

Western University
Faculty of Engineering
Department of Civil and Environmental Engineering

CEE 9628 –Prestressed Concrete
Course Outline – 2024/2025

DESCRIPTION

This course covers the behaviour and design of statically determinate and indeterminate prestressed concrete structures.

ENROLLMENT RESTRICTIONS

Enrolment in this course is restricted to graduate students in the Civil and Environmental Engineering program.

INSTRUCTOR CONTACT INFORMATION

Course instructor: Professor Maged A. Youssef, P. Eng.

Email address: youssef@uwo.ca

Office: SEB 3043

Office hours: By Appointment

COURSE FORMAT

The course will be delivered in person (3.0 weekly lecture hours). Please note that there will be no classes during reading week.

TOPICS

Topic	Description	Learning Activities	Tentative Schedule
Introduction	principles and methods of prestressing, material properties, and partial prestress loss.	Bi-Weekly Assignment	Weeks 1-2
Axially loaded members	short-term and long-term response, width and spacing of cracks.		Week 3
Flexural behaviour and design	moment-curvature relationship, service load design, ultimate flexural strength, composite beams, camber and deflections, width and spacing of cracks.		Week 4-8
Columns and walls	combined axial load and flexure.		Week 9
Shear behaviour and design	simplified method, modified compression field theory.		Week 10
Indeterminacy	indeterminate prestressed Concrete Structures, restraint action.		Week 11
Disturbed regions	anchorage zones, strut and tie models, bearing resistance, shear friction, and shear interface of composite beams.		Week 12

SPECIFIC LEARNING OUTCOMES

Degree Level Expectation	Weight	Assessment Tools	Outcomes
Depth and breadth of knowledge	45%	<ul style="list-style-type: none"> • Assignments • Final Exam 	<ul style="list-style-type: none"> • Understanding of advanced concepts and theories • Understanding of computational and empirical methodologies to solve related problems
Application of knowledge	45%		<ul style="list-style-type: none"> • Ability to apply knowledge in a rational way to analyze a particular problem • Ability to use a coherent approach to design a specific engineering system using existing design tools
Professional capacity/ autonomy	10%		<ul style="list-style-type: none"> • Awareness of academic integrity • Ability to implement established procedures and practices in the coursework

ASSESSMENTS

The final course mark will be determined as follows:

Biweekly Assignments*	50%
Final Exam: (open book)	50%

Total	100%

* All assignments should be completed independently

COURSE READINGS

There is no set textbook for the course. Several textbooks cover many of the aspects of the course material. These include:

- Concrete Design Handbook (current Edition), Cement Association of Canada, Ottawa, ON.
- CPCI, current edition, *Design Manual: Precast and Prestressed Concrete*, Canadian Prestressed Concrete Institute, Ottawa, ON.

Prepared class notes will be made available through the course site. The lecture notes are copyrighted to the instructor and legally protected. Do not post these notes on any other website or online forums. The illegal posting and sharing of the copyrighted course content could be subjected to legal action.

CHEATING, PLAGIARISM/ACADEMIC OFFENCES

Academic integrity is an essential component of learning activities. Students must clearly understand the course activities in which they are expected to work alone (and what working alone implies) and the activities in which they can collaborate or seek help; see the information above and ask the instructor for clarification if needed. Any unauthorized forms of help-seeking or collaboration will be considered an academic offence. University policy states that cheating is an academic offence. If you are caught cheating, there will be no second warning. Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence. Academic offences are taken seriously and attended to with academic penalties, which may include expulsion from the program. Students are directed to read the appropriate policy, precisely the definition of what constitutes a Scholastic Offence, at the following website: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf

All required assignments may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All assignments submitted for such checking will be included as source documents in the reference database to detect plagiarism of papers subsequently submitted 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>).

CONDUCT

Students must follow proper etiquette to maintain an appropriate and respectful academic environment. Any student who, in the opinion of the instructor, is not appropriately participating in course activities and/or is not following the rules and responsibilities associated with the course activities will be reported to the Associate Dean (Graduate) (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Associate Dean (Graduate), the student could be debarred from completing the assessment activities in the course as appropriate.

HEALTH/WELLNESS SERVICES

As part of a successful graduate student experience at Western, we encourage students to prioritize their health and wellness. Western provides several health and wellness-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>.

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, program director (graduate chair), or other relevant administrators in their unit. Faculty of Engineering has a Student Wellness Counsellor. How to schedule an appointment with the counsellor is available at: <https://www.eng.uwo.ca/undergraduate/academic-support-and-accommodations/Student-Wellness-Counselling.html>.

Students who are in emotional/mental distress should refer to Mental Health@Western: <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

SICKNESS

Students should immediately consult with the instructor or Associate Chair (Graduate) if they have problems that could affect their performance. The student should seek advice from the Instructor or Associate Chair (Graduate) regarding how best to deal with the situation. Failure to notify the Instructor or Associate Chair (Graduate) immediately (or as soon as possible after that) will negatively affect any appeal. Obtaining appropriate documentation (e.g., a note from the doctor) is valuable when asking for accommodation due to illness.

Students who cannot meet certain academic responsibilities due to medical, compassionate, or other legitimate reason(s) could request academic consideration. The Graduate Academic Accommodation Policy and Procedure details are available at:

<https://www.eng.uwo.ca/graduate/current-students/academic-support-and-accommodations/index.html>

ACCESSIBLE EDUCATION WESTERN (AEW)

Western is committed to achieving barrier-free accessibility for all its members, including graduate students. As part of this commitment, Western provides various services to promote, advocate, and accommodate persons with disabilities in their graduate programs.

Graduate students with disabilities (for example, chronic illnesses, mental health conditions, mobility impairments) are strongly encouraged to register with Accessible Education Western (AEW): http://academicsupport.uwo.ca/accessible_education/index.html.

AEW is a confidential service designed to support graduate and undergraduate students through their academic programs. With the appropriate documentation, the student will work with AEW and their graduate programs (usually their Graduate Chair and/or Course instructor) to ensure that appropriate academic accommodations to program requirements are arranged. These accommodations include individual counselling, alternative formatted literature, accessible campus transportation, learning strategy instruction, writing exams and assistive technology instruction.

NOTICE

Students are responsible for regularly checking their email and the course Brightspace site for new notices related to the course.

STATEMENT ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE (AI)

The use of AI in the preparation of the assignments must be acknowledged in the submission. Please refer to the published Provisional Guidance for the Use of Generative AI in Graduate Studies at Western University.