CIV E 526 Soil Remediation

Fall 2025

Class time: Tuesday, Thursday 11:00-12:20 Location: NRE 2-090

Instructor:

Selma Guigard, PhD, P.Eng

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Donadeo Innovation Centre For Engineering 7-233
Office Hours: Wednesday, 13:30 - 15:00

Course Description:

*3 (fi) (first term, 3-0-0) Identification of regulations and guidelines applicable to contaminated site assessment and remediation. Review of soil and contaminant properties that affect contaminant partitioning and movement in subsurface soils. Study of physical, chemical and biological treatment methods for the remediation of contaminated soils

Course synchronous and asynchronous content delivery schedule:

All lectures will be delivered synchronously. Lectures will not be recorded and recording will not be permitted except with explicit written permission from the instructor. Lecture notes and solutions to problems solved in class will be provided through Canvas.

Land Acknowledgment:

The University of Alberta respectfully acknowledges that we are situated on Treaty 6 territory, traditional lands of First Nations and Métis people.

TA Information:

Catherine Mar Pineda (marpined@ualberta.ca)
NREF 6-023
Office hours: Thursday, 15:00 - 16:00, location TBD

Course Objectives & General Content:

The primary objective of the course is for students to gain an understanding of the techniques used to remediate contaminated soils. In particular, students will:

- understand the procedures and regulations that are used to identify and assess contaminated sites,
- learn important soil and contaminant properties that influence contaminant behaviour and partitioning in soil, and
- identify physical, chemical and biological treatment processes that can be used to remediate contaminated soils and discuss the application of these treatment processes to a given contaminated site.

Learning Outcomes:

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

1. Predict the behaviour of a contaminant or group of contaminants in a soil environment
2. Describe and identify significant advantages, disadvantages, and limitations of physical, chemical, and biological treatment technologies for a given contaminated site
3. Identify remediation techniques that can be used to treat a given contaminated soil, taking into consideration the types of contaminants present at the site, the type of soil(s) at the site and the location of the site

Marking Scheme:

Activity	(A)Synchronous	Due/Scheduled	Weight
Assignments (5)			10%
Midterm		Oct. 23, 2025 (in class)	20%
Term Project		Dec. 1, 2025 (project); Dec. 2&4, 2025 (presentation)	30%
Final Exam		Dec. 11, 2025 (8:30am; Location TBA)	40%

The Faculty recommended grade point average for a 500 level course is 3.2.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

Only approved non-programmable calculators are permitted in examinations. Any calculator taken into an examination must have a sticker identifying it as an acceptable non-programmable calculator (gold sticker). Students can purchase calculators at the University Bookstore with the stickers already affixed. Calculators purchased elsewhere can be brought to the Student Services where the appropriate sticker will be affixed to the calculator.

Expectations for AI use

In this course, our primary focus is to cultivate an equitable, inclusive, and accessible learning community

that emphasizes individual critical thinking and problem-solving skills. To ensure a fair and consistent learning experience for all students, the use of advanced AI tools such as ChatGPT or Dall-E 2 is strictly prohibited for all academic (written/coding/creative/etc.) work, assignments, and assessments in this course. Each student is expected to complete all tasks without substantive assistance from others, including AI tools.

Any use of AI tool in your academic work may result in academic penalties and be considered an act of cheating and a violation as outlined in the relevant sections of University of Alberta (November 2022) Code of Student Behaviour .

Text and References (Recommended):

Suthersan, S.S., Horst, J., Schnobrich, M., Welty, N., McDonough, J. 2017. Remediation Engineering: Design Concepts, CRC Press, Taylor & Francis Group, Boca Raton, FL.

Zhang, C. 2020. Soil and Groundwater Remediation: Fundamentals, Practices and Sustainability, John Wiley & Sons, Inc., Hoboken, NJ.

Website:

Canvas

Previous Examples of Evaluative Materials:

Canvas will be used to provide students with lecture notes, completed lecture notes, assignments, assignment solutions, project requirements, sample midterm and final exam questions and additional material (reading material, useful websites, frequently asked questions, student Q&A forums). Completed lecture notes and assignment solutions should not be printed.

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!

Additional Information and Policies

Instructor availability: Outside of office hours, please contact me via email. Emails will be answered, but an instant response is not guaranteed, especially if the email is received outside of regular business hours.

Class participation: Class participation is expected and strongly encouraged; however, no marks are specifically allocated for participation. When coming to class, be prepared to work in groups on calculations and have group discussions.

