



ENGG*3670 Soil Mechanics

Fall 2019

Section(s): C01

School of Engineering

Credit Weight: 0.50

Version 1.00 - September 04, 2019

1 Course Details

1.1 Calendar Description

Relations of soil physical and chemical properties to strength; soil water systems and interactive forces. Visco-elastic property and pressure-volume relationships of soil systems. Stress-strain characteristics of soil under dynamic loads. Application of engineering problems. Laboratory and field investigation methods.

Pre-Requisites: ENGG*2120, ENGG*2230

1.2 Course Description

This course is an introductory course in geotechnical engineering, which is a basic course in most civil, environmental and water resources engineering programs. The main goals of the course are to teach students (1) the fundamental concepts in soil properties and its measurement; (2) environmental engineering applications and (3) software design tools.

1.3 Timetable

Lectures:

M/W/F 11:30 - 12:20 All Sections ANNU 156

Weekly Seminars:

Tues. 8:30 – 9:20 Sec 11, 21, 31, 41 ROZH 108 / THRN 1313

Fri. 9:30 – 10:20 Sec 12, 22, 32, 42 CRSC 403 / THRN 1313

Fri. 10:30 - 11:20 Sec. 13, 23, 33, 43 MCKN 307 / THRN 1313

*Note: Concurrent but different-content seminars are offered in the ROZH 108 / CRSC 403 /MCKN 307 classrooms than in the THRN 1313 Computer Lab on a bi-weekly schedule.

Bi-Weekly Laboratory:

Mon 2:30 - 4:20 Sec 21, 22, 23 THRN 1107

Tues 3:30 - 5:20 Sec 31, 32, 33 THRN 1107

Wed 2:30 - 4:20 Sec 41, 42, 43 THRN 1107

Thur 3:30 - 5:20 Sec 11, 12, 13 THRN 1107

1.4 Final Exam

Final Exam is scheduled for December 10th, 2019 at 14:30 for 2 hours.

2 Instructional Support

2.1 Instructional Support Team

Instructor: Bahram Gharabaghi
Email: bgharaba@uoguelph.ca
Telephone: (519) 824 4120 ext. 58451
Office: THRN 2417
Office Hours: TBA on CourseLink or by appointment.

Lab Technician: Ryan Smith
Email: rsmith17@uoguelph.ca
Telephone: (519) 824-4120 ext. 53278
Office: THRN 1114

2.2 Teaching Assistants

Teaching Assistant: Denis Clement
Email: dclement@uoguelph.ca
Office Hours: TBA on CourseLink

Teaching Assistant: Ye Eun Chai
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Office Hours: TBA on CourseLink

3 Learning Resources

3.1 Required Resources

Course Website (Website)

<http://courselink.uoguelph.ca>

Course material, news, announcements, and grades will be regularly posted to the ENGG*3670 CourseLink site. You are responsible for checking the site regularly.

Donald P. Coduto, Man-chu Ronald Yeung, William A. Kitch. 2014. Geotechnical Engineering: Principles and Practices, 2nd Edition. Pearson Custom Library; ISBN 10: 1-269-25924-5; ISBN 13: 978-1-269-25924- (Textbook)

3.2 Recommended Resources

Cheng Liu; Jack B. Evett. 2008. Soil Properties: Testing, Measurement, and Evaluation, 6th Edition. Prentice Hall; ISBN-13: 978-0-13-614123-5. (Lab Manual)

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you 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 sophisticated numerical models, to the

- analysis of Slope Stability for both natural and engineered soils and landfill slopes.
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 problem solving skills & use of engineering tools to Groundwater Flow problems.
 9. Follow laboratory testing procedures and standard methods, collect and analyze data and write professional engineering laboratory reports.

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
1	Knowledge Base	1
1.1	Recall, describe and apply fundamental mathematical principles and concepts	1
1.2	Recall, describe and apply fundamental principles and concepts in natural science	1
1.3	Recall, describe and apply fundamental engineering principles and concepts	1
1.4	Recall, describe and apply program-specific engineering principles and concepts	1
2	Problem Analysis	4, 6, 8
2.1	Formulate a problem statement in engineering and non-engineering terminology	4, 6, 8
2.2	Identify, organize and justify appropriate information, including assumptions	4, 6, 8
2.3	Construct a conceptual framework and select an appropriate solution approach	4, 6, 8
2.4	Execute an engineering solution	4, 6, 8
2.5	Critique and appraise solution approach and results	4, 6, 8
3	Investigation	1, 7
3.1	Propose a working hypothesis	1, 7
3.2	Design and apply an experimental plan/investigative approach (for example, to characterize, test or troubleshoot a system)	1, 7

