ENGG*3670 SOIL MECHANICS

SCHOOL OF ENGINEERING, UNIVERSITY OF GUELPH

FALL 2012

COURSE DESCRIPTION

Soil Mechanics is the branch of science that deals with the study of the physical properties of soil and the behavior of soil masses subjected to various types of forces. In this course we will study relations of soil physical and chemical properties to strength, visco-elastic property and pressure-volume relationships of soil systems, stress-strain characteristics of soil, environmental engineering applications of soil mechanics and field investigation methods.

INSTRUCTOR

Dr. Bahram Gharabaghi, THRN 2417, 519-824-4120 x 58451, bgharaba@uoguelph.ca
Homepage: http://www.soe.uoguelph.ca/faculty_pages/bahram_g.html

LABORATORY MANAGER

Ryan Smith, THRN 3403, 519-824-4120 x 53278, rsmith17@uoguelph.ca
John Whiteside, THRN 3403, 519-824-4120 x 54424, jwhitesi@uoguelph.ca

TEACHING ASSISTANTS

Farshid Sabouri, fsabouri@uoguelph.ca
Spyridon Antonelos, santonel@uoguelph.ca

COURSE RESOURCES

- Lectures
  - Monday, Wednesday and Friday, 10:30 AM - 11:20 PM, MACK 029
- Laboratory Experiments
  - Section 101: Monday, 03:30 PM - 05:20 PM, FVMI 135 or MACK 308;
  - Section 102: Wednesday, 03:30 PM - 05:20 PM, FVMI 135 or MACK 308;
  - Section 103: Thursday, 02:30 PM - 04:20 PM, FVMI 135; or ALEX 259;
  - Section 104: Friday, 02:30 PM - 04:20 PM, FVMI 135 or MACK 308.

REQUIRED TEXTBOOKS

1. Donald P. Coduto, Man-chu Ronald Yeung, William A. Kitch. 2010. Geotechnical Engineering: Principles & Practices; Prentice Hall; ISBN- 978-0132368681; and
2. Braja M. Das. 2008. Soil Mechanics Laboratory Manual [Paperback]. Oxford University Press. ISBN-10: 0195367596; ISBN-13: 978-0195367591.

COURSELINK

Please access course website to download course material and to upload laboratory experiment reports electronically to the course "Dropbox" under the designated folders: https://courselink.uoguelph.ca/shared/login/login.html

TOPICS OF STUDY

Week	Date	Lecture Topics
1	Sep. 10 to 14	Chapter 3: Site Exploration and Characterization
2	Sep. 17 to 21	Chapter 4: Soil Composition
3	Sep. 24 to 28	Chapter 5: Soil Classification
4	Oct. 1 to 5	Chapter 6: Excavation, Grading & Compacted Fill
5	Oct. 8 to 12	Chapter 7: Groundwater - Fundamentals
6	Oct. 15 to 19	Chapter 8: Groundwater - Applications
7	Oct. 22 to 26	Chapter 9: Stress in a Soil Mass
8	OC. 29 to Nov. 2	Chapter 10: Compressibility and Settlement
9	Nov. 5 to 9	Chapter 11: Rate of Consolidation
10	Nov. 12 to 16	Chapter 12: Soil Strength
11	Nov. 19 to 23	Chapter 13: Stability of Earth Slopes
12	Nov. 26 to 30	Chapter 17: Lateral Earth Pressures

LABORATORY EXPERIMENTS

Students will form groups of three (3) students and collaborate in conducting the experiments, taking notes, and discussions; however, each student will write and submit a separate individual report. If a student cannot attend a laboratory experiment on scheduled time for valid reasons, the student should contact the instructor and arrange to conduct the missed experiment during the Open Lab week.

Week	Date	Activity	Location
1	Sep. 10 to 14	Introduction Lab	FVMI 135
2	**Sep. 17 to 21**	**Lab 1: Grain Size Analysis**	**FVMI 135**
4	**Oct. 1 to 5**	**Lab 2: Hydrometer Analysis**	**FVMI 135**
6	**Oct. 15 to 19**	**Lab 3: LL, PL and SL Analysis**	**FVMI 135**
8	**Oct. 29 to Nov. 2**	**Lab 4: Permeability Test**	**FVMI 135**
10	**Nov. 12 to 16**	**Lab 5: Direct Shear Test**	**FVMI 135**
11	Nov. 19 to 23	Open Lab / CEC Demo	FVMI 135 / SC 2101

Each student must prepare individually a technical report for each completed experiment ***due within one week of the date of the experiment*** and submit both electronically on the CourseLink "Dropbox" designated folder as well as in hard copy to the course instructor by the due date. Late submissions (without valid reasons approved by the instructor) will have a penalty of 25% per day.

QUIZZES

In total four (4) quizzes are scheduled - as indicated in table bellow - each worth 5% of the total grade; If a student cannot attend a quiz on scheduled time for valid reasons, the student should contact the instructor and arrange to write the quiz during the Open Quiz week.

Week	Date	Activity	Location
3	Sep. 24 to 28	Tutorial & **Quiz 1** on Ch. 3 & 4	MACK 308
5	Oct. 8 to 12	Tutorial & **Quiz 2** on Ch. 5 & 6	MACK 308*
7	Oct. 22 to 26	Tutorial & **Quiz 3** on Ch. 7 & 8	MACK 308
9	Nov. 5 to 9	Tutorial & **Quiz 4** on Ch. 9 & 10	MACK 308
12	**Nov. 26 to 30**	**Open Quiz**	**MACK 308**

*Note: students in the Mon. Oct. 8th section will write Quiz 2 on Thursday Nov. 29th.

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Understand the basic concepts of Soil Classification, Site Exploration and Characterization; articulate the unique properties that distinguish different natural and engineered soils behavior from solids or fluids.
2. Demonstrate knowledge of the broad range of environmental engineering applications of soil mechanics encountered in practice.
3. Model practical engineering problems and solve them in a systematic manner using basic software tools (especially spreadsheets) and mathematical models.
4. Calculate soil stress in a soil mass, lateral earth pressure, soil strength, and the factor of safety against soil shear failure.
5. Have a working knowledge of accuracy, precision, and significant digits, and recognize the importance of dimensional homogeneity in engineering calculations.
6. Apply integral methods, and basic empirical and theoretical models, to the analysis of Slope Stability for both natural and engineered soils and Settlement calculations.
7. Demonstrate fundamental knowledge of specialized laboratory and field equipment, sensors and instruments used in site exploration and characterization.
8. Apply knowledge of Soil Mechanics fundamentals combined with effective technical engineering problem solving skills to Groundwater Flow problems.
9. Follow laboratory testing procedures and standard methods, collect and analyze data and write professional engineering laboratory reports.
10. Demonstrate individual and team work ethics, professionalism and respectful interaction with both instructors and students during laboratory experiments.

EVALUATION

The final grade will be determined from the results of the Laboratory Experiment Technical Reports, Quizzes, and the Final Examination weighted as follows:

1. Laboratory Experiment Technical Reports……..20%
2. Quizzes ……20%
3. Final Examination……..……...……....……60%

GRADE DISPUTES

If a student feels that a Quiz or Laboratory Report was graded unfairly, or if there is an error in the grading, it should be brought to the attention of the Instructor within one week after the graded material is handed back. Scores will not be reconsidered beyond one week after they are handed back.

POLICY FOR MISSED EXAMINATION

If the Final Examination is not written, the procedures in the current University of Guelph Undergraduate Calendar must be followed.

PLEASE NOTE

The regulations concerning Academic Misconduct as outlined in the current University of Guelph undergraduate calendar will be strictly enforced.