Assignments: There will be five assignments but only four assignments will be used to calculate the assignment grade – the lowest grade will be dropped. Assignments must be submitted at the time and to the location specified in the assignment. Late assignments will **not** be accepted and will receive a grade of zero.

Attendance (https://calendar.ualberta.ca/content.php?catoid=44&navoid=13550#attendance): "Since presence at lectures, participation in classroom discussions and projects, and the completion of assignments are important components of most courses, students will serve their interests best by regular attendance. Those who choose not to attend must assume whatever risks are involved. In connection to this, students should review the following sections.

The University recognizes that occasionally life events occur that require a student to miss term work, term examinations, or final examinations. However, excused absences are not granted automatically and will be considered only for acceptable reasons such as incapacitating mental and/or physical illness, severe domestic affliction, or for circumstances as described in the University's Discrimination, Harassment and Duty to Accommodate Policy (including religious belief). This policy is available on the University of Alberta Policies and Procedures Online (UAPPOL) website. An interfaith calendar is available on the Office of the Registrar University Calendar page.

Unacceptable reasons include, but are not limited to personal events such as vacations, weddings, or travel arrangements. When a student is absent without acceptable excuse, a final grade will be computed using a raw score of zero for the work missed. Any student who applies for or obtains an excused absence by making false statements will be liable under the Student Academic Integrity Policy. Students should consult their Faculty for detailed information and requirements.

Failure to follow the policies outlined below may result in denial of a student's request. Students with concerns should see Procedures for Registering Complaints about Marking, Grading, and Related Issues. Students should also review individual Faculty appeal policies posted on Faculty websites."

Missed midterm: There are no deferred midterm exams. In instances where a student has a documented reason for missing a term exam(s) and at the discretion of the instructor, the value of a missed term exam(s) will be added to the value of the final exam. A missed term exam(s) is considered assigned term work which has not been completed in determining eligibility for a deferred final exam.

Final exams: Please refer to **https://calendar.ualberta.ca/content.php?catoid=56&navoid=18647** for policies.

<u>Tentative</u> Schedule (last updated September 1, 2025)

DATE	LECTURE	TOPIC	ASSIGNMENTS AND DELIVERABLES
Sept. 2	1	Course Introduction	
Sept. 4	2	Introduction to Soil Remediation	
Sept. 9	3	Regulatory Framework related to Soil Contamination	
Sept. 11	4	Contaminants of Interest in Soil Remediation	
Sept. 16	5	Contaminant Properties	
Sept. 18	6	Contaminant Properties	
Sept. 19			***Assignment 1 due***
Sept. 23	7	Abiotic and Biotic Processes	
Sept. 25	8	Abiotic and Biotic Processes	
Sept. 30	***National Day for Truth and Reconciliation – no class***		
Oct. 2	9	Soil Properties	
Oct. 3			***Assignment 2 due***
Oct. 7	10	Soil Properties	
Oct. 9	11	Contaminant Partitioning	
Oct. 14	12	Contaminant Partitioning	
Oct. 16	13	Treatment Technologies	
Oct. 17			***Assignment 3 due***
Oct. 21	14	Physical Treatment Technologies	
Oct. 23	15	***Midterm (in-class)***	
Oct. 28	16	Physical Treatment Technologies	
Oct. 30	17	Physical Treatment Technologies	
Nov. 4	18	Physical Treatment Technologies	
Nov. 6	19	Chemical Treatment Technologies	
Nov. 7			***Assignment 4 due***
Nov. 11	***Fall Break – no lectures***		
Nov. 13			
Nov. 18	20	Chemical Treatment Technologies	
Nov. 20	21	Biological Treatment Technologies	
Nov. 25	22	Biological Treatment Technologies	
Nov. 27	23	Biological Treatment Technologies	
Nov. 28			***Assignment 5 due***
Dec. 1			***Term Project due***
Dec. 2	24	Student Term Project Presentations	
Dec. 4	25	Student Term Project Presentations	
Dec. 11	***Final Exam (8:30am)***		

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 and student conduct

The University of Alberta is committed to the highest standards of academic integrity and honesty, as well as maintaining a learning environment that fosters the safety, security, and the inherent dignity of each member of the community, ensuring students conduct themselves accordingly. Students are expected to be familiar with the standards of academic honesty and appropriate student conduct, and to uphold the policies of the University in this respect.

