Civil Engineering 3B03 – Geotechnical Engineering II

Session: Term II, Winter 2018
Instructor: Dr. Hamid Batenipour – Hamid.Batenipour@kiewit.com

Teaching Assistants:
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3\textsuperscript{rd} TA will be assigned

Schedule:
Lecture: Thursday 7:00pm – 9:00pm BSB-B135
Tutorials:* Wednesday 11:30am – 1:20pm ABB-163
       Friday  2:30pm – 4:20pm JHE-A102
Laboratory:* Monday  8:30am – 11:20am JHE-114 (Geo. Lab)
       Tuesday
*As per schedule

Text Books:

Additional Readings:
Course Description:

All structures that are designed and built by Civil Engineers are connected in some way to the earth. Foundations provide the connection between man-made structures and the geosphere, with foundation engineering being concerned with soil-structure interaction. Geotechnical Engineering II introduces the background theory required in foundation engineering.

This is a three-credit undergraduate course in Civil Engineering and is an extension of Geotechnical I, which focuses on stresses in the ground, as well as on settlements.

The main objective of the CIV ENG 3B03 is to introduce the principles of shear strength theory, which are required for the design and analyses of foundations of structures, including buildings, bridges, and retaining structures.

At the end of the course, the participants will understand and be capable of applying geotechnical principles and theories to analyze common problems encountered in foundation engineering.

Learning outcomes:

1.4. Competence in specialized engineering knowledge.

At the end of the course the students should develop an adequate background in relation to interpretation of the results drained/undrained triaxial tests and be able to apply basic geotechnical principles/methodologies to analyze common problems encountered in foundation engineering.

2.3. Ability to obtain substantiated conclusions as a result of a problem solution including recognizing the limitations of the solutions.

The students should develop skills for drawing adequate conclusions from the results of calculations in relation to design of a class of geotechnical structures. They should understand the limitations of various approaches including limit analysis and limit equilibrium strategies.

4.2. Recognizes and follows engineering design principles.

The students should develop a background in relation to design of retaining walls, assessment of slope stability as well as bearing capacity of shallow foundations.
Course Contents:

Chapter 1. Introduction: Course outline
   Review of basic soils characteristics

Chapter 2. Stress and strain considerations
   Review of mechanics

Chapter 3. Soil strength

Chapter 4. Soils shear strength: Sand (cohesionless) and Clay (cohesive)

Chapter 5. Bearing capacity theory

Chapter 6. Earth pressure theory

Chapter 7. Slope stability theory

Chapter 8. Embankments

Final Grades:

Assignments: 10%
Laboratories: 10% (group submission)
Mid-Term Test*: 30%
Final Examination*: 50%

* You must achieve a weighted average grade of at least 50% for the mid-term test and final examination combined in order for the assignments/quizzes to be counted as part of the final grade.

Tutorials:

Attendance at tutorials is mandatory! Students will generally be assigned problems that, in some cases, are to be completed during the tutorial session. The teaching assistants will be available during the tutorial period to answer questions concerning assignments, labs, etc. Bring textbook, notes, paper, drawing instruments, calculators, etc. to the tutorial session and be prepared to work.
Assignments:

Assignments must be submitted on time. Late submissions WILL NOT be accepted (will be assigned a mark of zero). Copying and plagiarism will not be tolerated.

Laboratory Experiments:

Each individual is required to participate in a total of 4 laboratory experiments. The experiments are normally performed in groups of 5 to 6 that will be assigned in two Lab sessions. They will take place in JHE114 (the soil mechanics laboratory on the ground floor of the Engineering Building). You have one week to write your lab reports, which must be submitted by 5:00 p.m. the same day of the week following the completion of the laboratory experiment.

Extensions on due dates for labs will be granted only under exceptional circumstances. Labs that are submitted late will be docked 10% per day.

Students are expected to familiarize themselves with each experiment before the laboratory session. They are also expected to understand the principles of the experiments, as the final examination may ask questions about them.

Academic Integrity:

All students are expected to conduct themselves in an ethical and honest manner. Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3.

The following illustrates only three forms of academic dishonesty:

- Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
- Improper collaboration in group work. (Insert specific course information)
- Copying or using unauthorized aids in tests and examinations.
Laboratory Health and Safety:

The Faculty of Engineering is committed to McMaster University’s Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs". It is your responsibility to understand McMaster University Workplace and Environmental Health and Safety programs and policies. For information on these programs and policies please refer to McMaster University Environmental and Health Support Services Occupational Safety Risk Management Manual at: http://www.workingatmcmaster.ca/med/document/Lab-Safety-Handbook-1-36.pdf. It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment.