Department of Civil and Environmental Engineering

CIVE 4200 A: Matrix Analysis of Framed Structures

Course Outline – Fall 2026

COURSE INSTRUCTOR	COURSE SCHEDULE
Christian Viau, Ph.D., P.Eng. Associate Professor Department of Civil and Env. Engineering Email: christian.viau@carleton.ca Office: 4535 Mackenzie Office Hours: Tuesday, 4:00 pm – 5:00 pm	Lectures: Tuesday and Thursday, 2:35 pm – 3:55 pm Lab Sessions: Wednesday, 7:05 pm – 9:55 pm

COURSE WEBSITE AND COMMUNICATION

All course information, assignments, and lecture files will be available through Brightspace. All students are responsible for ensuring that they are correctly registered through Brightspace and that they are receiving messages properly through their official university email address. Students are responsible for checking the Brightspace course management site and their official email account frequently. Brightspace will be used to send out announcements and important information related to the course.

COURSE DESCRIPTION AND LEARNING OUTCOMES

This course introduces advanced principles of structural analysis for engineering structures. Learning structural analysis will provide you with important problem-solving concepts and skills that are applicable to the topic of structural engineering. To develop the skills required for this course you must practice and participate in lectures and laboratory sessions. Concepts to be covered include matrix flexibility method, flexibility influence coefficients, development of stiffness influence coefficients, stiffness method of analysis, and an introduction to the finite element method.

By the end of the course, successful students will be able to:

- Model and analyze indeterminate framed structures by the two basic approaches of flexibility (force) and stiffness (displacement) matrix structural analysis methods;
- Explain the advantages and disadvantages between the flexibility and stiffness approaches;
- Have the fundamental knowledge required to conduct computer structural analysis;
- Model and analyze indeterminate 2D and 3D framed structures by hand calculations and by computer structural modelling and analysis software.

COURSE PREREQUISITE(S)

- CIVE 3203

TEXTBOOK(S)/LEARNING MATERIALS AND THEIR COSTS

There are no assigned textbooks for the course, therefore, students are not required to purchase textbooks or other learning materials for this course. However, students may purchase either of the following at their discretion, as recommended by the course instructor:

- Kassimali, A., *Matrix Analysis of Structures*, 3rd edition, Cengage, 2022.

COURSE DELIVERY AND PEDAGOGY

Lectures

Lectures will take place during the official lecture times. Incomplete lecture slides (in PDF) will be posted the day before each lecture. Annotated "full" lecture notes will be posted following the end of the lecture, however, attendance to the lectures is recommended as not everything will be written down on the posted notes.

Laboratories / PA Sessions

The laboratory sessions for this course are problem-solving sessions and will be run by the teaching assistants (TA). You will work through problems on the material currently being covered in class. Attendance is recommended and is a great way to reinforce what is learnt in the classroom.

Office Hours

Office hours are specifically allocated by the instructor and the TA to make themselves available for you to ask questions and receive clarifications regarding course content. To get the most out of them, you are asked to prepare your questions and works-in-progress prior to attending.

Assessments

The midterm and final exam will take place in-person. Assignment submissions will be made online via Brightspace.

COURSE OUTLINE (SUBJECT TO CHANGE)

WEEK	LECTURE DATES	TOPIC	LAB SESSION	TEXTBOOK CHAPTER
1	Sept. 10	Intro and review of matrix algebra		1.1-1.4
2	Sept. 15 & 17	Intro to the stiffness method	Lab 1	1.5, 2.1-2.4
3	Sept. 22 & 24	Axial elements		3.1-3.3
4	Sept. 29 & Oct. 1	Plane trusses	Lab 2	3.1-3.3, 3.5-3.8
5	Oct. 6 & 8	Beams		5.1-5.2, 5.4-5.7
6	Oct. 13 & 15	Beams	Lab 3	
7	Oct. 20 & 22	Midterm review and exam		N/A
8		**Reading Week**		
9	Nov. 3 & 5	Plane frames	Lab 4	6.1-6.6
10	Nov. 10 & 12	Special cases		7.1, 7.3, 7.5, 9.4
11	Nov. 17 & 19	Special cases	Lab 5	
12	Nov. 24 & 26	Axial load effects		N/A
13	Dec. 1 & 3	Structural dynamics	Lab 6	
14	Dec. 8 & 10	Structural dynamics / Course review		N/A

COURSE WORK AND ASSESSMENTS

Assignments..... 20%
Midterm Exam..... 30%
Final Exam 50%

***NOTE**: A final course grade of D- or better must be obtained to pass the course. All components of the course must be fulfilled; otherwise, students may receive an F as a final mark. This is also valid for students who are taking the course for the second or third time. For assignments, this consists of at least three completed and submitted assignments.*

Assignments

There will be a total of 5 assignments tentatively posted and due on the following dates:

Assignments	Posted Date	Due Date (at 11:59 pm)
Assignment 1	Sept. 24	Oct. 4
Assignment 2	Oct. 1	Oct. 11
Assignment 3	Oct. 8	Oct. 18
Assignment 4	Nov. 5	Nov. 22
Assignment 5	Nov. 19	Dec. 6

Assignments are due at 11:59 pm on their due date and shall be submitted on Brightspace as a single PDF file. It is each student's responsibility to ensure that their work is legible and neat, otherwise, points may be deducted. Feedback will be provided on the submission by the TA; no assignment solutions will be posted.