Students are particularly urged to familiarize themselves with the provisions of the Student Academic Integrity Policy and the Student Conduct Policy, and avoid any behaviour that could

potentially result in suspicions of academic misconduct (e.g., cheating, plagiarism, misrepresentation of facts, participation in an offence) and non-academic misconduct (e.g., discrimination, harassment, physical assault). Academic and non-academic misconduct are taken very seriously and can result in suspension or expulsion from the University.

All students are expected to consult the Academic Integrity website for clarification on the various academic offences. All forms of academic dishonesty are unacceptable at the University. Unfamiliarity of the rules, procrastination or personal pressures are not acceptable excuses for committing an offence. Listen to your instructor, be a good person, ask for help when you need it, and do your own work -- this will lead you toward a path to success. Any academic integrity concern in this course will be reported to the College of Natural and Applied Sciences. Suspected cases of non-academic misconduct will be reported to the Dean of Students. The College, the Faculty, and the Dean of Students are committed to student rights and responsibilities, and adhere to due process and administrative fairness, as outlined in the Student Academic Integrity Policy and the Student Conduct Policy. Please refer to the policy websites for details on inappropriate behaviours and possible sanctions.

The College of Natural and Applied Sciences (CNAS) has created an Academic Integrity for CNAS Students eClass site. Students can self-enroll and review the various resources provided, including the importance of academic integrity, examples of academic misconduct & possible sanctions, and the academic misconduct & appeal process. Students can also complete assessments to test their knowledge and earn a completion certificate.

"Integrity is doing the right thing, even when no one is watching." -- C.S. Lewis

The Faculty of Engineering 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 Academic Integrity Policy 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)

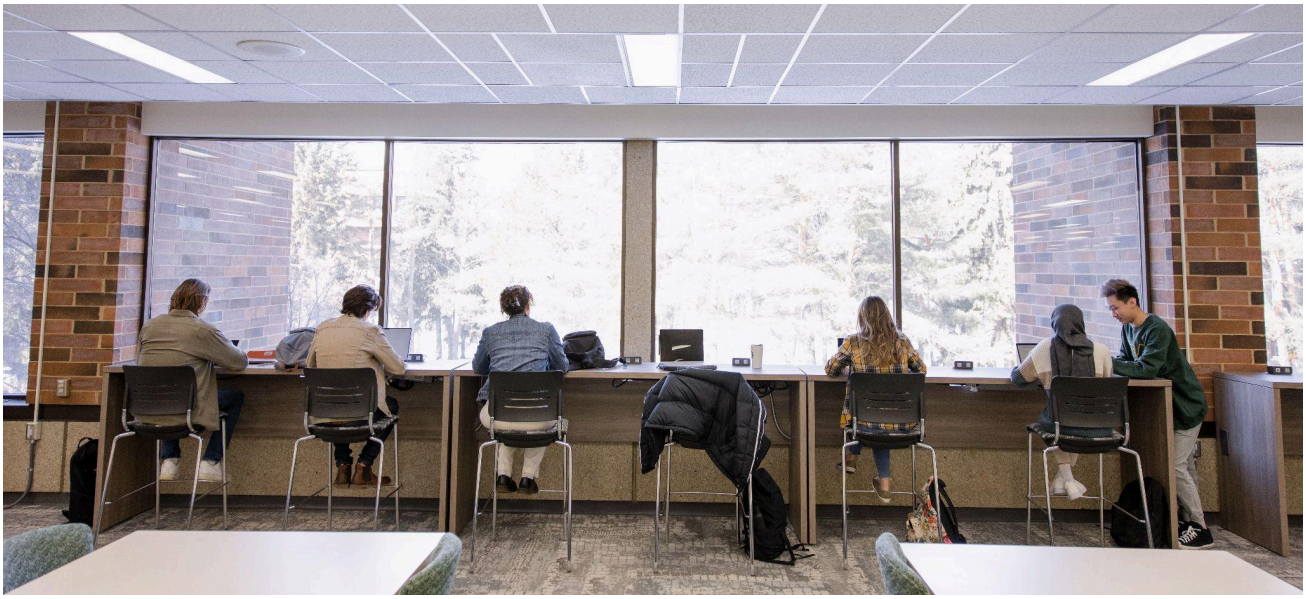
The OSDHR advises confidentially on sensitive issues you may not feel comfortable solving on your own. Contact the OSDHR if you want to get help or to make a report while keeping your privacy. Visit uab.ca/OSDHR to learn more.

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.

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.