Carleton University Department of Civil and Environmental Engineering

CIVE 4302A: REINFORCED AND PRESTRESSED CONCRETE DESIGN
Course Syllabus – Fall 2022

COURSE INSTRUCTOR

Ahmed Hassan
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Office: ME (Mackenzie) 3440
Office Hours: Monday 4:30 to 5:30 PM

COURSE SCHEDULE

Lectures: Thursday 6:05 to 8:55 PM EST
UC 182
Tutorials: ODD WEEKS ONLY
Tuesday 8:35 to 11:25 AM EST
SA 516

COURSE WEBSITE AND COMMUNICATION

All course information and online quizzes 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.

COURSE DESCRIPTION AND OBJECTIVES

Calendar Description: Reinforced concrete shear and torsion design. Two-way slab design by Direct Design and Equivalent Frame Method. Behaviour and design of slender reinforced concrete columns. Prestressed concrete concepts; flexural analysis and design; shear design; anchorage zone design; deflection and prestress loss determination.

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

- Differentiate between the direct design and elastic frame methods for analyzing two-way slabs, and justify using one over the other in various applications
- Design a two-way slab based on a set of loads determined using the student’s chosen analysis method
- Assess the loads on a slender column and design the slender column based on the applied loading
- Assess the flexural, shear and torsional loads on prestressed beams, and design the beam accordingly based on prestressed concrete design principles
- Examine the long-term loading effects on prestressed beam members and explain how these effects result in prestressing losses in the member behaviour

COURSE DELIVERY

This course will **be taught in-person during the lecture times**. Lecture slides for each week will be posted one week in advance. Students are advised to review the slides, read the corresponding code clauses, and attempt the lecture examples before attending the lecture. Doing this allows the lecture time to have more discussion about different aspects of the lecture content. Once the lecture concludes, students are advised to complete the online lecture quiz to ensure that they clearly understood the conceptual and theoretical components of the lecture. And finally, assignments are designed to be a good practice of the practical components of the lecture.
I will be using the announcement function in Brightspace to send out weekly update with important information related to the course. Using the announcement function is helpful because it keeps all communication from me about this course in one place instead of searching through your email every time you need to find a previous communication.

I will also have an “ask the instructor” forum in Brightspace in which you can post your questions about weekly course content and wording of assignment questions. I will be checking this forum daily (except weekends) to answer all questions. There are two reasons why I like to do this (i) Out of fairness so that all students can have access to the answers I provide other students and (ii) efficiency, I often get the same questions over and over again, also, I am not always available to answer emails right away. Having the forum allows me to put the answer to questions there and reduce the wait time on your end and reduce the response time on my end. You are welcome to use this forum before or after lecture time.

TEXTBOOK

It is necessary that all students own a copy of the Concrete design handbook 4th edition. All assessment will be open book using this design manual only. It is not available at the university bookstore. You must get a copy on your own from the Cement Association of Canada. To purchase the book please visit https://www.cement.ca/technical-publications/. Make sure you use your Carleton student email in your correspondence to be able to access student pricing.

COURSE OUTLINE (SUBJECT TO CHANGE)

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>1</td>
<td>Lect. #1 Sep. 8</td>
<td>General review of Reinforced Concrete Design</td>
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<tr>
<td>2</td>
<td>Lect. #2 Sep. 15</td>
<td>Shear and Torsion design Part 1</td>
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<tr>
<td>3</td>
<td>Lect. #3 Sep. 22</td>
<td>Shear and Torsion design Part 2</td>
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<tr>
<td>4</td>
<td>Lect. #4 Sep. 29</td>
<td>Design of two-way slabs Part 1</td>
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<tr>
<td>5</td>
<td>Lect. #5 Oct. 6</td>
<td>Design of two-way slabs Part 2</td>
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<tr>
<td>6</td>
<td>Lect. #6 Oct. 13</td>
<td>Design of two-way slabs Part 3</td>
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<tr>
<td>7</td>
<td>Lect. #7 Oct. 20</td>
<td>Design of Slender Columns</td>
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FALL BREAK OCTOBER 22 TO 30

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>8</td>
<td>Lect. #8 Nov. 3</td>
<td>Prestressed Concrete Concepts and materials</td>
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<tr>
<td>9</td>
<td>MDT EXM Nov. 10</td>
<td>MIDTERM EXAM</td>
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<td>10</td>
<td>Lect. #9 Nov. 17</td>
<td>Determination of prestress losses</td>
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<td>11</td>
<td>Lect. #10 Nov. 24</td>
<td>Flexural analysis and design</td>
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<tr>
<td>12</td>
<td>Lect. #11 Dec. 1</td>
<td>Shear and torsion design</td>
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<tr>
<td>13</td>
<td>Lect. #12 Dec. 8</td>
<td>Anchorage zone design</td>
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COURSE WORK AND ASSESSMENT