While it is permitted and suggested to discuss and work through the assignments with colleagues to enhance your learning, it is crucial that assignments are completed individually. Attempting assignments individually is the only way to have an opportunity to test your understanding and practice for the midterm and the final exam.

Assignment Token and Late Term Work Submissions

As of the first day of class, each student is given one (1) "**assignment token**". Each token allows for a one-time 24-hour extension of any assignment without penalty. Tokens may not be transferred to other students, and no additional tokens will be given. Tokens may not be used to extend a deadline beyond Dec. 11th, 2026 (i.e., the last day of classes). Tokens shall be submitted on Brightspace.

Late submissions will be assigned a grade of zero (0%).

Midterm Exam

An open-book midterm exam is scheduled to take place **Thursday, October 22nd** from **2:35 pm – 3:55 pm**. The midterm exam will take place in the same room as the lectures.

Final Exam

The final exam has not yet been scheduled - you will be notified of the date, time and location through the university once SES makes the exam schedule available. The final exam will be an open-book exam written on campus and proctored. The final exam is for evaluation purpose and will not be returned to students.

Graduate Attribute Data Collection

The Canadian Engineering Accreditation Board (CEAB) requires graduates of undergraduate engineering programs to possess 12 attributes. Courses in all four years of our programs evaluate students' progress towards acquiring these attributes. Aggregate data (typically, the data collected in all sections of a course during an academic year) is used for accreditation purposes and to guide improvements to our programs. Some of the assessments used to measure GAs may also contribute to final grades; however, the GA measurements for individual students are not used to determine the student's year-to-year progression through the program or eligibility to graduate.

COURSE POLICIES

Email Policy

Please use ***CIVE 4200A*** in the subject header. Efforts will be made to reply to emails as soon as possible, but please expect a possible delay of up to 48 hours for a response. Emails will not be answered during weekends or holidays. **For course content questions, please use the office hours**.

For enquiries regarding assignments and laboratory sessions, please contact the TA.

Deferred term work and self declaration

Students who claim extenuating circumstances defined in the Academic Consideration Policy, as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases. This must occur no later than three (3) days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Consult Section 4.4 of the University Calendar.

Unjustified late submissions will not be accepted. If an absence or missed deadline is deemed justified:

Assignment: the weight will be transferred onto the remaining assignments.

Midterm exam: the weight will be transferred onto the final exam. There will be no make-up midterms.

Final exam: Students who are unable to write the final examination because of extenuating circumstances, as defined in the Academic Consideration Policy, may apply for accommodation by contacting the Registrar's office. Consult the Section 4.3 of the University Calendar.

Grade Appeals

All appeals of grades assigned in this course must be made within 7 calendar days of the grade being made available. Note that an appeal may result in a reduction, increase, or no change in grade. Please consult the Appeal of Grade Policy.

Academic Integrity and Plagiarism:

a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures. Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or expulsion.

b) One of the main objectives of the Academic Integrity Policy is to ensure that **the work you submit is your own**. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source.

Examples of violations of the policy include, but are not limited to:

- any submission prepared in whole or in part, by someone else;
- any submission prepared in whole or in part, using artificial intelligence (AI);
- using another's data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and
- failing to acknowledge sources of information through the use of proper citations when using another's work and/or failing to use quotations marks.

Unauthorized Dissemination

As per Carleton's Academic Integrity Policy, Unauthorized Dissemination is a violation of the standards of academic integrity to publish, disseminate, or otherwise make available to a third-party instructional material where the instructor has explicitly prohibited their dissemination.

The materials (including the course outline, slides, posted notes, videos, labs, projects, assignments, quizzes, exams, and solutions) created for this course are intended for personal use only. They may not be reproduced, redistributed, or disseminated in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—without written permission from the author(s), both during and after the semester.

Generative Artificial Intelligence (GenAI)

As our understanding of the uses of GenAI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of GenAI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course. While GenAI can be used to help students study, do their assignments, and practice the course material, in no circumstances can GenAI be used in whole or in part for any graded submissions.

Permitted use: Students may use GenAI to study and verify their assignment work/practice. GenAI may also be used to assist the students' learning via providing additional context, explanations, and examples. Students' can also use GenAI to proofread their emails to the course instructor and TAs.

Documentation / acknowledgement: Students must disclose the use of GenAI on their assignments and work. This must take place on the first page, via a short statement.

Limitations / prohibited use: Students may not use GenAI in any of their submissions.

Safer Learning and Working Environment

The Carleton University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca, Ombuds Services - Carleton University or submit an anonymous human rights concern through this form.

