Civil Engineering
CIVENG 3A03
Geotechnical Engineering I
Fall 2026

McMaster University
ENGINEERING

Instructor Information

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By Appointment

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Class Times

Component	Section	Day/Time	Location
Lecture	C01	Monday, 4:30–6:20 PM	Michael G. DeGroote Centre, Room 1102
Tutorial	T02	Monday, 10:30 AM–12:20 PM	A.N. Bourns Building, Room 271

Component	Section	Day/Time	Location
Tutorial	T01	Friday, 8:30–10:20 AM	A.N. Bourns Building, Room 164
Laboratory	L01	Thursday, 8:30–11:20 AM	John Hodgins Engineering Building, Room 114
Laboratory	L02	Friday, 2:30–5:20 PM	John Hodgins Engineering Building, Room 114

Class Format

In-person attendance is required for this course.
Course Dates: 09/08/2026 - 12/10/2026
Units: 3.00
Course Delivery Mode: In Person
Course Description: Composition of soils, soil identification and classification; compaction; seepage theory; effective stress concept; stresses and displacements using elastic solutions; consolidation theory; numerical solutions. Two lectures, one tutorial (two hours), one lab (three hours); fall term Prerequisite(s): CIVENG 2J03 or CIVENG 2J04

Instructor-Specific Course Information

Recommended Textbooks

- Budhu, M. (2010). *Soil Mechanics and Foundations*, 3rd Edition, John Wiley & Sons.
- Knappett, J. & Craig, R.F. (2019). *Craig's Soil Mechanics*, 9th Edition, CRC Press.

Students may use either textbook as a primary reference. Additional materials and references may be provided throughout the term.

Assignments

Assignments must be submitted by the specified deadline. **Late assignments will not be accepted and will receive a grade of zero**, unless an extension has been approved in accordance with applicable course or university policies.

Students are expected to complete and submit their own work. Copying, plagiarism, and other forms of academic dishonesty will be addressed in accordance with McMaster University's academic integrity policies.

Tutorials

Tutorials are intended to reinforce concepts introduced during lectures and provide opportunities for guided problem solving, clarification, and preparation for course assessments.

Students should attend their assigned tutorial section:

- **T02:** Monday, 10:30 AM–12:20 PM — A.N. Bourns Building, Room 271
- **T01:** Friday, 8:30–10:20 AM — A.N. Bourns Building, Room 164

Tutorial problems may be assigned for completion during the session. The TAs and/or instructor will be available to answer questions related to lecture material, assignments, and laboratories. Students should bring their lecture notes, relevant textbook/materials, calculator, and other required materials and be prepared to actively work through problems.

Quizzes

Four quizzes will be administered during the **scheduled tutorial periods**. Each quiz will be approximately **45 minutes** in duration and will primarily assess material covered since the preceding quiz.

Questions may include multiple-choice and calculation-based problems requiring students to demonstrate appropriate problem-solving procedures.

The **best three of the four quiz grades** will be used in calculating the final course grade.

Quiz dates will be announced in advance through the course learning management system and course schedule.

Important Links

- Mosaic
- Avenue to Learn
- Student Accessibility Services - Accommodations
- McMaster University Library
- eReserves
- Open Education Resources

Course Learning Outcomes

- Characterize soils as engineering materials using geological origin, particle characteristics, phase relationships, index properties, and engineering classification systems.
- Evaluate soil compaction behaviour using moisture–density relationships, laboratory compaction data, and field compaction criteria.
- Analyze groundwater flow through soils using hydraulic head, Darcy's law, hydraulic conductivity, equivalent permeability, and flow-net principles.
- Calculate stress distributions within soil masses resulting from surface loading using appropriate elasticity-based solutions and influence methods.
- Determine total stress, pore-water pressure, and effective stress within soil deposits under different groundwater and geostatic conditions.
- Evaluate soil compressibility and stress history using oedometer data, preconsolidation pressure, compression parameters, and overconsolidation ratio.
- Predict the magnitude and rate of soil settlement using one-dimensional consolidation theory and appropriate soil parameters.
- Interpret geotechnical laboratory measurements to determine engineering soil properties, assess experimental results, and relate observed behaviour to soil-mechanics principles.
- Solve geotechnical engineering problems by selecting appropriate soil parameters, analytical methods, assumptions, and engineering tools and assessing the physical reasonableness of calculated results.

