ENGG*3670 Soil Mechanics

Fall 2017

Sections(s): C01

School of Engineering

Credit Weight: 0.50

Version 1.00 - September 05, 2017

---

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-Requisite(s): 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:

Mon/Wed/Fri	4:30 – 5:20	THRN 1307

Weekly Seminars:

Thur	Sec 11, 21, 41	01:30 – 02:20	MCKN 305
Tues	Sec 12, 22, 42	11:30 – 12:20	MCKN 311
Mon	Sec 13, 23, 43	12:30 – 01:20	MACN 118

*Note: Seminar during weeks 1, 2, 6, and 7 will be in THRN 1313 Computer Lab.

Bi-Weekly Laboratory:

Thur	Sec 11, 12, 13	11:30 - 01:20	THRN 1107
Wed	Sec 21, 22, 23	12:30 - 02:20	THRN 1107
Tues	Sec 41, 42, 43	03:30 - 05:20	THRN 1107

1.4 Final Exam

Final Exam is scheduled for Tues, Dec. 5th, 2017; 07:00PM - 09:00PM (2017/12/05).

---

2 Instructional Support

2.1 Instructor(s)

Gharabaghi Bahram

Email: bgharaba@uoguelph.ca
Telephone: (519) 824 4120 ext. 58451
Office: THRN 2417

Office Hours: TBA on CourseLink or by appointment.

2.2 Instructional Support Team

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

2.3 Teaching Assistant(s)

Name	Details
Sandra Verban	sf.vrban@gmail.com TBA on CourseLink
Stephen Stajkowski	stajkows@uoguelph.ca TBA on CourseLink

---

3 Learning Resources

3.1 Required Resources(s)

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,WilliamA. 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(s)

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)

Kalinski, E. Michael. 2011. Soil Mechanics Lab Manual, 2nd Edition. (Textbook)

http://ca.wiley.com/WileyCDA/WileyTitle/productCd-EHEP001814.html#

Thorsten Ewald. 2014. Writing in the Technical Fields, A Practical Guide. Oxford Univ. Press. (Textbook)

http://www.coursesmart.com/writing-in-the-technical-fields/ewald/dp/9780199018475

---

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

Successfully completing this course will contribute to the following:

#	Outcome Set Name	Course Learning Outcome
1	Knowledge base	1, 4, 5
1.1	Recall, describe and apply fundamental mathematical principles and concepts	1, 4, 5
1.2	Recall, describe and apply fundamental concepts and principles in natural sciences	1, 4, 5
1.3	Comprehend and apply fundamental engineering concepts	1, 4, 5
1.4	Comprehend and apply program-specific engineering concepts	1, 4, 5
2	Problem analysis	1, 3, 6, 8
2.1	Formulate a problem statement in engineering and nonengineering terminology	1, 3, 6, 8
2.2	Construct a conceptual framework	1, 3, 6, 8
2.3	Identify, organize and justify appropriate information	1, 3, 6, 8
2.4	Execute an engineering solution	1, 3, 6, 8
2.5	Critique and appraise results	1, 3, 6, 8
3	Investigation	1, 3, 6, 7
3.1	Propose and test working hypotheses	1, 3, 6, 7
3.2	Design and apply an investigation plan	1, 3, 6, 7
3.3	Analyze and interpret experimental data	1, 3, 6, 7
3.4	Assess validity of conclusions within limitations of data and methodologies	1, 3, 6, 7
5	Use of engineering tools	3, 6, 8, 9
5.1	Select appropriate engineering tools from various alternatives	3, 6, 8, 9
5.2	Apply selected engineering tools	3, 6, 8, 9
5.3	Recognize limitations of selected engineering tools	3, 6, 8, 9
6	Individual and team work	3, 7, 8, 9
6.1	Act as an individual team member to promote team success	3, 7, 8, 9
6.2	Demonstrate leadership through team building, providing feedback and	3, 7, 8, 9

#	Outcome Set Name	Course Learning Outcome
	positive attitude	
7	Communication skills	3, 7, 8, 9
7.1	Develop and deliver clear, key concepts using methods appropriate for the intended audience	3, 7, 8, 9
7.2	Critically evaluate received information	3, 7, 8, 9
7.3	Demonstrate active listening and follow instructions	3, 7, 8, 9
8	Professionalism	9
8.1	Identify what it means to be a professional and distiguish between legislated and non-legislated based professions	9
8.2	Perform in a professional manner	9
8.3	Effectively describe engineering law and its impact on professional engineering practice	9

---

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 preferably two (occasionally three students) from the same lab section and collaborate in conducting the experiments, taking notes, discussions and submit a report as a group for marking electronically on the course website designated drop box. In total two reports will be submitted; the first report focuses on soil classification and covers Particle Size Analysis, Hydrometry Test, Atterberg Limits Tests, and soil classification methods; Lab Report 1 is due on Wed. Oct. 18th at noon. The second report will focus on groundwater flow and covers the Falling Head Test and the SEEP-W program as well as soil strength covering Direct Shear Test and the slope stability analysis using SLOPE-W program; Lab Report 2 is due on Wed. Nov. 29th at noon. All lab reports must be submitted electronically on the course website designated drop box folder by the designated due date; late submissions will have a 24% penalty per day.

