Western University – Faculty of Engineering
Department of Civil and Environmental Engineering

CEE 3358b – Reinforced and Prestressed Concrete Design
Course Outline 2025/26

This one-term course integrates material from previous structural analysis and design courses, extending students' knowledge and abilities in structural behaviour and design. It enables students to understand the behaviour of Reinforced and Prestressed Concrete Structures. In this course, students develop skills for designing such structures by applying their knowledge of mathematics, science, and engineering to identify, formulate, and solve structural design problems. The course techniques and skills prepare students for engineering practice. Upon completing this course, students will be able to analyze and design reinforced concrete elements, including two-way slabs, slender columns, bearing walls, basement walls, shear walls, strip footings, spread footings, combined footings, and pile caps. They will also develop the ability to design statically determinate prestressed-concrete one-way slabs and beams.

Calendar Copy:
Behaviour and design of Reinforced Concrete (RC) and Prestressed Concrete (PC) elements: RC two-way slabs, RC slender columns in non-sway frames, RC bearing walls, RC basement walls, RC shear walls, RC footings, RC pile caps, PC one-way slabs and PC beams.

Prerequisites:
CEE 2202A/B, CEE 2221A/B, CEE 3347A/B.

Corequisites:
None

Antirequisite:
None

Note: It is the **student's responsibility** to ensure that all Prerequisite and Corequisite conditions are met or that special permission to waive these requirements has been granted by the Faculty. It is also the **student's responsibility** to ensure they have not taken a course listed as an Antirequisite. The student may be dropped from the course or not receive credit toward their degree if they violate the Prerequisite, Corequisite, or Antirequisite conditions.

Contact Hours:
3 lecture hours/week; 3 tutorial hours/week.

3 lecture hours/week:
Lecture materials are posted online before the lectures. Reviewing lecture material and attending lecture sessions should take approximately 8 hours per week.

3 tutorial hours/week:
A 3-hour tutorial session will be delivered each week during the scheduled tutorial hours. A graded Gradescope assignment will be completed each week and must be submitted on the Friday following the tutorial.

Instructor:

[redacted]

References:

Required: Prepared class notes can be downloaded from the course website. Students are responsible for regularly checking their email and the course site.

Recommended: Concrete Design Handbook, Cement Association of Canada, Ottawa, ON.

Recommended: Reinforced Concrete Design: A Practical Approach, S. Brzev and J. Pao, Pearson Education.

Units:

SI units will be used in lectures, tutorials, and examinations.

Specific Learning Objectives:

At the end of this course, students should be able to:

1. REINFORCED CONCRETE
   a) Design different types of two-way slabs for flexure, one-way shear, and two-way shear (ET2, PA2, **D4**, CS2, PR1).
   b) Design slender reinforced concrete columns (PA2, D4, PR1).
   c) Design bearing, basement, and shear walls (PA2, **D4**, PR1).
   d) Structural design of shallow foundations (**PA2**, D4, CS2, PR1):
      1. Strip footings.
      2. Spread footings.
      3. Eccentrically loaded footings.
      4. Combined footings.
   e) Structural design of pile caps using the sectional method (PA2, D4, CS2, PR1).
2. PRESTRESSED CONCRETE
   a) Acquire knowledge about prestressing techniques, materials, and prestress losses (KB4).
   b) Calculate losses due to friction, anchorage slip, and elastic shortening (KB4).
   c) Design prestressed concrete flexural members to satisfy the serviceability and ultimate limit clauses in A23.3 (ET2, **PA2**, **D4,** PR1).
   d) Design prestressed concrete members to satisfy the shear requirements in A23.3 (PA2, D4, PR1).

The instructor may expand or revise the course material as needed.

General Learning Objectives

E=Evaluate, T=Teach, I=Introduce (*Advanced Level*)

Knowledge Base	I	Engineering Tools	T	Impact on Society	
Problem Analysis	E(A)	Teamwork		Ethics and Equity	
Investigation		Communication	I	Economics and Project Management	
Design	E(A)	Professionalism	I	Life-Long Learning	

Accreditation Units:

Engineering design = 100%

Evaluation:

The final course grade will be determined as follows:

Assignments	10 %
Participation (Bonus)	05 %
1st Midterm	25 %
2nd Midterm	25 %
Final Exam	40 %
Total	100 %

Note: (a) **Students must pass the final examination to pass this course**. Students who fail the final examination will be assigned the aggregate mark determined above, or 48%, whichever is lower.
(b) **Students who have failed this course previously must repeat all components of the course**. No special permissions will be granted to enable a student to retain laboratory, assignment, or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted.