Graduate Attributes

The Canadian Engineering Accreditation Board (CEAB) is a division of Engineers Canada and is responsible for accrediting undergraduate engineering programs across Canada. Accreditation by the CEAB ensures that the engineering programs meet a national standard of quality and cover essential educational requirements. Graduate Attributes are a set of qualities and skills that the CEAB expects engineering graduates to possess. These attributes are a benchmark for the learning outcomes of accredited engineering programs. This section lists the Graduate Attribute Indicators associated with the Learning Outcomes in this course.

Lab Information

Laboratory sessions are an integral and **mandatory** component of CIVENG 3A03. Each student will participate in four laboratory experiments during the term:

- **Soil Compaction**
- **Permeability**
- **Seepage**
- **Soil Consolidation**

Experiments will be conducted in groups of approximately **four students**. Students must attend their assigned laboratory section:

Section	Time	Location
L01	Thursday, 8:30–11:20 AM	John Hodgins Engineering Building, Room 114
L02	Friday, 2:30–5:20 PM	John Hodgins Engineering Building, Room 114

Students are expected to review the relevant laboratory instructions, underlying theory, and experimental procedures **before attending each session** and to participate actively in the experimental work.

Laboratory reports are due **two weeks after each experiment, by 11:59 PM on the corresponding laboratory day**, unless otherwise specified. Late submissions will

be subject to a **10% deduction per day**. Extensions will be considered only under exceptional circumstances and in accordance with University policies.

Detailed laboratory procedures, group assignments, experiment schedules, report requirements, and submission instructions will be provided separately through the course learning management system.

Laboratory Report and Group Work Policy

Laboratory reports are **group submissions**, and all group members share responsibility for the quality, accuracy, and timely submission of the final report.

Although students may divide specific reporting tasks among group members, **each section of the laboratory report must clearly identify the name(s) of the student(s) who contributed to its preparation and analysis**. All group members remain responsible for reviewing and understanding the complete report before submission.

Students are **strongly encouraged to work collaboratively on all aspects of the laboratory**, rather than simply dividing the work. This includes conducting the experiments, collecting and processing data, performing calculations and analyses, interpreting results, and making engineering judgments and conclusions. The laboratory component is intended to provide every student with **hands-on experience throughout the complete experimental and engineering decision-making process**.

All group members are expected to participate actively and meaningfully in the laboratory work.

Lab 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". It is your responsibility to understand McMaster University Workplace and Environmental Health and Safety programs and policies. For information on

these programs and policies please refer to McMaster University Health and Safety. The Lab Safety Handbook is available here, as well as on A2L.

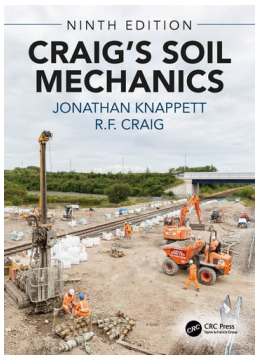
It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment. A laboratory-specific set of rules can also be added to ensure that students fully understand laboratory safety rules that are in place prior to their first session.

Course Schedule

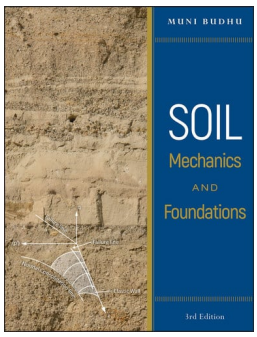
Date	Topic
Sept. 14	Introduction to Geotechnical Engineering & Nature of Soils
Sept. 21	Soil Phase Relationships
Sept. 28	Soil Identification, Index Properties & Classification
Oct. 5	Soil Compaction & Ground Improvement
Oct. 12	**Midterm Recess – No Class**
Oct. 19	Groundwater, Hydraulic Head & Darcy's Law
Oct. 26	Permeability & Two-Dimensional Seepage
Nov. 2	Engineering Applications of Seepage
Nov. 9	Effective Stress & Geostatic Stress
Nov. 16	**Stress Distribution I & II**
Nov. 23	Soil Compressibility & Stress History
Nov. 30	Settlement & One-Dimensional Consolidation
Dec. 7	Consolidation Rate, Secondary Compression & Course Review

Required Materials and Texts

Please sign in with your MacID here to view your booklist



Craig's Soil Mechanics
ISBN: 9781138070066
Authors: Jonathan Knappett, Robert F. Craig
Publisher: CRC Press
Publication Date: 2019-10-31
Edition: 9



Soil Mechanics and Foundations
ISBN: 9780470556849
Authors: Muniram Budhu
Publisher: John Wiley and Sons
Publication Date: 2010-12-21
Edition: 3

Course Evaluation

Student performance in **CIVENG 3A03** will be assessed as follows:

Assessment Component	Submission	Weight
Laboratory Reports	Group	**15%**
Assignments	Individual	**20%**
Quizzes	Individual – Best 3 of 4	**30%**
Final Examination	Individual	**35%**
Total		**100%**

Course Evaluation Details

Laboratory Reports — 15%

Students will complete **four laboratory experiments**: Soil Compaction, Permeability, Seepage, and Soil Consolidation. Laboratory reports will be completed and submitted **as a group**. Detailed requirements, deadlines, and assessment criteria are provided in the **Lab Information** section.