Date	**Activity**
Week 1	Safety & Orientation; Particle Size Analysis
Week 2	Safety & Orientation; Particle Size Analysis
Week 3	Atterberg Limits; Hydrometry Test
Week 4	Atterberg Limits; Hydrometry Test
Week 5	No Labs this week
Week 6	**Submit Lab Report 1, electronically on CourseLink, due on Wed. Oct. 18th at noon.**

Week 7	Falling Head Test
Week 8	Falling Head Test
Week 9	Direct Shear Test
Week 10	Direct Shear Test
Week 11	No Labs this week
Week 12	**Submit Lab Report 2, electronically on CourseLink, due on Wed. Nov. 29th at noon.**

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 as a component of Lab Report 2 for marking. The other main activity during the weekly seminars include tutorials in preparation for the two term tests and the final exam.

Date	**Activity**
Week 1	**SEEP-W Computer Program Tutorial, Part I**
Week 2	**SEEP-W Computer Program Tutorial, Part II**

Week 3 Tutorials for Term Test 1, Part I

Week 4 Tutorials for Term Test 1, Part II

Week 5 Review of Term Test 1

Week 6 SLOPE-W Computer Program Tutorial, Part I

Week 7 SLOPE-W Computer Program Tutorial, Part II

Week 8 Tutorials for Term Test 2, Part I

Week 9 Tutorials for Term Test 2, Part II

Week 10 Review of Term Test 2

Week 11 Tutorials for Final Exam, Part I

Week 12 Tutorials for Final Exam, Part II

5.4 Other Important Dates

- ***Thursday*, September 7**
    - Classes commence
- ***Friday*, September 8**
    - Last day to submit co-op work performance evaluations and learning goals reflections for Summer Semester 2017
    - Last day to apply via hard copy to graduate at Fall 2017 Convocation (late application fee still in effect)
- ***Wednesday*, September 13**
    - Last day to submit co-op work semester reports for Summer Semester 2017
- ***Friday*, September 15**
    - Add period ends

    - Last day to drop two-semester courses (S17/F17)
- ***Friday*, September 22**
    - Last day for clearance to graduate at Fall 2017 Convocation
- ***Monday*, October 9**
    - Holiday--NO CLASSES SCHEDULED -- classes rescheduled to Friday, December 1
- ***Tuesday*, October 10**
    - Fall Study Break Day - NO CLASSES SCHEDULED -- classes rescheduled to Thursday, November 30
- ***Wednesday*, October 11**
    - Course selection period for Winter Semester 2018 begins--In-course students
- ***Friday*, October 13**
    - Last day to submit co-op learning goals for Fall Semester 2017
- ***Monday*, October 16**
    - Deferred examinations for Summer 2017 courses commence
- ***Friday*, October 20**
    - Deferred examinations for Summer 2017 courses conclude
    - Last day to apply to graduate at Winter 2018 Convocation without application late fee
- ***Saturday*, October 21**
    - Fall 2017 Convocation
- ***Thursday*, November 2**
    - Course selection period for Winter Semester 2018 ends--In-course students
- ***Friday*, November 3**
    - Fortieth class day--Last day to drop one semester courses
    - Last day to apply online to graduate at Winter 2018 Convocation (late application fee still in effect)
- ***Wednesday*, November 15**
    - Last day for external and internal applications for admission to Winter Semester 2018 for all programs with Winter entry

- ***Wednesday*, November 29**
  - Last day for regularly scheduled classes
- ***Thursday*, November 30**
  - Classes rescheduled from Tuesday, October 10, Tuesday schedule in effect
- ***Friday*, December 1**
  - Classes rescheduled from Monday, October 9, Monday schedule in effect
  - 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 (%)
Term Test 1	20.00
Lab Report 1	20.00
Term Test 2	20.00
Lab Report 2	20.00
Final Exam	20.00
Total	100.00

6.2 Assessment Details

Term Test 1

Date: Wednesday, October 11, In Class

Lab Report 1

Date: Wednesday, October 18, Submit Electronically on Courselink DropBox

Term Test 2

Date: Wednesday, November 15, In Class

Lab Report 2

Date: Wednesday, November 29, Submit Electronically on Courselink DropBox

Final Exam

Date: TBA on WebAdvisor, TBA on WebAdvisor

---

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

Passing Grade: In order to pass the course, you must pass both the laboratory (40%) and exams (60%) course portions. Students must obtain a grade of 50% or higher on the exams portion (i.e. sum of the term tests and the final exam grades should be at least 30%) of the course in order for the laboratory portion (40%) of the course to count towards the final grade.

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. 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 Reports: All lab reports must be submitted electronically on the course website on the designated drop box folder by the due date. Late submissions of lab reports will not be accepted.

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 regulations and procedures for Academic Consideration are detailed in the Undergraduate Calendar.

9.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

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.

More information: www.uoguelph.ca/sas

9.6 Academic Misconduct

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 discourages misconduct. 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.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

9.7 Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate 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 which apply to undergraduate, graduate and diploma programs.
