Session

Term I: Tuesday, September 03 – Wednesday, December 04

Instructor

Dr. SeonHong Na
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Contact: seonhong@mcmaster (ext. 21720)
Office hours: Tuesday 10:00 – 12:00, or by appointment

Teaching Assistants

TBA

Class Schedule

Lectures: Wednesday, 19:00-22:00 (ETB 235)
Tutorials: Friday, 11:30-13:20 (ABB 163)

Prerequisites

CIVENG 3B03 Geotechnical Engineering II

Course Description

This is a four-credit undergraduate course in civil engineering. The main purpose of the course is to apply the principles of geology and soil mechanics to the design and analyses of foundations of structures, such as buildings, bridges, and retaining structures. Theoretical and empirical design methods for stability and settlement are discussed using example problems and case histories. Practical application is emphasized through the assignments, which require interpreting results of a soil investigation, engineering analyses and design (applying the principles and concepts of Geotechnical Engineering to ‘real’ structures). Foundation designs are not unique; although some are better than others.

Teaching Approach

The topics in this course will be presented using a traditional lecture format. Students are expected to attend lectures to ensure that they appreciate what material is considered to be most important. Tutorials will be used present examples and case histories, or as a problem-solving session during which assignments will be completed and handed in. Assignments are intended to help consolidate the understanding of material presented in lectures as well as extend concepts covered in lectures.
Textbook
Braja M. Das, Principles of Foundation Engineering (8th or 9th Edition), Cengage Learning

References
   Complementary K provides additional information for the National Building code of Canada (NBCC) 2005 provisions regarding the design of foundations and temporary excavations. Pertinent NBCC Sections include Section 4.2 (Foundations) Subsection 4.1.3 (Limit states design)
3. NAVFAC Manuals: DM 7.01 and DM 7.02

Learning Outcomes
By the end of this course, students should be able to:
• list various types of foundations and describe their applications.
• illustrate the design process of different foundations under the simple field conditions.
• explain fundamental theories and principles (models) in foundation engineering.
• select designing methods and perform analysis that accounts for foundations designs.
• identify assumptions and constraints in designing different foundations.
• investigate modern/state of the art tools in foundation engineering.

The emphasis in the course will be on relating theory to practice, which is not always clear. Skills and theoretical background obtained in CIVENG 3A03 and 3B03 should be sufficient to carry out analysis and design in this course.

Sufficient review of material covered in the Level III courses is provided, focusing on the practical applications. You are expected to have mastered what was taken in Level III.

Please remember that design in the application of theory to problems, which are not necessarily well defined to provide a solution for the task at hand.

Assessment of Learning*
1. Assignments: 35%
2. Term Tests/Quizzes: 40%**
3. Exam: 25%***

* A student must achieve a weighted average grade of at least 50% for the term tests and final exam combined for the assignments/quizzes to be counted as part of the final grade.

** Missed work forms will not be accepted for quizzes/tests. Each quiz has a weight of 1%. The weight of test will depend on the number of tests and quizzes. Each test/quiz emphasizes the material covered during the previous two weeks unless otherwise informed.
*** The weight of the exam will be decided based on discussion with class regarding the marking scheme.

**Course Topics (Tentative)**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Lectures*</th>
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<tbody>
<tr>
<td>1. Introduction</td>
<td>1</td>
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<tr>
<td>2. Review of Soil Mechanics (First tutorial will be used as a review)</td>
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<td>3. Site Investigation</td>
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<td>o Site characterization</td>
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<td>o Exploration and sample techniques</td>
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<td>o In-situ tests (SPT, CPT, Vane shear, etc.)</td>
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<td>4. Observational Approach in Foundation Engineering</td>
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<td>5. Limit States Design in Geotechnical Engineering</td>
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<td>6. Shallow Foundations</td>
<td>3-4</td>
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<td>o Bearing capacity</td>
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<td>o Settlements</td>
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<td>o Spread footing design</td>
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<td>7. Mat Foundations</td>
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<td>8. Lateral Earth Pressure and Retaining Structures</td>
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<td>9. Gravity Retaining Structures (John Emery)</td>
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<tr>
<td>10. Coulomb Analysis and Braced Excavations (dewatering)</td>
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<td>11. Deep Foundation Analysis and Design</td>
<td>2</td>
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<td>o Types, installation, load transfer, etc.</td>
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<td>o Single Piles</td>
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<td>o Pile Groups</td>
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<td>12. Slope Stability for Foundation Problems</td>
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<td>13. Miscellaneous – depends on time constraints</td>
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* The list of topics and the number of lectures are approximate. Order of lectures may be switched around, depending on lecture and time constraints and.

**Policy Reminders**

The Engineering Faculty has a specific policy statement on discrimination. If you are unfamiliar with it, please obtain a copy from the Faculty Office.

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 dishonest”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. 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 (Insert specific course information, e.g., style guide).
- Improper collaboration in group work (Insert specific course information).
- Copying or using unauthorized aids in tests and examinations.

Health and Safety

The Department of Civil Engineering is committed to McMaster’s University 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.

Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.