1. Examination:
A three-hour, open-book final examination will be administered during the designated examination period.

2. 1st Midterm Exam
The first Midterm is a 2-hour, open-book exam. The exam will assess the material covered in the weeks leading up to the exam.

3. 2nd Midterm Exam
The 2nd Midterm is a 2-hour, open-book exam. The exam will assess the material covered in the weeks leading up to the exam. **Academic consideration will not be given for this assessment without the submission of appropriate documentation.**

4. Participation:
Participation will be assessed based on class attendance, participation in lectures and tutorials, and completion of bonus assignments.

5. Weekly Assignments:
The platform "gradescope.ca" will be utilized to submit assignments throughout the course. Assignments will be made available during the tutorial sessions on a weekly basis. Students should submit their completed assignments through the platform before the specified due dates.

I. Missed/Late Accommodation Policy:

1. Students missing an assignment, Midterm, or examination will report the absence by submitting an Academic Consideration Request form through the STUDENT ABSENCE PORTAL.
2. Documentation must be provided as soon as possible.
3. No makeup exam will be offered for the two midterms. If a student misses one of the midterms, their scores on the other Midterm and the final exam will account for 35% and 55% of the overall course grade, respectively. On rare occasions when a student misses both midterms, their final exam score will account for 90% of the overall course grade.

II. Exam Accommodation:

1. If you cannot write a final examination, report your absence using the Academic Consideration Request Form through the STUDENT ABSENCE PORTAL.

2. Be prepared to provide the Undergraduate Services Office with supporting documentation the next day or as soon as possible in cases where students are hospitalized. The following circumstances are not grounds for missing a final examination or requesting special accommodations: a common cold, headache, oversleeping, misreading the timetable, or travel arrangements.
3. To receive permission to write a Special Examination, you must obtain the Chair of the Department's approval and the Associate Dean's approval. You must submit an Academic Consideration Request Form through the STUDENT ABSENCE PORTAL.

   PLEASE NOTE: It is the student's responsibility to check the Special Examination's date, time and location.

III. Late Assignments:

1. Students must advise the course instructor if they have difficulty completing an assignment on time (before the due date).
2. Students should be prepared to submit the Academic Consideration Request Form and provide documentation if requested by the course instructor.
3. This course has 10 assignments, with only nine assignments counted towards your final grade. Academic consideration will not be granted for missed assignments. If students miss one assignment, the remaining nine will be used to calculate the final grade. If students miss more than one assignment, they will receive a zero on each missed assignment.
4. The assignment deadlines are on the platform "gradescope.ca." Students are expected to submit each assignment by the deadline listed. If you have a long-term academic consideration, please contact your instructor at least one week before the posted deadlines.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

IV. Medical Accommodation:

1. Requests for Academic Consideration Request Form through the Student Absence Portal.
2. Requests for academic consideration must include the following components:
   a. Self-attestation signed by the student (*This is only accepted for the first/one absence*)
   b. Medical note
   c. Indication of the course(s) and assessment(s) affected by the request
   d. Supporting documentation as relevant
3. Requests without supporting documentation are limited to one per term per course.
4. **Students must request academic consideration as soon as possible and no later than 48 hours after the missed assessment.**
5. Once the request and supporting documents have been received and reviewed, the instructor, in consultation with the academic advisor, will determine the appropriate academic consideration, if granted, in accordance with the course outline. Academic consideration may include extending deadlines, waiving attendance requirements for classes, labs, or tutorials, or reweighting course requirements. Some forms of academic consideration (such as arranging Special Examinations, assigning a grade of Incomplete, or granting late withdrawals without academic penalty) may only be granted by the Academic Advising Office of the Faculty of Engineering.

V. Religious Accommodation:

When scheduling unavoidably conflicts with religious holidays, which (a) require an absence from the University or (b) prohibit or require certain activities (i.e., activities that would make it impossible for the student to satisfy the academic requirements scheduled on the day(s) involved), no student will be penalized

for absence because of religious reasons, and alternative means will be sought for satisfying the academic requirements involved. If a suitable arrangement cannot be worked out between the student and instructor involved, they should consult the appropriate Department Chair and, if necessary, the student's Dean.

