

CIV E 680 Engineering Properties of Soils

Fall 2024 - September 03 to December 09

Class time: Friday 8:00-10:50 Location: NRE 2-122

Instructor:

Michael Hendry, PhD, P.Eng

hendry@ualberta.ca

DICE 6-226

Office Hours:

Course Description:

*4 (fi) (first term, 3-1S-1) Principle of effective stress, clay-water systems, soil compressibility and theories of consolidation. Pore pressure parameters. Strength of granular and cohesive media. Anisotropy of soils. Laboratory measurement of strength and deformation properties. Stress-strain relations

Course synchronous and asynchronous content delivery schedule:

This course will be provided synchronously.

TA Information:

TBD - will be posted on eClass.

Lab Sections:

Section	Day	Time	Location
LAB D01		01:00 - 01:00	
LAB D02		01:00 - 01:00	

Seminar Sections:

Section	Day	Time	Location
SEM E01		01:00 - 01:00	
SEM E02		01:00 - 01:00	

Course Objectives & General Content:

The objective of this course is to provide an advanced understanding of the behaviour of soils including an introduction to critical state soil mechanics.

Specifically, the following material will be covered within this course:

1. Soil Composition and Density;

2. Clay Mineralogy and Behaviour;
3. Law (Principal) of Effective Stress;
4. Stress Paths and Pore Pressure Response;
5. Stiffness, Elasticity & Elastic Strain;
6. Consolidation;
7. Yielding, Plasticity & Plastic Strain;
8. Shear Strength & Critical State;
9. Elastic-Plastic Modelling; and,
10. An Introduction to Unsaturated Soil Mechanics (time permitting)

Learning Outcomes:

By the end of this course, students should be able to:

Marking Scheme:

Activity	(A)Synchronous	Due/Scheduled	Weight
Quiz 1	Synchronous	Oct. 11, 2024	25%
Quiz 2	Synchronous	Nov. 8, 2024	25%
Quiz 3	Synchronous	Dec. 6, 2024	25%
Direct Shear Laboratory	Synchronous	TBD	10%
CU triaxial testing laboratory	Synchronous	TBD	15%

The Faculty recommended grade point average for a 600 level course is 3.3. Instructors have the leeway to deviate from this average and can assign grades based on their own scheme. All grades are approved by the department chair (or delegate). The office of the Dean has final oversight on all grades.

Term Work

All term work solutions will be posted no later than the last day of classes. All term work will be returned to students by the final day of classes, with the exception of major term work due in the last week of classes. The latter will be returned by the day of the final examination or the last day of the examination period if there is no final examination in the course as per university policy; instructors will make accommodations to return these term work. It is the responsibility of the student to pick up all their term work at the specified time and place. Any unreturned term work, shall be retained and then shredded six months after the deadline for reappraisal and grade appeals. Final examinations will be kept for one year as required by university guidelines and the Government of Alberta's Freedom of Information and Protection of Privacy Act.

Calculator Policy

There is no calculator policy in this course; students are free to use the calculator they wish for all assessments.

Text and References (Mandatory):

Wood, D. M. (1990). Soil behaviour and critical state soil mechanics. Cambridge University Press. (Available Online via University Library)

Wood, D. M. (2009). Soil mechanics: a one-dimensional introduction. Cambridge University Press. (Available Online via University Library)

Davis, R., & Selvadurai, A. (2002). Plasticity and Geomechanics. Cambridge: Cambridge University Press. (Available Online via University Library)

Text and References (Recommended):

Holtz, R. D., Kovacs, W. D., & Sheahan, T. C. (2011). An introduction to geotechnical engineering, 2ed Prentice-Hall.

Website:

eClass

Previous Examples of Evaluative Materials:

Past examination materials have been migrated to the Tutorial Questions which are appended to the end of each section of notes.

Lab Information:

Lab Topic	Date
Lab 1: Direct Shear Testing	TBD
Lab 2: CU Triaxial Testing	TBD

Did you know that the University of Alberta has various low-to-no-cost services to help students succeed? Visit <http://www.deanofstudents.ualberta.ca/> for information about the academic, wellness, and various other support services available to U of A students. It's never too early or too late to seek help!



