Civil Engineering
CIVENG 2E03
Computer Applications in Civil Engineering
Fall 2025

McMaster University
ENGINEERING

Instructor Information

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TBD

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Class Times

- **Lectures:** Tu 5:30PM - 6:20PM; Th 5:30PM - 6:20PM
- **Tutorials:** Mon 12:30PM - 2:20PM (T01); Mon 12:30PM - 2:20PM (T02)

- **Labs:** Mon 10:30AM - 11:20AM (L01); Wed 9:30AM - 10:20AM (L02); Mon 9:30AM - 10:20AM (L03); Th 9:30AM - 10:20AM (L04)

Class Format

In Person

Course Dates: 09/02/2025 - 12/04/2025
Units: 3.00
Course Delivery Mode: In Person
Course Description: Numerical techniques including error analysis, root finding, linear algebraic equations, curve fitting, integration and differentiation, ordinary differential equations; sensitivity analysis; use of several software packages for numerical analysis; civil engineering applications. Two lectures, one tutorial (two hours), one lab (three hours); first term Prerequisite(s): Credit or registration in CIVENG 2P04 Antirequisite(s): ENGPHYS 2CE4, CHEMENG 2E04, MECHENG 3F04, COMPENG 3SK3, ENGPHYS 3NM4, MECHTRON 3X03, SFWRENG 4X03

Instructor-Specific Course Information

Course materials: Course materials will be posted on Avenue to Learn.

Assignments: Ten homework assignments (20%), three major assignments (20%), and nine lab assignments (20%) will be assigned during the term, contributing to 60% of the grade.

Examination: There will be one final exam, contributing to 40% of the grade. Students may bring two double-sided crib sheets (letter size) and McMaster standard calculators.

Important Links

- Mosaic
- Avenue to Learn
- Student Accessibility Services - Accommodations
- McMaster University Library

- eReserves

Course Learning Outcomes

- Learn the basic principles of modelling mathematical problems that occur in engineering.
- Understand the main tools available in numerical analysis.
- Write MATLAB programs that use numerical methods to solve engineering problems.
- Understand numerical techniques, including error analysis, root finding, linear algebraic equations, curve fitting, integration and differentiation, ordinary differential equations.
- Apply numerical techniques to various civil engineering applications.

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.

A03 INVESTIGATION – 3.1 Selects appropriately from relevant knowledge base to plan appropriate data collection methods and analysis strategies.

A04 DESIGN - 4.1 Defines the problem by identifying relevant context, constraints, and prior approaches before exploring potential design solutions.

A05 USE OF ENGINNEERING TOOLS - 5.2 Successfully uses engineering tools.

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

A weekly breakdown of the course schedule

Week	Topic	Assessment
1. Sep 2, 4	Introduction, Modelling and Computers (Ch. 1, 2)	
2. Sep 9, 11	Number Representation and Errors (Ch. 3, 4)	HW Assignment 1
3. Sep 16, 18	Root Finding: Bracketing Methods (Ch. 5)	HW Assignment 2
4. Sep 23, 25	Root Finding: Open Methods (Ch. 6)	HW Assignment 3
5. No classes. Sep 30	National Day for Truth and Reconciliation	HW Assignment 4
5. Oct 2	Systems of Linear Equations (Ch. 9)	HW Assignment 5
6. Oct 7, 9	Systems of Linear Equations (Ch. 10, 11)	Major Assignment 1

Week	Topic	Assessment
Midterm Break. Oct 13-19		
7. Oct 21, 23	Least Squares Regression (Ch. 17)	HW Assignment 6
8. Oct 28, 30	Polynomial Interpolation, Polynomials (Ch. 18)	HW Assignment 7
9. Nov 4, 6	Numerical Integration (Ch. 21)	Major Assignment 2
10. Nov 11, 13	Numerical Integration (Ch. 22)	HW Assignment 8
11. Nov 18, 20	Numerical Differentiation (Ch. (23	HW Assignment 9
12. Nov 25, 27	First Order ODE (Ch. 25)	Major Assignment 3
13. Dec 2, 4	Higher Order ODE (Ch. 25), Review	HW assignment 10
Final Exam	Scheduled during the regular University Final Examination period established by The Registrar's Office.	

Required Materials and Texts

Please sign in with your MacID here to view your booklist

There are no required materials and texts.

Optional Course Materials

Please sign in with your MacID here to view your booklist

Numerical Methods for Engineers
ISBN: 978-1-260-23207-3
Authors: Raymond P. Canale, Steven C. Chapra
Publisher: McGraw-Hill
Edition: 8th

Course Evaluation

Item	Weight
Homework assignments	20%
Lab assignments	20%
Major assignments	20%
Final exam	40%
Total	100%

Submission: All assignments must be submitted through the designated Dropbox folders on Avenue to Learn.

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
F	0	0-49

Late Assignments

- Students are responsible for regularly checking Avenue to Learn for updates and announcements.
- Assignments submitted late without an approved extension will receive a penalty of 10% per day.
- Assignments submitted more than six days after the deadline will not be accepted.

Absences, Missed Work, Illness

- Submitting a McMaster Student Absence Form (MSAF) for missed work will provide a six-day extension.
- Students are responsible for notifying the instructor by email of their MSAF submission. Accommodations will be confirmed by email from the instructor; if confirmation is not received, students should assume the MSAF has not been received or processed.
- For properly reported and approved MSAFs, the weight of the missed work will be automatically transferred to the final examination.

Generative AI: Some Use Permitted

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.

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, located at https://secretariat.mcmaster.ca/university-policies-proceduresguidelines/

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.

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.

Equity, Diversity, and Inclusion

The Faculty of Engineering is committed to creating an environment in which students of all genders, cultures, ethnicities, races, sexual orientations, abilities, and socioeconomic backgrounds have equal access to education and are welcomed and treated fairly. If you have any concerns regarding inclusion in our Faculty, in particular if you or one of your peers is experiencing harassment or discrimination, you are encouraged to contact the Chair, Associate Undergraduate Chair, Academic Advisor or to contact the Equity and Inclusion Office.

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.

Academic Advising

For any academic inquires please reach out to the Office of the Associate Dean (Academic) in Engineering located in JHE-Hatch 301.

Details on academic supports and contact information are available from:

https://www.eng.mcmaster.ca/programs/academic-advising

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.