#	Outcome	Learning Outcome
3.3	Analyze and interpret experimental data	1, 7
3.4	Assess validity of conclusions within limitations of data and methodologies	1, 7
5	Use of Engineering Tools	3, 6, 7, 8
5.1	Select appropriate engineering tools from various alternatives	3, 6, 7, 8
5.2	Demonstrate proficiency in the application of selected engineering tools	3, 6, 7, 8
5.3	Recognize limitations of selected engineering tools	3, 6, 7, 8
6	Individual & Teamwork	9
6.1	Describe principles of team dynamics and leadership	9
6.2	Understand all members' roles and responsibilities within a team	9
6.3	Execute and adapt individual role to promote team success through, for example, timeliness, respect, positive attitude	9
6.4	Apply strategies to mitigate and/or resolve conflicts	9
6.5	Demonstrate leadership through, for example, influencing team vision and process, promoting a positive team culture, and inspiring team members to excel	9
7	Communication Skills	2, 5, 9
7.1	Identify key message(s) and intended audience in verbal or written communication as both sender and receiver	2, 5, 9
7.2	Interpret technical documentation such as device specification sheets, drawings, diagrams, flowcharts, and pseudocode	2, 9
7.3	Construct the finished elements using accepted norms in English, graphical standards, and engineering conventions, as appropriate for the message and audience	2, 9
7.4	Substantiate claims by building evidence-based arguments and integrating effective figures, tables, equations, and/or references	2, 5, 9
7.5	Demonstrate ability to process oral and written communication by following instructions, actively listening, incorporating feedback, and formulating meaningful questions	2, 9
8	Professionalism	5, 9

#	Outcome	Learning Outcome
8.1	Demonstrate an understanding of what it means to be a professional engineer and distinguish between legislated and non-legislated professions	9
8.2	Effectively describe engineering law and its impact on professional engineering practice	9
8.3	Demonstrate professional behaviour	5, 9
9	Impact of Engineering on Society and the Environment	2, 5
9.1	Analyze the safety, social, environmental, and legal aspects of engineering activity	2
9.2	Evaluate the uncertainties and risks associated with engineering activities	2, 5
9.3	Anticipate the positive and negative impacts of introducing innovative technologies to solve engineering problems	2

5 Teaching and Learning Activities

5.1 Lecture Schedule

Lectures	Lecture Topics	Learning Objectives
1 - 3	Soil Composition	1,7
4 - 6	Soil Classification	1,7
7 - 9	Excavation & Compacted Fill	1,2,7
10 - 12	Groundwater Fundamentals	2,7
13 - 15	Groundwater Applications	2,3,8
16 - 18	Site Exploration	2,3,5,8,9
19 - 21	Stress in Soil Mass	3,4

22 - 24	Soil Strength	2,3,9
25 - 27	Stability of Earth Slopes	2,4,9
28 - 30	Compressibility & Settlement	3,4,6
31 - 33	Rate of Consolidation	2,3,5
34 - 36	Lateral Earth Pressures	2,9

5.2 Lab Experiment Schedule

Students will form groups of three (occasionally two students) from the same lab section and collaborate in conducting the experiments, taking notes, discussions and submit a report as a group electronically on the course website designated drop box, due within 7 days of conducting each test, for marking; late submissions will have a 1% penalty per hour (i.e. if you submit 12 hours late the grade will be multiplied by 0.88).

Week of	Activity
Sep. 9	Safety & Orientation; Registering Your Groups
Sep. 16	No labs this week
Sep. 23	Particle Size Analysis & Hygrometry test
Sep. 30	No labs this week
Oct. 7	Atterberg Limits
Oct. 14	No labs this week
Oct. 21	Falling Head Test
Oct. 28	No labs this week

- Nov. 4 Direct Shear Test

- Nov. 11 No labs this week

- Nov. 18 Open Lab

- Nov. 25 No labs this week

In this course, your instructor will be using Turnitin, integrated with the CourseLink Dropbox tool, to detect possible plagiarism, unauthorized collaboration or copying as part of the ongoing efforts to maintain academic integrity at the University of Guelph. All submitted lab reports will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such reports. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. Accounts are available to students on Turnitin to help with the editing of their submissions to ensure that plagiarism did not take place.

5.3 Seminar Schedule

The focus of the weekly seminars is to teach the students engineering analysis and design tools, namely: SEEP-W and SLOPE-W. These programs greatly enhance the analysis and design capabilities for complex problems. Students of the same lab group will collaborate in building computer models for the assigned problems, discussions and submit a report electronically on the course website dropbox, due within 7 days of conducting each assignment, for marking; late submissions will have a 1% penalty per hour (i.e. if you submit 12 hours late the grade will be multiplied by 0.88). The other main activity during the weekly seminars include tutorials in preparation for the term tests and the final exam.

