McMaster University | Civil Engineering

2023-24 COURSE OUTLINE

COURSE INFORMATION

Course Name: Engineering Geology Course Code: CIVENG 2J03

Session Offered: Winter 2024

Calendar Description: 3-unit(s) Fundamentals of engineering geology; The topics include description of earth structure and rock types; geological structures; earth surface processes; engineering properties and behaviour of soils and rocks; fundamentals of surface and groundwater conditions, flow, and monitoring; geological materials used in construction, subsurface exploration and site investigation. Two lectures, one tutorial (two hours), one lab (three hours); second term.

Prerequisite(s): Registration in Level II Engineering or permission of the Department.

Instructor(s): Dapo Awolayo Phone: (905) 525-9140 x 20493

Email: awolayoa@mcmaster.ca Office Hours: Tu 10.30am – 12.30 pm

Class Schedule Day(s):	TuTh (Lecture)	Time: 8.30am – 9.20am
	Th (Tutorial)	Time: 12.30pm – 2.20pm
	We (Tutorial)	Time: 12.30pm – 2.20pm
	Fr (Lab)	Time: 8.30am – 11.20am
	Fr (Lab)	Time: 2.30pm – 5.20pm

1. COURSE OBJECTIVES

The objective of this course is to introduce engineering students to geologic materials and phenomena that influence engineering and land use decisions, as well as to develop a deeper understanding of earth processes that affect society and infrastructure. This course covers the engineering properties of rock and soil surficial materials and their significance for civil work projects and natural and engineered geological processes. Lectures and related discussions will cover the topics of geology for engineers, earth structure and geology of Canada, geological processes, engineering properties and behaviour of soils and rocks, rock and soil classification, groundwater fundamentals, flow and monitoring, subsurface exploration, and site investigation.

2. COURSE SPECIFIC POLICIES

Course materials: All course materials will be made available on Avenue to Learn (A2L) at least 12 hours prior to the scheduled class. Students are encouraged to access and review the materials prior to the scheduled session.

Attendance: Attendance at lectures and tutorials is strongly encouraged, but it will not be reflected in the grading assessment. Students must notify the instructor of any scheduled absences for sports or other activities during the first two weeks. This early notification allows for adequate time to make necessary arrangements for makeup work or changes to the course schedule as deemed feasible.

Participation: Students are expected to be fully engaged in learning engineering geology during class hours, demonstrating active participation and maintaining a professional demeanour. The level and quality of participation will be evaluated and accounted for in the final grade.

Textbook: The designated textbook is *Engineering Geology (Second Edition), F.G. Bell*, which will be supplemented by lecture notes (designed to be self-sufficient) and class discussions. Students are encouraged to refer to the textbook for independent study. Additional texts at the library or online that may be useful include:

Geology for Engineers & Environmental Scientists, Alan E. Kehew: Pearson Prentice Hall, New Jersey.
Geology Applied to Engineering, Terry R. West and Abdul Shakoor: Waveland Press Inc., Illinois.

Assignments: Homework is designed to reinforce your understanding of the class material, with problems that mirror the typical expectations for exam questions. There will be six (6) assignments throughout the term, with the top five (5) grades contributing to the final grade.

Labs: In order to pass this course, you are expected to attend the labs and submit your lab reports. If you miss handing in lab reports and do not contact the instructor or teaching assistants within one week of the lab report deadline, you may be assigned a grade of either W or F.

Term projects: Students will work on case studies that integrate geology and civil engineering, demonstrating how geology is used by engineers to solve a practical societal problem. The project will involve analyzing data, constructing figures, working in a group, and making a report — all things you will be expected to do as engineers. Each group will present their findings during the last tutorial of the semester and submit a project term report.

Examinations: There will be one midterm and one final exam. Students may bring one crib sheet (letter size, double-sided). Each exam will cover all material to date in the lab, homework assignments, classroom, and tutorials since the previous exam.

MSAF Policy: If you miss any assessment for any reason, you must contact the instructor within 24 hours of the assessment. Otherwise, your MSAF will NOT be accepted by the instructor. When a self-reporting relief is submitted (see Section 8 for further details) for missed assignments, assignments will be extended by the absence period listed in the submitted MSAF. It is your responsibility to notify the instructor of your MSAF submission. For term project reports, MSAF will NOT be accepted.

Late submission penalty policy: Any submission made an hour later than the specified submission time is considered a day late. Late submissions with no granted relief will be assessed a penalty of 10% per day in general.

