

CIVE 4200 A: Structural Analysis II

Course Outline – Fall 2024

COURSE INSTRUCTOR	COURSE SCHEDULE
<p>Christian Viau, Ph.D., P.Eng. Department of Civil and Env. Engineering Email: christian.viau@carleton.ca</p> <p>Office: 4535 Mackenzie Office Hours: Thursday, 12:30 pm – 1:30 pm</p>	<p><u>Lectures:</u> Monday and Wednesday, 2:35 pm – 3:55 pm</p> <p><u>Lab Sessions:</u> Thursday, 6:05 pm – 8:55 pm</p>

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. The announcement function in Brightspace will be used to send out any updates with important information related to the course.

COURSE DESCRIPTION AND OBJECTIVES

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, laboratory sessions, and other course elements. 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:

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

PREREQUISITES

- CIVE 3203

RECOMMENDED COURSE TEXTBOOK

- 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 **HEAVILY** 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 assistant (TA). In each session, you will work through problems on the material currently being covered in class. Attendance is **HEAVILY** 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

All exams will take place in-person. Assignment submissions will be made online via Brightspace.

TENTATIVE COURSE OUTLINE (SUBJECT TO CHANGE)

WEEK	LECTURE DATES	TOPIC	LAB SESSION	TEXTBOOK SECTIONS
1	Sept. 4	Intro and review of matrix algebra		1.1-1.4
2	Sept. 9 & 11	Intro to the stiffness method	Lab 1	1.5, 2.1-2.4
3	Sept. 16 & 18	Axial elements		3.1-3.3
4	Sept. 23 & 25	Plane trusses	Lab 2	3.1-3.3, 3.5-3.8
5	Sept. 30 & Oct. 2	Beams		5.1-5.2, 5.4-5.7
6	Oct. 7 & 9	Beams and Midterm Review	Lab 3	
7	Oct. 16	Midterm		N/A
Reading Week				
8	Oct. 28 & 30	Structural Analysis Software	Lab 4	N/A
9	Nov. 4 & 6	Plane frames		6.1-6.6
10	Nov. 11 & 13	Plane frames	Lab 5	
11	Nov. 18 & 20	Special cases		7.1, 7.3, 7.5, 9.4
12	Nov. 25 & 27	Special cases	Lab 6	
13	Dec. 2, 4 & 6	Structural dynamics		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 in order 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 time.

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. 16	Sept. 27
Assignment 2	Sept. 23	Oct. 4
Assignment 3	Sept. 30	Oct. 18
Assignment 4	Nov. 4	Nov. 22
Assignment 5	Nov. 18	Dec. 6

Unless otherwise noted, assignments are due on Friday and shall be submitted on Brightspace. It is each student's responsibility to ensure that their work is legible and neat, otherwise, points may be deducted. While it is permitted and recommended 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. Feedback will be provided directly on the assignment. **No assignment solutions will be posted.**

As of the first day of class, each student is given two (2) "**assignment tokens**". Each token allows for a one-time 24-hour extension of any assignment of their choosing without penalty. Tokens may be combined for a single assignment (e.g., using two tokens for a 48-hour extension). Tokens may not be transferred to other students. No additional tokens will be given. Tokens may not be used to extend a deadline beyond Dec. 6th, 2024 (i.e., last day of classes).

Midterm Exam

The midterm exam is scheduled to take place on **Wednesday, October 16th from 2:35 pm – 3:55 pm**. The midterm exam location is the same room as the lectures, Tory Building 240 (TB 240). The midterm will cover all the material from weeks 1 through 6, inclusively.

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.

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 or an increase in grade.

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

Academic Integrity:

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensure that a degree from Carleton University is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. Carleton University's Policy on Academic Integrity (<http://www.carleton.ca/studentaffairs/academic-integrity>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. It is your responsibility to be familiar with these policies. 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 from the university.

Email Policy

The professor is more than happy to answer questions related to administration via email. **For course content questions, please use the office hours.** Effort 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 enquiries regarding assignments and problems seen during laboratory sessions, please contact the respective TA.

Missed Term Work

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](#).

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. No make-up midterms will be administered.

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](#).

Copyright

Classroom teaching and learning activities, including lectures, discussions, presentations, etc., are copyright protected and remain the intellectual property of the instructor. All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of the instructor. Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or

non-commercial purposes without express written consent from the copyright holder(s). Students are not permitted to upload these copyrighted course materials to any online repositories.

Learning and Working Environment

The 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](mailto:equity@carleton.ca) at equity@carleton.ca.

We will strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone's personal beliefs, choices, and opinions.

Engineering Academic Advising

[The Engineering Academic Support Service](https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/) 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/>).

PUBLIC HEALTH MEASURES

If you are feeling 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 you feel ill or exhibit symptoms while on campus or in class, please leave campus immediately. In the event that 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. A recorded lecture will be posted on Brightspace shortly afterwards

STUDENT MENTAL HEALTH AND WELLNESS

University students may experience a range of mental health challenges that can significantly impact academic success and overall well-being. Carleton's Wellness Services Navigator is designed to help students connect with mental health and wellness resources. If a student needs to talk to someone from the department for more information and support with connecting to resources, they can contact the following faculty members, or contact the department at CEEUGChair@cunet.carleton.ca

ACSE: Prof. [Elie Azar](#)

Email: Elie.Azar@carleton.ca, Office: 3432 Mackenzie

CIVE: Prof. [Heng Khoo](#)

Email: heng.khoo@carleton.ca, Office: 3364 Mackenzie

ENVE: Prof. [Shoeleh Shams](#)

Email: shoelehshams@cunet.Carleton.ca, Office: 4242 Mackenzie

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 Health and Counselling Services:** To book an appointment contact the main clinic by calling (613) 520-6674. 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://carleton.ca/health/>
3. **Residence Counselling and Wellness Service:** Counselling services specifically for students in residence. <https://carleton.ca/health/residence-counselling/>
4. **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/>
5. [Emergencies and Crisis](#) and [Emergency Numbers](#)
6. **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/>
7. **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/>
8. **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/>
9. **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/>
10. **Distress and Crisis Ontario, Available for chat 2 pm – 2 am EST.** <https://www.dcontario.org/>

11. **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/>.