

CIVE 3210: Geotechnical Engineering, Course Syllabus - Fall 2026

Faculty of Engineering and Design, Carleton University
Department of Civil and Environmental Engineering

Schedule: Please refer to the [Public Class Schedule](#) for current days, times, and locations.

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Office: EDC 4530

Office hours: Mondays, 2:00-3:30 p.m.

TA(s): Information will be posted on Brightspace

1 Course Overview

In this course, we explore the application of soil mechanics concepts obtained in CIVE 3208 to the analysis and design of geotechnical systems such as foundations, slopes, embankments, and retaining walls. The course also includes training and individual assignments using GeoStudio simulation software.

Calendar description: Strength of soils, steady-state seepage, flownets and piping. Stress distribution in soils. Earth pressures: at rest, active and passive. Design of flexible and rigid retaining structures. Stability of excavations, slopes and embankments. Settlement of foundations. Bearing capacity of footings.

2 Learning Outcomes

The learning outcomes for this course, as listed in the departmental 6C accreditation file, are:

- Analyze and solve problems related to seepage
- Analyze and solve problems related slope stability
- Analyze and solve problems related retaining walls
- Analyze and solve problems related shear strength of soils
- Basic analysis of shallow foundations

3 Textbook and Learning Materials

Recommended textbook (optional): Soil Mechanics and Foundations (3rd Edition), by M. Budhu. Estimated cost if purchased: approximately CAD \$178 for a lifetime eText; prices may change. Used or second-hand copies are acceptable, and no access code is required.

Required software: GeoStudio Student Edition, including SLOPE/W and SEEP/W. The software is available at no cost on the Department's virtual computers and can also be installed on Windows PCs. Cost: \$0.

Students are not required to purchase textbooks or other learning materials for this course.

4 Topics and tentative plan

The sequence and dates below are tentative and may be adjusted to reflect the pace of the class. PA sessions begin in the second week of classes (Sept 17) and are held weekly thereafter. They will generally follow the lecture sequence and focus on worked examples, problem solving, and questions answered by the teaching assistants.

Dates	Topics	Assessment / notes
Sept. 9-11	Course introduction; prerequisite review; shear strength of soils	-
Sept. 14-18	Shear strength of soils	-
Sept. 21-25	Slope stability	-
Sept. 28-Oct. 2	Slope stability; asynchronous GeoStudio/SLOPE/W training on Sept. 28 and 30. No in-person lectures on those dates.	Assignment 1 released Sept. 28
Oct. 5-9	Slope-stability applications; introduction to two-dimensional seepage	Assignment 1 due Oct. 9

Dates	Topics	Assessment / notes
Oct. 12-16	Two-dimensional flow of water through soils; flownets and piping. Oct. 12 is a statutory holiday (University closed).	Assignment 2 released Oct. 16
Oct. 19-23	Seepage analysis and GeoStudio/SEEP/W	-
Oct. 26-30	Fall break - no classes	-
Nov. 2-6	Lateral earth pressure	-
Saturday, Nov. 7	Midterm examination (tentative date)	2 hours; material up to and including seepage
Sunday, Nov. 8	-	Assignment 2 due Nov. 8
Nov. 9-13	Lateral earth pressure and retaining structures	-
Nov. 16-20	Design and stability of retaining structures	Assignment 3 released Nov. 16
Nov. 23-27	Retaining structures and computer simulation	-
Nov. 30-Dec. 4	Shallow foundations; bearing capacity and settlement; CalcForge demonstration	Assignment 3 due Dec. 4
Dec. 7-11	Shallow foundations; review and problem solving	Dec. 11 follows a Monday schedule

Final examination: Date and time will be set by Examination Services.

5 Prerequisite Knowledge and Precluded Course (Important)

Prerequisite: CIVE 3208. Also listed as CIVE 4208 (the same course under the former course number).