University and faculty policies



Respect and professionalism



The Faculty of Engineering is committed to fostering and protecting an equitable, inclusive, and respectful work and study environment in line with University of Alberta policies and professional engineering industry standards.

The faculty prepares students to uphold industry standards to become a Professional Engineer (P.Eng). Therefore, respect, professionalism, and accountability must be upheld within the Faculty of Engineering and the University of Alberta.

Academic integrity

All students are expected to follow the University of Alberta's [Student Code of Behaviour](#) and [Student Conduct Policy](#). The faculty expects an environment free of harassment, discrimination, and bullying. We encourage you to talk to the [Office of Safe Disclosure and Human Rights](#) about experiences, questions, or concerns. Additional resources and support for students are attached below.

Engineering students studying in the province of Alberta must also follow the Code of Ethics set by the Association of Professional Engineers and Geoscientists of Alberta (APEGA).

Course outline policies, course requirements, evaluation and grading information can be found in the [University Calendar](#).

Safety during learning activities



In all Faculty of Engineering courses, labs, seminars or other learning activities, safety is of paramount importance. In some cases, laboratory work in a program requires high standards for risk management to keep potential hazards safely under control.

Anyone found to be unable to function safely in the class, lab, seminar or other learning activity may be asked to leave or be removed for their and the safety of other participants and instructors in alignment with the [Student Code of Behaviour](#) and [Student Conduct Policy](#). As members, or prospective members, of the engineering profession, it is your responsibility to identify and inform the proper authorities of unsafe work.

Audio and video recording



Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan.

Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

Only those items specifically authorized by the instructor may be brought into the exam facility. Students must not bring any unauthorized electronic device into an examination room, including cell phones or other devices.



Student services and support

Health & Wellness Support

Counselling and Clinical Services

Free, short-term, appointment-based counselling and psychiatric services. Also offers drop-in workshops. Book an initial consultation. Visit uab.ca/CCS to learn more.

Wellness Supports Social Workers

Free one-on-one support for students in the areas of housing, finances, academics, personal wellness, life skill development, family dynamics, system navigation, and any area of life where there is a desire to invite change. Visit uab.ca/wellness to learn more.

Sexual Assault Centre

Free, anonymous, and confidential drop-in counselling. Visit uab.ca/UASAC to learn more.

The Office of Safe Disclosure & Human Rights (OSDHR)

The OSDHR advises confidentially on sensitive issues you may not feel comfortable solving on your own. Contact the OSDHR if you want to get help or to make a report while keeping your privacy. Visit uab.ca/OSDHR to learn more.

HIAR (Helping Individuals at Risk)

If you're worried about someone, contact HIAR, who can help assess risk and connect individuals to support. Learn more at uab.ca/HIAR.

Immediate External Supports

Health Link Alberta: 811

Suicide Crisis Helpline: 988



Academic support



Academic Success Centre

Access to a variety of services to maximize your academic success. Learn more at uab.ca/ASC.



Accessibility Resources

Connects students with disabilities to accommodations. Learn more at uab.ca/Access under accommodations + accessibility.



Decima Robinson Support Centre

Academic support for 100- or 200-level introductory calculus, linear algebra and statistics courses. Visit uab.ca/DSC to learn more.



Engineering Student Success Centre

The Faculty of Engineering provides drop-in tutoring for first-year courses. Visit uab.ca/ESSC to learn more.



Office of the Student Ombuds

Call for complex problems and conflict mediation. Learn more at uab.ca/ombuds.



**UNIVERSITY
OF ALBERTA**



Financial support



Student Service Centre

For awards and other funding support. Learn more at uab.ca/ask.



Campus Food Bank

The Campus Food Bank Society is an independent charity supporting University of Alberta students, faculty, staff, and alumni for up to five years. For additional information visit their website at campusfoodbank.com.

