Civil Engineering
CIVENG 3G04
Structural Analysis
Fall 2026

McMaster University
ENGINEERING

Instructor Information

Saber Fosoul, Ph.D.
Email: alesahes@mcmaster.ca
Office Hours:
By Appointment

TA Information

Name: Masih Andalib
Email: andalibm@mcmaster.ca
Office Hour: TBD

Name: Fatmaelzahraa Nashat Ahmed (Fatma) Mohamed
Email: mohamf67@mcmaster.ca
Office Hour: TBD

Name: Ahmed Sherif
Email: sheria14@mcmaster.ca
Office Hour: TBD

Class Times

Lectures:

Tuesdays, Thursdays, and Fridays: 11:30 - 12:20

Tutorials:

Wednesdays 16:30 - 18:20

Class Format

In Person

Course Dates: 09/08/2026 - 12/10/2026
Units: 4.00
Course Delivery Mode: In Person
Course Description: Structural analysis and modelling of linear elastic truss, beam and frame structures; stress resultants and deformations of statically determinate structures; methods for analysis of indeterminate structures; stiffness matrix method; plane frame computer analysis. Three lectures, one tutorial (two hours); fall term Prerequisite(s): CIVENG 2C04 and CIVENG 2P04

Course Objectives: This course is designed to introduce students to a range of techniques for the analysis of linear elastic structural systems. Emphasis will be placed on developing a strong understanding of fundamental analysis methods and their application to both simple and complex structural systems.

The first half of the course will focus on the analysis of statically determinate structures, including beams, frames, and trusses. Topics will include the assessment of structural stability and determinacy, calculation of internal forces, construction of shear force and bending moment diagrams, and determination of structural deflections.

The second half of the course will focus on the analysis of statically indeterminate structures. Various analysis methods will be introduced, with continued emphasis on understanding structural behaviour and accurately determining internal forces and constructing shear force and bending moment diagrams.

At the end of each major section, students will be introduced to **SAP2000** as a practical structural analysis tool. Students will use the software to analyze selected structural systems and compare the results with their hand calculations, helping them develop both analytical understanding and familiarity with commonly used structural engineering software.

To attain the course objectives, we will:

- examine the fundamental principles governing the behaviour of linear elastic structures
- review construction of axial, shear, and bending moment diagrams
- review the important distinctions between statically determinate and indeterminate structures
- become familiar with modelling truss, beam and frame structures, as needed for analysis
- investigate the use and merits of various classical techniques of structural analysis
- develop and apply matrix techniques for structural analysis of planar trusses, beams and frames
- investigate the use of approximate methods for the analysis of indeterminate structures

Instructor-Specific Course Information

Attendance at all lectures and tutorials is mandatory and is an important part of successfully completing the course.

All course-related email communication must be conducted using your McMaster University email account. Emails sent from non-McMaster accounts may not receive a response. When contacting the instructional team, please use your McMaster email and include the course code in the subject line whenever possible.

Avenue to Learn (http://avenue.mcmaster.ca) will serve as the primary platform for course materials and announcements. Lecture notes, supplementary materials, assignments, and other course-related resources will be posted on Avenue throughout the term.

Students are responsible for checking Avenue regularly and reviewing all posted announcements, materials, instructions, and deadlines. Important course updates communicated through Avenue will be considered part of the official course communication.

SAP2000: Structural Analysis Software and Course Integration

As part of this course, students will be required to install the latest version of

SAP2000 on their computers. An educational license will be made available through Avenue to Learn (A2L), allowing students to model and analyze simple structural systems.

Selected assignments will include SAP2000-based components in which students will analyze structural systems using the software and compare the results with their hand calculations. These exercises are intended to provide practical experience with commonly used structural analysis software while reinforcing the fundamental concepts and analysis methods covered in the course.

Students are encouraged to use these exercises as an opportunity to develop their engineering judgment by interpreting, verifying, and critically evaluating computer-generated results rather than relying solely on software output.

