

CIVE 3208 (ERTH 4107): Geotechnical Mechanics Course Syllabus - Fall 2024

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

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| Sections A&B | Lecture Time: Section A: Tu/Th 10:05 am-11:25 am Section B: Wed 8:35 am-11:25 am | Lecture location: check your Timetable Lab location: MC 1060 |
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Instructor: [Dr. Mehdi Pouragha](#)Email: Mehdi.Pouragha@carleton.caOffice: **EDC 4530**

1 Course Overview:

In this course, we explore the nature and engineering characteristics of soils and the fundamentals of mechanics used in describing the response of soils to loading and deformation. The learning outcomes includes: (1) Fundamental concepts of soil mechanics and their application in civil and environmental engineering applications. (2) Individual and teamwork: Personal and group time management, group culture and dynamics

2 Textbook:

The course textbook is the following: **Fundamentals of Geotechnical Engineering (3rd Edition)**, Braja M.Das

Other useful sources: **Soil Mechanics and Foundations (3rd Edition)**, by M. Budhu

3 Topics:

| Topic | Book Chapter† |
|---|---------------|
| Introduction, Phase Relations: scope, concepts of soils mechanics, soil types, mass and volume relations in soils | 3.1-3.4 |
| Grain Size Analysis: sieve analysis, hydrometer test | 2.12-2.13 |
| Index Properties: deformability of soils, Atterberg indexes, | 3.5-3.8 |
| Soil Classification: unified and AASHTO classification systems | 3.9 |
| Compaction: optimum moisture content, Proctor tests | 4 |
| Seepage: hydraulic head, Darcy's law, constant and falling head tests | 5.1-5.7 |
| Stress in Soils: porewater pressure, total vs effective stress, stress transformation and Mohr circle | 6 |
| Consolidation: Consolidation settlement, 1D consolidation theory, normally- vs over-consolidated clays | 7 |
| Shear Strength: cohesion and friction in soils, Mohr-Coulomb failure criterion, lab experiments for measuring shear strength | 8 |

† Relevant chapters from the textbook: Fundamentals of Geotechnical Engineering (3rd Edition), Braja M.Das

Note that the content covered in the lectures does not map exactly onto the book chapters, and the covered content can occasionally go beyond the textbook.

4 Prerequisites knowledge (**Important**)

This course builds on the basic understanding of stresses and strains in solids and pressure in fluids. A working knowledge of linear algebra, derivatives, integrals, and differential equations (ODEs and PDEs) is also assumed.

5 Assessment:

Breakdown of the final grade is given in the table below. A minimum of **40%** in each component is required to obtain a passing grade. Laboratory attendance and satisfactory submittal of all Lab reports are compulsory. Missing Labs or failure to submit Lab reports will lead to a grade of FND in the course. Attendance in lectures is not mandatory. Exams will be in-person.

| # | sections | Description | Weights |
|---|--------------------|---|---------|
| 1 | Assignments | 2 Assignments | 10% |
| 2 | Laboratory reports | Biweekly group reports | 20% |
| 3 | Midterm Exam | 2 hours, closed-book, formula sheet provided, (tentative date: Nov 2 nd). | 20% |
| 4 | Final Exam* | 2~3 hours, closed-book, formula sheet provided*. Date and time TBD. | 50% |

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

5.1 Late Submission Policy for Assignments:

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

5.2 Deferred term work

Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work (including midterm exam) 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**. In case of illness, a doctor note or a completed self-declaration form will be required (<https://carleton.ca/registrar/special-requests/deferral/>). 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.

6 Course Policies (**Important**)

6.1 Classroom Behaviour:

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

6.2 Communications:

Course materials will be distributed through the course's **BrightSpace** page. Students are responsible for ensuring they are correctly registered through **BrightSpace**, and for checking the **BrightSpace** course management site regularly. Lecture slides will be made available before class; however, lecture slides will not include all the information discussed during the (e.g. solutions, calculations, and extra clarifications).

Important Note: All electronic communications with the instructor must be through official **Carleton email accounts**. In your email, include your **full name, student number, course, and section number**. Professionalism is expected in all course communications; e-mails with **improper language will not receive a response**. Electronic

correspondence should be limited to the scheduling of meetings or providing information (e.g. absence from an exam). **Course material cannot be clarified through e-mail.**

6.3 Attendance and Absences:

Attendance in the laboratory sessions, and examinations is mandatory. Attendance in lectures is not mandatory for lectures.

6.4 Appeals:

All grade appeals in this course must be made within seven days of the posting or return of the graded component. Appeals for lab reports and assignments are to be addressed to the marking TA first. The final exam is for evaluation purposes only, and the paper will not be returned or made available to students by the instructors after it is marked. You will be able to make arrangements with the instructor or with the department office to see your marked final examination after the grades have been made available.

7 Copyright on Materials (Important**)**

The materials created for this course (including the course outline and any slides, posted notes, labs, project, assignments, exams and solutions) are intended for personal use and should not be reproduced, redistributed, or posted on any **website** without prior written permission from the author(s).

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 the use of proper citations when using another’s work and/or failing to use quotations marks.

• Learning and Working Environment

The 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](#) at equity@carleton.ca

We will strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone’s personal beliefs, choices, and opinions.

• Academic Accommodations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at **613-520-6608** or pmc@carleton.ca.

You should request your academic accommodations in the [Ventus Student Portal](#), for each course at the beginning of every term. For in-term tests or midterms, please request accommodations at least

two (2) weeks before the first test or midterm. Please consult the [PMC website](#) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the [Senate Policy on Accommodation for Student Activities \(PDF\)](#).

Pregnancy Obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [Student Guide to Academic Accommodation \(PDF\)](#).

Religious Obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [Student Guide to Academic Accommodation \(PDF\)](#).

Survivors of Sexual Violence: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the [Sexual Violence Prevention & Survivor Support](#).

- **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 Advisors Contact can be found here: <https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/>.

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.

GAs measured in CIVE4208 include: 6.1 (Personal and group time management), 6.2 (Group culture, group dynamics). GA scores in this course are measured based on students' performance during the laboratory sessions.

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