 2002.
- D.J. Elton, *Grounded! : amazing classroom demonstrations in soil mechanics*, ASCE Press, 2015

https://ebookcentral.proquest.com/lib/ucb/detail.action?docID=3425656
- R.D. Holtz & W.D. Kovacs, *An Introduction to Geotechnical Engineering*, Prentice Hall, 1981.
- T.W. Lambe & R.V. Whitman, *Soil Mechanics*, Wiley, 1969.
- T.W. Lambe & R.V. Whitman, *Soil Mechanics, SI version*, Wiley, 1979.

Course Outline
Stress analysis in soils (K&C 5.1, Bardet Ch5, brief review of CVEN3161, handout)
Shear strength (K&C Ch5, Bardet Ch5,7)
Lateral earth pressures and retaining structures (K&C Ch11)
Bearing capacity and foundations (K&C Ch8)
Stability of slopes (K&C Ch12)

CVEN 3718 Grading:

Problem Sets	20%
Lab Reports	20%
Midterm Exam 1 (in-class, TBD)	20%
Midterm Exam 2 (in-class, TBD)	20%
Final Project	20%

Problem Sets:
There are approximately 7 problem sets. You can work together but must turn in your own solutions. You are allowed one late problem set, turning in the late problem set two class periods after it is due.

Labs:
The labs are required for the course and will help in understanding the principles presented in lecture. **You are required to participate in the labs. If you miss a lab, you will receive a grade of 0 points on the lab report**. Read a description of the lab before your lab session (K&C, Bardet, and handout). You will work in groups of <5 students in lab, but will hand in one report per student, and list your fellow lab group students so we know the source of data. Reports should

discuss relation between theory presented in class (and covered in problem sets) and measurements made in the lab. A required general format for reports will be provided in the respective lab handout, and reports are due typically one week after the lab was held (unless you share data from all lab sessions). Most likely lab sessions will be split into two sub-sessions depending on the number of students per lab (e.g., for a 2hr lab session, you will be assigned to one of the two 1hr sub-sessions, A or B; the TA will determine this schedule). **There is no class period on the Friday of the week that lab is held.**

Tentative lab schedule:
Lab 1 (shear strength of cohesionless soils: direct shear) F 9/14
Lab 2 (shear strength of cohesionless soils: CD triaxial compression) F 9/21
Lab 3 (shear strength of cohesive soils: Vane test; UC) F 10/12
Lab 4 (centrifuge testing of retaining wall failure) F 10/26
Lab 5 (Bechtel lab: SLOPE/W for slope stability analysis) F 11/2 (held during classtime)
Lab 6 (centrifuge testing of slope stability) F 11/9

Midterm Exams:
The two in-class midterm exams will test your knowledge of the concepts learned in class, problem sets, and in the labs. They will be open book and open notes.

Final Project:
You may work individually or maximum in groups of two students (groups of two students will be expected to do more than a student working by her/himself; I will grade accordingly).
You have two options for the Final Project: (i) choose a related *amazing classroom demonstration* from Elton's book (preferably no repeats between groups); or (ii) choose a design problem (retaining wall, shallow foundation, or slope) related to topics covered in class, but based on a real-world problem (e.g., you could verify an existing design reported in a published case study). You will present your project (in-class demonstration for (i) with supporting videos, and PowerPoint-like slides for (ii)) along with written report during the Final Exam period (TBD). Format of the report for (i) is similar to the Lab report format, and (ii) similar to case study format (see posted guidelines, and look up example yourself, unless you're following an existing case study for your design project). For (i), you will be reimbursed maximum up to $30 per project for materials (provide receipts), and you must use the same soils from Lab (Colorado Mason Sand and Boulder Clay). The TA will facilitate access to soil. For (i), having access to some tools is helpful (not sure we can use the Structures lab or not), and McGuckin Hardware in Boulder will cut plywood pieces to size, if needed. Any other materials in Lab may be used, assuming they are returned clean and unbroken to their proper places; the TA will facilitate.

Conduct in lecture:
Please conduct yourself in a respectful and professional manner in class so as not to disturb the instructor or your fellow students. Attendance is not required for lecture, but it is for labs. *Please do not talk in class out of turn.* Refer to the campus webpage: http://www.colorado.edu/policies/student-classroom-and-course-related-behavior

Honor Code:
Violation of the honor code will not be tolerated. Refer to the following webpage for details:
http://www.colorado.edu/policies/student-honor-code-policy
If you are found to violate the honor code, you will receive an "F" for the course, regardless of the degree of academic dishonestly.

Special considerations:
•If you have a disability and require special accommodations, provide Dr. Regueiro with a letter from Disability Services outlining your needs. Refer to webpage https://www.colorado.edu/disabilityservices/.
•If you have a conflict as a result of religious observances, notify Dr. Regueiro at least 2 weeks in advance of the exam or assignment due date. http://www.colorado.edu/policies/observance-religious-holidays-and-absences-classes-andor-exams

Bechtel Lab: Stop by ECOT 441 to sign up to use the Bechtel Lab if you don't already have Buff OneCard card swipe access. Use your identikey username and password to login to the computers.