3. SCHEDULE

WEEK 1	Introduction to Engineering Geology, Earth Systems and Plate Tectonics	
WEEK 2	Geological time scales, Minerals classification, Rock cycle and types	Homework 1 (Assign)
WEEK 3	Igneous, Sedimentary, and Metamorphic Rocks, and Geology of Canada	Homework 1 (Due); Homework 2 (Assign)
WEEK 4	Geological Structural Deformation: Folds and Faults	Homework 2 (Due); Homework 3 (Assign)
WEEK 5	Discontinuities, Earthquake and Seismology	Homework 3 (Due)
WEEK 6	Surface Processes: Weathering, Slopes stability and Landslides	Midterm Exam
WEEK 7	Geomorphological Processes: Coastal Transport Processes, Storm Surges and Tsunamis	Homework 4 (Assign)
WEEK 8	Rock and Soil Characteristics: Classification and Phase relationships	Homework 4 (Due)
WEEK 9	Surface Water Hydrology	Homework 5 (Assign)
WEEK 10	Groundwater Systems: Aquifers, Properties, Flow	Homework 5 (Due)
WEEK 11	Geological materials used in construction	Homework 6 (Assign)
WEEK 12	Subsurface Explorations: Site investigation, Topographic and geological maps	Homework 6 (Due)
WEEK 13	Practical geological exploration and Course Review	Term Project Report (Due)
FINAL EXAMINATION	Scheduled during the regular University Final Examination period established by the Registrar's Office	

This schedule is tentative — the Instructor and the University reserve the right to modify elements of the course during the term. Any changes will be announced in class or posted on A2L.

4. ASSESSMENT OF LEARNING	WEIGHT %
Homework (best 5 of 6)	20%
Lab	15%
Midterm Exam	25%
Term Project	15%
Final Exam	25%
Total	**100%**

5. LEARNING OUTCOMES

Following completion of this course, the students will be able to:

- Gain an appreciation for the role of geology in shaping engineering systems and understand its relevance to and influence engineering decisions (1.2, 2.1)
- Develop a fundamental understanding of earth systems, geological structures, surface and internal geologic processes, and their implications for society and infrastructure (1.2, 9.2).
- Understand the basic principles of mineral, rock and soil classification, and how their properties impact surface and groundwater flow (9.1).
- Develop insights into geological materials used in construction, including their properties, and explore geotechnical considerations necessary for successful engineering projects. (9.1, 12.2).
- Conduct assessment of geological hazards, and formulate environmentally sustainable strategies for their mitigation and management (1.3, 2.1).

CEAB Learning Indicators measured in this course as included in parenthesis above are:
1.2 Competence in Natural Sciences
2.1 Identifies and states reasonable assumptions and suitable engineering fundamentals, before proposing a solution path to a problem.
9.1 Evaluates the environmental impact of engineering activities, identifies uncertainties in decisions, and promotes sustainable design.
9.2 Evaluates the social impact of engineering activities, including health, safety, legal, cultural, and other relevant factors, and identifies uncertainties in decisions.

6. LABORATORY SAFETY

The Faculty of Engineering is committed to McMaster University's Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs and policies". It is your responsibility to understand McMaster University's Risk Management system, which is supported by a collection of Risk Management Manuals (RMMs) that contain programs and policies in support of the Risk Management System. The RMMs are available from https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/risk-management-manuals-rmms/.

It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for specific experiments (see course lab manuals) and the laboratory equipment https://www.eng.mcmaster.ca/sites/default/files/civil_lab_health_and_safety_manual.pdf

Additionally, McMaster University's workplace health and safety guidance related to COVID-19 must always be followed (available from https://hr.mcmaster.ca/resources/covid19/workplace-health-and-safety-guidance-during-covid-19/).

The safety requirements for JHE 113 and JHE 114 are listed below. Students not abiding by these safety requirements will be given one warning. Second offences will result in the student being asked to vacate the laboratory and receiving a grade of zero for that particular lab.

[JHE 113, JHE 114, JHE 121]

• Glasses or safety glasses/goggles must be worn in the lab at all times.
• Contact lenses are not to be worn in the lab.
• No short (i.e., above the knee) pants or skirts are permitted in the lab – lab coats must be worn over top of your clothing in these instances.
• Closed-toe shoes must be worn at all times.
• No loose clothing is allowed.
• Long hair must be tied back.
• Disposable latex or nitrile gloves must be worn when working with hazardous chemicals.
• Heat resistant gloves must be worn when removing hot items from the drying oven (as indicated by the laboratory instructor).
• Dust masks must be worn (as indicated by the laboratory instructor).
• Hearing protection must be worn (as indicated by the laboratory instructor).

7. COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their "@mcmaster.ca" alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

8. POLICIES

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the *Academic Integrity Policy*, located at https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/.

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the *Code of Student Rights & Responsibilities* (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's *Academic Accommodation of Students with Disabilities* policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

The McMaster Student Absence Form is a self-reporting tool for **Undergraduate Students** to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period. You may submit a maximum of 1 Academic Work Missed request per term. It is **your** responsibility to follow up with your Instructor immediately regarding the nature of the accommodation. If you are absent more than 5 days or exceed 1 request per term you **must** visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation. This form should be filled out immediately when you are about to return to class after your absence.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office ***normally within 10 working days*** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

PROTECTION OF PRIVACY ACT (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades, and all other personal information at all times. For example, the submission and return of assignments and the posting of grades must be done in a manner that ensures confidentiality – see http://www.mcmaster.ca/univsec/fippa/fippa.cfm.

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer, or the Human Rights Consultant, as soon as possible.
https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

9. MCMASTER GRADING SCALE

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49