This course builds on the **basic understanding of geotechnical mechanics** from CIVE 3208 and solid mechanics from CIVE 2200, as delivered at Carleton University. Most relevant topics from CIVE 3208 include **phase relations, stresses in soil, geotechnical tests (triaxial and direct shear), shear strength of soils, and seepage**. We will also use the concept of the **Mohr circle** from CIVE 2200 and CIVE 3208. Students should use the recommended textbook or another suitable source to refresh the background knowledge on which this course builds. In particular, Chapters 4, 6, 7, and 10 of Budhu provide useful review material.

6 Mode of Delivery

Lectures, PA sessions, the midterm examination, and the final examination will be held in person, except for the lectures on September 28 and September 30, which will be delivered asynchronously online for GeoStudio training. There will be no in-person lectures on those dates. The PA session during that week will remain in person.

The course includes two 1.5-hour lectures and one 1.5-hour PA session each week. PA sessions will be used primarily for worked examples, problem solving, and questions answered by the teaching assistants.

7 Evaluation and marking scheme

The breakdown of the final grade is given in Table 2. A minimum grade of 35% in each component - the combined assignment component, the midterm examination, and the final examination - is required to obtain a passing grade. Examinations will be in person.

#	Component	Description	Weight
1	Assignments	Three individual computer-simulation assignments, submitted as PDF reports: Assignment 1 (5%), Assignment 2 (10%), and Assignment 3 (5%).	20%
2	Midterm exam	2 hours; Saturday, November 7, 2026 (tentative; exact time and location TBA); in person; closed book; instructor-provided formula sheet; standard non-programmable calculator required; covers material up to and including seepage.	40%
3	Final exam*	2-3 hours; in person, on campus, and proctored; closed book; instructor-provided formula sheet; standard non-programmable calculator required; primarily post-midterm material; date and time set by Examination Services.	40%

*Final examinations are for evaluation purposes and will not be returned to students.

Practice problems: Ungraded practice problem sets will be provided together with their solutions. They are intended for self-study and examination preparation and will not be assessed.

7.1 Computer-Simulation Assignments

All three assignments are individual assignments and will be submitted as PDF reports. The tentative topics are:

- Assignment 1 (5%): Slope stability using the Morgenstern-Price method.
- Assignment 2 (10%): Seepage analysis and coupled seepage-slope-stability analysis.
- Assignment 3 (5%): Retaining-wall stability, including comparison of a wall without and with a shear key.

7.2 Examination Conditions

The midterm and final examinations will be in-person, on-campus, proctored, paper-based examinations. No electronic proctoring will be used. Smart watches, smart glasses, mobile phones, and other communication-, recording-, or internet-capable electronic devices are not permitted during examinations unless specifically authorized as approved accommodation.

Both examinations are closed book. An instructor-provided formula sheet will be supplied. Students must bring a standard non-programmable calculator; such a calculator is both permitted and necessary.

7.3 Late Submission Policy for Assignments

Assignments submitted after the deadline and up to one day late will receive a penalty of 10% of the full grade. Work submitted more than one day late and up to three days late will receive a penalty of 25% of the full grade. Work submitted more than three days late will not be graded. A student may request an extension by stating the reason in writing at least one day before the deadline. An extension may be granted at the discretion of the instructor.

7.4 Deferred Term Work

Students who claim extenuating circumstances defined in the [Academic Consideration Policy](#), as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases. This must occur no later than three (3) days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Consult [Section 4.4 of the University Calendar](#). Arrangements for a legitimately missed midterm examination will be determined case by case. The usual arrangement will be a deferred midterm examination.

7.5 Deferred Final Examinations

Students who are unable to write the final examination because of extenuating circumstances, as defined in the Academic Consideration Policy, may apply for accommodation through the Registrar's Office using the Online Deferral Application. Consult Section 4.3 of the University Calendar.

8 Course Policies (Important)

8.1 Classroom Behaviour

Students are required to observe the standards of behaviour expected in a university environment and in the engineering profession. Please maintain a professional, quiet, attentive, and engaging classroom environment.