Lecture Quizzes .................................. 5%
Assignments .................................... 25% (5% each)
Midterm Exam.................................... 20%
Final Exam..................................... 50%

Lecture Quizzes

A lecture quiz will be used weekly to assess the level of understanding attained from the lectures. The quizzes have two main purposes: a) ensure an adequate level of understanding is attained from the lecture, and b) they act as a from of formative assessment that allows me to address common mistakes
and questions. Therefore, it is imperative for students to attempt the quizzes on their own in order for me to be able to adequately prepare and address issues of concern during the lecture time. Lecture quizzes will be available for 1 week after the lecture concludes. The quizzes will be a combination of multiple choice and short answer questions.

To avoid the need for extensive accommodations for sickness or other obligations, the lecture quiz with the lowest marks will be dropped from the final mark. Any additional accommodations require exceptional circumstances and supporting documentation.

Assignments

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

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Posted</th>
<th>Due</th>
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<tr>
<td>Assignment #1</td>
<td>September 22\textsuperscript{nd}</td>
<td>September 29\textsuperscript{th}</td>
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<tr>
<td>Assignment #2</td>
<td>October 13\textsuperscript{th}</td>
<td>October 20\textsuperscript{th}</td>
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<td>Assignment #3</td>
<td>October 20\textsuperscript{th}</td>
<td>November 3\textsuperscript{rd}</td>
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<td>Assignment #4</td>
<td>November 17\textsuperscript{th}</td>
<td>November 24\textsuperscript{th}</td>
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<td>Assignment #5</td>
<td>December 1\textsuperscript{st}</td>
<td>December 8\textsuperscript{th}</td>
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Example questions will be solved during the lectures. Assignments will be similar to the examples solved during the lecture. Submission of the assignment will be done through a submission form on Brightspace. 

\textbf{It is absolutely crucial that assignments are completed individually.} It is okay to discuss the assignment with colleagues to enhance understanding, but attempting assignments individually is the only way to have an opportunity to test your understanding and practice for the midterm and final exam.

\begin{center}
Any late assignments will be deducted 25\% (even if late by one minute) and will receive a grade of zero if late by 24 hours or more.

Forgetting or making a mistake in submission is not an acceptable excuse for late assignments. Make sure to note down assignment deadlines in your calendar and double checking to make sure the assignment has been submitted correctly. It is your responsibility to ensure submissions are made properly and punctually
\end{center}

Midterm and Final Exam

The midterm exam will take place during the lecture time on November 10\textsuperscript{th}. It will cover all topics up to the end of the slender columns lecture. The final exam has not yet been scheduled. Make sure that you time yourself throughout the semester while doing the assignments to ensure that you are not taking longer than you should during the midterm and exam.

\begin{center}
A minimum mark of 50\% on the final exam is required to pass the course.
\end{center}
Appeals

All appeal of grades assigned in this course must be made within 7 calendar days of the grade being made available. Appeals of grade can result in either a reduction or an increase in grade.

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. Any students who do not act with academic integrity will face severe consequences including immediate referral to Associate Dean of Student Affairs.

Email Policy

The instructor is more than happy to answer questions related to administration via email. For course content questions please use the “ask the instructor” forum. 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 (especially during weekends). In addition, complex technical questions should be addressed during office hours, or by appointment. Emails must come from official Carleton University email addresses or through Brightspace. The instructor will not respond to emails from external addresses.

Extensions

In the interest of fairness for all students, requests for extensions will only be granted for situations that are truly out of a student’s control. Extensions cannot be granted more than 24 hours after deadlines.

Course Material Copyright

Classroom teaching and learning activities, including lectures, discussions, presentations, etc., are copy 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.

Academic Accommodation

Students with diverse learning styles and needs are welcome in this course.
You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details please review the [Student Guide to Academic Accommodation](#).

**Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details please review the [Student Guide to Academic Accommodation](#).

**Academic Accommodations for Students with Disabilities:** If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the [Paul Menton Centre website](#).

**Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton’s Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the [Equity and Inclusive Communities website](#).

**Accommodation for Student Activities:** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the [Senate Policy on Accommodation for Student Activities (PDF, 25KB)](#).