McMaster University | Civil Engineering

2026-27 COURSE OUTLINE

COURSE INFORMATION

Course Name: Foundation Engineering **Course Code:** CIVENG 4S04

Session Offered: Fall Term, 2026

Calendar Description: Principles of foundation design; stability analysis; bearing capacity, settlement and location, footings, deep foundations, piles, pile groups and drilled piers; retaining walls.

Instructor: Dr. Mehdi Shafikhani **Phone:** (647) 501-8114

Email: shafikhm@mcmaster.ca **Office Hours/Contact:** By appointment only

Class Schedule Days: Lectures:	Monday	Time: 5:30 PM – 6:20 PM	Location: BSB 120
	Wednesday	Time: 5:30 PM – 6:20 PM	Location: BSB 120
	Thursday	Time: 5:30 PM – 6:20 PM	Location: BSB 120
Tutorial:	T01: Monday	Time: 12:30 PM – 2:20 PM	Location: ABB 163

Teaching Assistants: Ali Mosaddegh (mosaddea@mcmaster.ca); Omar Gamal (gado1@mcmaster.ca)

Reference Material: Braja M. Das, Principles of Foundation Engineering (8th ed.), Cengage (2016)

Additional Reading:

Joseph E. Bowels, Foundation Analysis and Design, McGraw-Hill, 1995

Canadian Foundation Engineering Manual (5th ed.), 2023

1. COURSE OBJECTIVES

The objective of the course is to apply the principals of geology and soil mechanics to the design and analyses of foundations of structures, such as buildings, bridges and retaining structures. Theoretical and empirical design methods for stability and settlement are discussed. Emphasis will be placed on practical application, which require interpreting results of a soil investigation, engineering analyses and design, i.e. applying the principles and concepts of Geotechnical Engineering to real structures.

2. COURSE SPECIFIC POLICIES

All lectures and tutorials are mandatory.
All email exchanges are to be via McMaster University email accounts (we will not be checking for emails via Avenue). Lecture notes, additional notes and assignments will be posted on Avenue. Students are expected to check and read all the materials posted on Avenue.
Accommodations for missed academic work with a granted relief are as follows:
1. Term tests: There will be no makeup test, and the missed test grade portion will be re- allocated to the final examination.
2. Assignments will be extended by the same length of the absence. Late assignment submissions with no granted relief: the assignment grade will be reduced by 20% per each late day. Late assignments that are submitted after 5 days from the deadline will not be accepted.

The following course schedule is tentative. The instructor and the University reserve the right to modify elements of the course during the term. Any changes you will be announced in class and/or posted on A2L.

3. SCHEDULE		
WEEK 1	Introduction, Soil Mechanics Review	Introduction to Tutorials
WEEK 2	Site Investigation	Assignment 1
WEEK 3	Shallow Foundation	Assignment 2
WEEK 4	Shallow Foundation	
WEEK 5	Shallow Foundation	Term Test 1
WEEK 6	Reading Week	
WEEK 7	Deep Foundation	Assignment 3
WEEK 8	Deep Foundation	
WEEK 9	Deep Foundation	Term Test 2
WEEK 10	Retaining Structures	Assignment 4
WEEK 11	Deep Excavation	Assignment 5
WEEK 12	Review	Term Test 3
WEEK 13	Review	
FINAL EXAMINATION	Scheduled during the regular University Final Examination period established by the Registrar's Office	

4. ASSESSMENT OF LEARNING	WEIGHT %
Individual components will be weighted as follows:	
Assignments	25%
Term Tests	45% (15% for each term test)
Final Exam	30%
Project – Numerical Modeling (Bonus)	3%

Students that have written and received a grade equal or larger than 60% on all three term tests, and their cumulative average is equal or greater than 75%, and have not been absent in more than 3 lectures, have the option to be exempt from writing the final exam. For those that receive an exemption, the individual component for the final grade will be weighted as follows:

Assignments	25%
Term Tests	75% (25% for each term test)
Project – Numerical Modeling (Bonus)	3%

LECTURES AND TUTORIALS

The classes and tutorials are the primary means for delivering the course material and for regular communication between the instructor/TAs and the class. The lectures and tutorials will be used to present theoretical background and some illustrative examples. Additional examples will be demonstrated during the tutorials.

Assignments

The purpose of the assignment problems is to give you an opportunity to develop an in-depth understanding of the course material. All work that you submit for grading must be your own work. Assignments are to be submitted through Avenue to Learn, do not submit assignments by email.

5. LEARNING OUTCOMES

When you have successfully completed this course, you will be able to:

- List various types of foundations and describe their applications.
- Illustrate the design process of different types of foundations under simple field conditions.
- Explain fundamental theories and principles (models) in foundation engineering.
- Select designing methods and perform analysis that accounts for different types of foundation design.
- Identify assumptions and constraints in designing various types of foundation.
- Investigate modern/state of the art tools in foundation engineering.

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/).

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 requests 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