Assignments — 20%

Assignments will reinforce and extend concepts introduced in lectures and tutorials. All assignments are **individual submissions** and must be submitted by the specified deadline. Late assignments will not be accepted unless otherwise approved in accordance with University policies.

Quizzes — 30%

Four quizzes will be administered during the scheduled **tutorial periods**. Each quiz will be approximately **45 minutes** and will assess material covered since the preceding quiz. Questions may include conceptual, multiple-choice, and calculation-based problems. The **best three of the four quiz grades** will contribute to the final course grade.

Final Examination — 35%

A **comprehensive final examination** will assess students' ability to apply and integrate the fundamental concepts and problem-solving methods covered throughout the course. The examination will be scheduled during the University final examination period.

Undergraduate Grading Scale

The McMaster 12 Point 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

Grade	Equivalent Grade Point	Equivalent Percentages
F	0	0-49

Graduate Grading Scale

Graduate Student Grading Scale (Except for MBA and Master of Finance)

Grade	Points	Equivalent Percentage	Pass/Fail
A+	12	90-100	P+
A	11	85-89	P
A-	10	80-84	
B+	9	77-79	
B	8	73-76	
B-	7	70-72	
F	0	69 and under	F

MBA and Master of Finance Grading Scale

Grade	Points	Equivalent Percentage	Pass/Fail
A+	12	90-100	P+
A	11	85-89	P
A-	10	80-84	
B+	9	75-79	
B	8	70-74	
B-	7	60-69	
F	0	59 and under	F

Late Assignments

Assignments must be submitted by the **specified due date and time**. Late assignments will **not normally be accepted and will receive a grade of zero**.

Students who are unable to submit an assignment on time due to illness or other extenuating circumstances must follow the appropriate **McMaster University academic consideration/accommodation procedures**. Where academic consideration is approved, an alternative deadline or other appropriate arrangement may be provided at the instructor's discretion.

Students are responsible for ensuring that the **correct and complete file** is submitted before the deadline. Technical difficulties occurring close to the submission deadline will not normally constitute grounds for an extension.

Generative AI: Use Prohibited

Students are not permitted to use generative AI in this course. In alignment with McMaster academic integrity policy, it "shall be an offence knowingly to … submit academic work for assessment that was purchased or acquired from another source". This includes work created by generative AI tools. Also stated in the policy is the following, "Contract Cheating is the act of "outsourcing of student work to third parties" (Lancaster & Clarke, 2016, p. 639) with or without payment." Using Generative AI tools is a form of contract cheating. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity.

Generative AI: Some Use Permitted

Example One

Students may use generative AI in this course in accordance with the guidelines outlined for each assessment, and so long as the use of generative AI is referenced and cited following citation instructions given in the syllabus. Use of generative AI outside assessment guidelines or without citation will constitute academic dishonesty. It is the student's responsibility to be clear on the limitations for use for each assessment and to be clear on the expectations for citation and reference and to do so appropriately.

Example Two

Students may use generative AI for [editing/translating/outlining/brainstorming/revising/etc] their work throughout the course so long as the use of generative AI is referenced and cited following citation instructions given in the syllabus. Use of generative AI outside the stated use of [editing/translating/outlining/brainstorming/revising/etc] without citation will constitute academic dishonesty. It is the student's responsibility to be clear on the limitations for use and to be clear on the expectations for citation and reference and to do so appropriately.

Example Three

Students may freely use generative AI in this course so long as the use of generative AI is referenced and cited following citation instructions given in the syllabus. Use of generative AI outside assessment guidelines or without citation will constitute academic dishonesty. It is the student's responsibility to be clear on the expectations for citation and reference and to do so appropriately.

Generative AI: Unrestricted Use

Students may use generative AI throughout this course in whatever way enhances their learning; no special documentation or citation is required.

Turnitin.com

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.

APPROVED ADVISORY STATEMENTS

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.

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

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. Avenue to Learn, 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, 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

In the event of an absence for medical or other reasons, students should review and follow the Policy on Requests for Relief for Missed Academic Term Work.

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.

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, Avenue to Learn and/or McMaster email.