Engineering Academic Advising

The Engineering Academic Support Service assists undergraduate engineering students with course selection, registration, and learning support from first-year through to graduation. Academic Advisors Contact can be found here: https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/

Academic Accommodations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website (https://students.carleton.ca/course-outline/).

STUDENT MENTAL HEALTH AND WELLNESS

As a university student you may experience a range of mental health challenges that can significantly impact your academic success and overall well-being. Carleton's Wellness Services Navigator is designed to help students connect with mental health and wellness resources.

If you need to talk to someone from the department for more information and support with connecting to resources, you can contact the following faculty members, depending on your program, or contact the department:

Department: Prof. Shoeleh Shams
Email: CEEUGChair@cunet.carleton.ca, Office: 4242 Mackenzie

ACSE: Prof. Cara Lozinsky
Email: caralozinsky@cunet.carleton.ca, Office: 2374 Mackenzie

CIVE: Prof. Christian Viau
Email: christian.viau@carleton.ca, Office: 4535 Mackenzie

ENVE: Prof. Cole Van De Ven
Email: cole.vandeven@carleton.ca, Office: 6210 Canal Building

PUBLIC HEALTH MEASURES

If you feel sick, please stay home. If you require assistance due to missing a lecture while recovering from an illness, please contact a colleague or the course instructor. **You will not be penalized for staying home if you are feeling unwell**. Remaining vigilant and not attending work or school when sick or with symptoms is critically important for the wellbeing of your peers and Carleton University staff.

If the course instructor falls ill prior to a scheduled lecture, an announcement will be made on Brightspace, and the in-person lecture will be canceled or arrangements will be made.

The following is a non-exhaustive list of available on- and off-campus resources:

1. **Carleton's Wellness Desk**: Located at 204A MacOdrum Library, is a space for students to learn about resources, connect with our Wellness Coordinator, and decompress during stressful times of the year. You can pop into the Wellness Desk any time during its hours of operation – no appointments necessary! https://wellness.carleton.ca/mental-health/wellness-desk/

2. **Carleton's Care and Support Team:** The role of a Care and Support Team is to support students with any questions or concerns they may have relating to their academics, well-being, finances or any other challenges they may be experiencing. https://wellness.carleton.ca/mental-health/student-care-and-support-team/

3. **Carleton's Health and Counselling Services:** To book an appointment visit the CHR Connect App or contact the main clinic by calling 613-520-6674 ext. 2. If urgent, let the Patient Care Coordinator know or go in person to the main clinic (2500 Carleton Technology and Training Centre Building) and indicate that they are in crisis and need to speak to someone right away. https://wellness.carleton.ca/counselling/

4. **Carleton's Single Session Counselling:** To book an appointment visit the CHR Connect App**.** https://thconnect.telushealth.com/mobile-app-information/xz6lzGrv

5. **Residence Counselling and Wellness Service:** Counselling services specifically for students in residence. https://carleton.ca/health/residence-counselling/

6. **Therapy Dogs:** Carleton's therapy dogs are around campus with their owners (who are Carleton University staff and faculty) to comfort and provide support to help you thrive as a university student. https://carleton.ca/wellness/dogs/

7. Emergencies and Crisis and Emergency Numbers

8. **Good2Talk (1-866-925-5454):** Good2Talk is a free, confidential helpline providing professional counselling and information and referrals for mental health, addictions and well-being to post-secondary students in Ontario, 24/7/36 https://good2talk.ca/

9. **Empower Me:** Undergraduate students have access to free counselling services in the community through Empower Me, either in person, by telephone, video-counselling or e-counselling. **This free service is accessible 24/7, 365 days per year.** Call **1-844-741-6389 (toll free)** to make an appointment with a counsellor in the community. More information is available https://students.carleton.ca/services/empower-me-counselling-services/

10. **The Walk-In Counselling Clinic (off-campus community resource):** The walk-in Counselling Clinic have offices in various locations across Ottawa and the greater Champlain region that are open 7 days a week. Individuals will be assisted, with no appointment, on a first-come, first-serve basis during the Walk-in Counselling Clinic hours. The Walk-in Counselling Clinic **offers services in many languages** and is free and confidential. More information can be found at: https://walkincounselling.com/

11. **Distress Centre of Ottawa and Region**: Available 10am-11pm, 7 days/week, 365 days/year. **Distress Line:** 613-238-3311, **Crisis Line:** 613-722-6914 or 1-866-996-0991, **Text:** 343-306-5550. https://www.dcottawa.on.ca/

12. **Distress and Crisis Ontario, Available for chat 2 pm – 2 am EST.** https://www.dcontario.org/

13. **BounceBack Ontario (Toll-Free: 1-866-345-0224)** is a free skill-building program managed by the Canadian Mental Health Association (CMHA). It is designed to help adults and youth 15+ manage low mood, mild to moderate depression and anxiety, stress or worry. Delivered over the phone with a coach and through online videos, you will get access to tools that will support you on your path to mental wellness. **https://bouncebackontario.ca/.**