8.2 Recording of Lectures and Course Activities

Audio, video, or photographic recording of lectures, PA sessions, or other course activities is not permitted without prior permission from the instructor. This includes recording using **mobile phones, smart glasses, smart watches, laptops, or other recording-capable devices**. Exceptions may be made where recording is specifically authorized by the instructor or forms part of an approved academic accommodation. Any permitted recording is for the student's personal academic use only and may not be shared, posted, or otherwise disseminated without permission.

8.3 Communications

Course materials will be distributed through Brightspace. Students are responsible for ensuring that they are correctly registered and for checking Brightspace regularly. Lecture slides may be made available before class; however, the slides will not necessarily include all information discussed during class, including worked solutions, calculations, and additional clarifications.

Electronic communication with the instructor must use an official Carleton email account. Emails should include the student's full name, student number, course number, and section number (when applicable). Professionalism is expected in all course communications. Email should generally be used for scheduling meetings or providing information, such as notification of an absence; **detailed clarification of course material should be addressed during lectures, PA sessions, or office hours, and are not expected to be discussed in email communications.**

8.4 Attendance and Absences

Attendance in lectures and PA sessions is not mandatory but is strongly encouraged. Attendance at examinations is mandatory unless an approved alternate arrangement has been made.

8.5 Grade Appeals

Appeals concerning graded term work must be made within seven days of the grade being posted or the work being returned. Assignment appeals should first be addressed to the marking TA. Final examinations are for evaluation purposes and will not be returned. Students may make arrangements with the instructor or the Department office to view a marked final examination after grades have been released.

8.6 Generative Artificial Intelligence (GenAI)

Generative AI tools may be used for consultation, clarification of concepts, troubleshooting, and improving the clarity or quality of writing. These permitted uses are intended to support learning and problem solving while ensuring that graded work reflects each student's own technical understanding and engineering judgment. Students may not use GenAI to produce substantive content for graded work, including calculations, computer simulations, engineering interpretation, analysis, or answers submitted for evaluation. No separate declaration is required for the permitted consultation, troubleshooting, or writing-support uses described above. Students remain responsible for verifying the accuracy of all submitted material and for ensuring that the final submission represents their own work. Students are required to discuss with the course instructor any use of GenAI that is not clearly described here, to ensure that it supports the learning goals of the course.

9 Academic Dates

Students should be aware of academic dates (e.g., last day for academic withdrawal) posted on the [Registrar's Office academic dates website](#) or the Carleton University Calendar.

10 Unauthorized Dissemination

As per Carleton's [Academic Integrity Policy](#), Unauthorized Dissemination is a violation of the standards of academic integrity to publish, disseminate, or otherwise make available to a third-party instructional material where the instructor has explicitly prohibited their dissemination.

The materials (including the course outline, slides, posted notes, videos, labs, projects, assignments, quizzes, exams, and solutions) created for this course are intended for personal use only. They may not be reproduced, redistributed, or disseminated in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—without written permission from the author(s), both during and after the semester.

11 Other Relevant Information and Policies

Academic Integrity and Plagiarism

a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: <https://carleton.ca/engineering-design/current-students/fed-academic-integrity>. Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or expulsion.

b) One of the main objectives of the Academic Integrity Policy is to ensure that the work you submit is your own. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source.

Examples of violations of the policy include, but are not limited to:

- any submission prepared in whole or in part by someone else;
- using another's data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and
- failing to acknowledge sources of information through proper citations when using another's work and/or failing to use quotation marks.

Safer Learning and Working Environment

Carleton University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the [Department of Equity and Inclusive Communities](mailto:equity@carleton.ca) at equity@carleton.ca, [Ombuds Services - Carleton University](#) or submit an anonymous human rights concern through [this form](#).

Academic Accommodations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website (students.carleton.ca/course-outline).

Engineering Academic Advising

The Engineering Academic Support Service assists undergraduate engineering students with course selection, registration, and learning support from first year through to graduation. Academic advisor contact information can be found on the [undergraduate academic advisors website](#).

Student Mental Health and Wellness

As a university student you may experience a range of mental health challenges that can significantly impact your academic success and overall well-being. Carleton's [Wellness Services Navigator](#) is designed to help students connect with mental health and wellness resources.