Such students are responsible for informing themselves about the work done in classes they miss and for taking appropriate action.

VI. Academic Integrity:

In the Faculty of Engineering, we encourage students to cultivate a culture of honesty, trust, fairness, respect, responsibility, and courage, which benefits their professional development.

Please visit Academic Integrity Western Engineering for more information.

VII. Academic Offences:

Plagiarism refers to the act of using another's work without proper attribution. The University has rules against plagiarism and other scholastic offences. Western Engineering has a zero-tolerance policy on plagiarism. The minimum penalty is zero for the coursework; a repeat offence will earn you zero for the course. A third offence may lead to expulsion from the University.
Scholastic Discipline for Undergraduate Students & Cheating, Plagiarism and Unauthorized Collaboration: What Students Need to Know

Students must write their reports and assignments in their own words rather than copying or paraphrasing from others. Whenever students borrow an idea or passage from another author, they must acknowledge their debt by using quotation marks where appropriate and by providing proper referencing, such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is subject to academic penalties, which may include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be submitted for textual similarity review using commercial plagiarism-detection software licensed to the University. All submitted papers will be included as source documents in the reference database to detect plagiarism in subsequent submissions to the system. Use of the service is subject to the licensing agreement between the University of Western Ontario and Turnitin.com (http://www.turnitin.com). Scholastic offences are taken seriously, and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

VIII. Faculty of Engineering AI Policy:

The Faculty of Engineering will not discourage the use of generative Artificial Intelligence (GenAI) tools. As we pride ourselves on building the future, we cannot ignore the use of GenAI tools to contribute to our understanding of the course materials. However, the use of GenAI tools in any assignment or contribution during the course must be disclosed as a resource.

The use of GenAI tools will not be permitted in any examination or other assessments where the Faculty has prohibited their use. If the instructor detects the use of GenAI tools in these instances, academic offence penalties may be imposed on the student.

IX. Use of English Policy:

In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of the English language. Additionally, poorly written work, except for the final examination, may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

X. Accessibility:

Western is committed to achieving barrier-free accessibility for persons with disabilities who study, visit, and work at Western. As part of this commitment, various services, groups, and committees on campus are devoted to promoting accessibility and ensuring that individuals have equitable access to services and facilities. To help provide the best experience to all campus community members, please visit the Accessibility Western University for information on accessibility-related resources available at Western.
Students with disabilities may arrange for academic accommodation at Western. Please visit Academic Support & Engagement -Academic Accommodations for a more detailed explanation.

XI. Inclusivity, Diversity, and Respect:

The Faculty of Engineering at Western University is committed to creating equitable and inclusive learning environments that value diverse perspectives and experiences. We recognize that university courses often marginalize students based on social identity characteristics, including, but not limited to, Indigeneity, race, ethnicity, nationality, ability, gender identity, gender expression, sexuality, age, language, religion, and socioeconomic status. Understanding this, we strive to facilitate equitable experiences and inclusion within the classroom by respecting and integrating multiple ways of knowing, being, and doing. Please visit the Office of Equity, Diversity and Inclusion.

XII. Health and Well-Being:

- Health & Wellness Services – Students - Offers an appointment-based medical clinic for all registered part-time and full-time students.
- Mental Health Support - Provides professional and confidential services, free of charge, to students needing assistance to meet their personal, social and academic goals. Services include consultation, referral, groups and workshops, and brief, change-oriented psychotherapy.
- Crisis Support - For immediate assistance, please visit Thames Hall, Room 2170, or call 519-661-3030. The crisis clinic operates between 11:00 a.m. and 4:30 p.m. For after-hours crisis support, click here.
- Gender-Based Violence and Survivor Support - Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, here. To connect with a case manager or schedule an appointment, please email support@uwo.ca.

Important Contacts:

Engineering Undergraduate Services	SEB 2097	519-661-2130	engugrad@uwo.ca
Civil & Environmental Engineering	SEB 3005	519-661-2139	civil@uwo.ca
Office of the Registrar/Student Central	WSSB 1120	519-661-2100	

Important Links:

- WESTERN ACADEMIC CALENDAR
- ACADEMIC RIGHTS AND RESPONSIBILITIES