Week of	THRN 1313		CRSC 403 / ROZH 108	
Sep 9	SEEP-W Tutorial, Part I	11, 31,12, 32, 13, 33	TT1 Tutorials, Part I	21, 41, 22, 42, 23, 43
Sep 16	SEEP-W Tutorial, Part I	21, 41, 22, 42, 23, 43	TT1 Tutorials, Part I	11, 31,12, 32, 13, 33
Sep 23	SEEP-W	11, 31,12,	TT1 Tutorials,	21, 41, 22,

	Tutorial, Part II	32, 13, 33	Part II	42, 23, 43
Sep 30	SEEP-W Tutorial, Part II	21, 41, 22, 42, 23, 43	TT1 Tutorials, Part II	11, 31,12, 32, 13, 33
Oct 7	SLOPE-W Tutorial, Part I	11, 31,12, 32, 13, 33	TT2 Tutorials, Part I	21, 41, 22, 42, 23, 43
Oct 14	No seminars this week			
Oct 21	SLOPE-W Tutorial, Part I	21, 41, 22, 42, 23, 43	TT2 Tutorials, Part I	11, 31,12, 32, 13, 33
Oct 28	SLOPE-W Tutorial, Part II	11, 31,12, 32, 13, 33	TT2 Tutorials, Part II	21, 41, 22, 42, 23, 43
Nov 4	SLOPE-W Tutorial, Part II	21, 41, 22, 42, 23, 43	TT2 Tutorials, Part II	11, 31,12, 32, 13, 33
Nov 11	No seminars this week			
Nov 18	Tutorials for Final Exam	11, 31,12, 32, 13, 33	Final Exam Tutorials	21, 41, 22, 42, 23, 43
Nov 25	Tutorials for Final Exam	21, 41, 22, 42, 23, 43	Final Exam Tutorials	11, 31,12, 32, 13, 33

5.4 Other Important Dates

- **Monday, October 14**
Holiday--NO CLASSES SCHEDULED -- classes rescheduled to Friday, Nov 29
- **Tuesday, October 15**

Fall Study Break Day - NO CLASSES SCHEDULED -- classes rescheduled to Nov. 28.

- **Thursday, November 28, 2018:** Make up for Study Day (Tuesday Schedule)
- **Friday, November 29, 2018:** Make up for Thanksgiving Day (Monday Schedule)

Classes conclude

Undergraduate calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/>

6 Assessments

6.1 Marking Schemes & Distributions

The final grade for this course will be calculated as a weighted average of two lab reports, two term tests and a final exam, according to the following distribution scheme.

Name	Scheme A (%)
Four Lab Reports (5% each)	20
Two Models (5% each)	10
Term Test 1	20
Term Test 2	20
Final Exam	30
Total	100

6.2 Assessment Details

Four Lab Reports (5% each) (20%)

Date: Due within 7 days of conducting each test., Submit Electronically on Courselink DropBox

Learning Outcome: 1, 7, 9

Two Computer Model Assignments (5% each) (10%)

Date: Due within 7 days of the tutorial (Part II), Submit Electronically on Courselink DropBox

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 9

Term Test 1 (20%)

Date: Wed, Oct 9, In Class

Learning Outcome: 1, 2, 5

Term Test 2 (20%)

Date: Wed, Nov 13, In Class

Learning Outcome: 1, 2, 4, 5, 6, 8

Final Exam (30%)

Date: December 10th, 2019 at 14:30, TBA on WebAdvisor

Learning Outcome: 1, 2, 4, 5, 6, 8

7 Course Statements

7.1 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor at the start of the semester to make alternate arrangements. See the undergraduate calendar for more detail on this topic: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

Missed Term Tests: If you miss one of the Term Tests due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam (i.e. there will not be a deferred Term Test 1); however, on the unlikely event that you miss both Term Tests, due to grounds for granting academic consideration or religious accommodation, a deferred Term Test 2 will be scheduled and the weight of the missed Term Test 1 will be added to the Final Exam.

Lab Work: You must attend and complete all laboratories and computer model assignments. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be made with the teaching assistant to complete a makeup lab.

Lab & Computer Model Reports: All laboratory and computer model reports must be submitted electronically on the course website on the designated drop box folder by the due date. Late submissions of the reports will receive 1% penalty per hour.

Grade Dispute: If a student feels that a Lab Report or Midterm was graded unfairly, or if there is an error in the grading, it should be brought to the attention of the Instructor by email within one week after the grade is posted on CourseLink. Scores will not be reconsidered beyond this period.

8 School of Engineering Statements

8.1 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and labs.

8.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

8.3 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>