If you need to talk to someone from the Department for information and support with connecting to resources, you may contact the Department or the following faculty members, depending on your program:

- Department: CEEUGChair@cunet.carleton.ca
- Prof. Shoeleh Shams - shoelehshams@cunet.carleton.ca, Office: 4242 Mackenzie
- ACSE: Prof. Cara Lozinsky - caralozinsky@cunet.carleton.ca, Office: 2374 Mackenzie
- CIVE: Prof. Christian Viau - Christian.Viau@carleton.ca, Office: 4535 Mackenzie
- ENVE: Prof. Cole Van De Ven - cole.vandeven@carleton.ca, Office: 6210 Canal Building

Selected on-campus and off-campus resources are listed below:

1. **Emergencies and Crisis** <https://wellness.carleton.ca/get-help-now/>
2. **Carleton's Wellness Desk:** Located at 204A MacOdrum Library; no appointment is necessary. <https://wellness.carleton.ca/mental-health/wellness-desk/>
3. **Carleton's Care and Support Team:** Support with academics, well-being, finances, and other challenges. <https://wellness.carleton.ca/mental-health/student-care-and-support-team/>
4. **Carleton's Health and Counselling Services:** Book through the CHR Connect App or call 613-520-6674 ext. 2. <https://wellness.carleton.ca/counselling/>
5. **Carleton's Single Session Counselling:** Book through the CHR Connect App. <https://thconnect.telushealth.com/mobile-app-information/xz6lzGrv>
6. **Residence Counselling and Wellness Service:** Counselling services for students in residence; call 613-520-2600 ext. 8061. <https://carleton.ca/health/residence-counselling/>
7. **Carleton's Therapy Dogs** <https://wellness.carleton.ca/mental-health/therapy-dogs/>
8. **Good2Talk:** 1-866-925-5454; free, confidential counselling and referrals for post-secondary students in Ontario. <https://good2talk.ca/>
9. **The Walk-In Counselling Clinic:** Free, confidential counselling at locations across Ottawa and the greater Champlain region. <https://walkincounselling.com/>
10. **Distress Centre of Ottawa and Region:** Distress Line 613-238-3311; Crisis Line 613-722-6914 or 1-866-996-0991; Text 343-306-5550. <https://www.dcottawa.on.ca/>
11. **Distress and Crisis Ontario** <https://www.dcontario.org/>
12. **BounceBack Ontario:** 1-866-345-0224; a free skill-building program managed by the Canadian Mental Health Association. <https://bouncebackontario.ca/>

Other Useful FYIs:

Note: The Graduate Attributes and Accreditation Units described below have **no impact** on individual student evaluation in the course.

• Graduate Attributes:

The Canadian Engineering Accreditation Board (CEAB) requires graduates of undergraduate engineering programs to possess 12 attributes. Courses in all four years of our programs evaluate students' progress towards acquiring these attributes. Aggregate data (typically, the data collected in all sections of a course during an academic year) is used for accreditation purposes and to guide improvements to our programs. Some of the assessments used to measure GAs may also contribute to final grades; however, the GA measurements for individual students are not used to determine the student's year-to-year progression through the program or eligibility to graduate. This following list provides the GAs that will be measured in this course, along with the Learning Outcomes that are intended to develop abilities related to these attributes.

For information on GAs and continual curriculum improvement, visit the [Accreditation section of the Engineers Canada website](#).

GA	Assessment Tool
1.6.C (Discipline-specific concept CEE-6 Geotechnical Engineering),	Selected assignments and examination questions
2.1 (Problem definition)	Selected assignments and examination questions
2.2 (Approach to the problem)	Selected assignments and examination questions
2.3 (Use of assumptions)	Selected assignments and examination questions
2.4 (Interpreting the solution - validity of results)	Selected assignments and examination questions

• Accreditation Units

Math	Natural Science	Complementary Studies	Engineering Science	Engineering Design
-	-	-	50%	50%