Please note that proficiency in SAP2000 and the use of the software will NOT be assessed on the term tests or final examination.

Important Links

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

Course Learning Outcomes

- Understand and apply engineering fundamentals
- Identify and state reasonable assumptions and suitable engineering fundamentals, before proposing a solution path to a problem.
- Evaluate engineering tools, identify their limitations, and select, adapt, or extend them appropriately.
- Use appropriate engineering tools effectively and accurately

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.

Graduate Attributes and CEAB Indicators

Through this course, students will develop the following attributes and indicators:

- Attribute: A01. A knowledge base for engineering
  - Indicator: 1.3 – Competence in Engineering Fundamentals
- Attribute: A02. Problem analysis
  - Indicator: 2.1 – Identifies and states reasonable assumptions and suitable engineering fundamentals, before proposing a solution path to a problem.
- Attribute: A05. Use of engineering tools
  - Indicator: 5.1 – Evaluates engineering tools, identifies their limitations, and selects, adapts, or extends them appropriately
  - Indicator: 5.2 – Successfully uses engineering tools.

Course Schedule

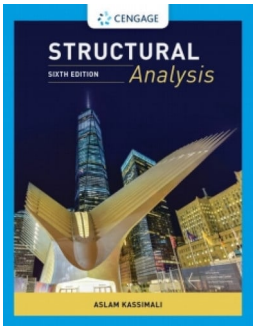
A weekly breakdown of the course schedule

Week	Topic	Assessment
1	Introduction/determinacy/stability	Assignment 1 - Term Test 1 - Final Exam
2	Analysis of trusses	Assignment 1 - Term Test 1 - Final Exam
3	Analysis of beams and frames	Assignment 2 - Term Test 1 - Final Exam
4	Direct integration method	Assignment 3 - Term Test 1 - Final Exam

Week	Topic	Assessment
5	Moment-area method	Assignment 4 - Term Test 1 - Final Exam
Midterm Break		
6	Slope-deflection method	Assignment 5 - Term Test 2 - Final Exam
7	Moment distribution method	Assignment 6 - Term Test 2 - Final Exam
8	Method of consistent deformations	Assignment 7 - Term Test 2 - Final Exam
9	Approximate methods	Assignment 8 - Final Exam
10	Matrix method	Assignment 9 - Final Exam
11	Matrix method	Assignment 9 - Final Exam
12	Matrix method	Assignment 9 - Final Exam
13	Review	

Required Materials and Texts

Please sign in with your MacID here to view your booklist



Structural Analysis
ISBN: 9780357372647
Authors: Kassimali
Publisher: Cengage Learning US
Publication Date: 2019-04-17
Edition: 6

Course Evaluation

ASSESSMENT OF LEARNING	
Assessment	**Weight (%)**
Assignments	30
Term Tests	30
Final Exam	40

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

Graduate Grading Scale

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

Grade	Points	Equivalent Percentage	Pass/F
A+	12	90-100	P+
A	11	85-89	
A-	10	80-84	
B+	9	77-79	P
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/F
A+	12	90-100	P+
A	11	85-89	
A-	10	80-84	
B+	9	75-79	P
B	8	70-74	
B-	7	60-69	
F	0	59 and under	F

Late Assignments

Assignment deadlines will be extended by the same duration as any approved

absence. For late submissions without approved academic relief, the assignment grade will be reduced by 20% for each day late. Assignments submitted more than five days after the deadline will not be accepted.

Absences, Missed Work, Illness

Please feel free to reach out to discuss your unique circumstances. We will work together to arrange any accommodations you may need to help you achieve your learning goals for this course.

There will be no make-up tests. If you miss a term test, the weight of the missed test will be reallocated to the final examination.

If you do not write a term test or submit an assignment at the scheduled time, and you do not file a MSAF, you will receive a grade of zero on the missed work. Additional details can be found at http://mcmaster.ca/msaf/.

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.

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.