Western University
Faculty of Engineering
Department of Civil and Environmental Engineering

CEE 9628b –Prestressed Concrete

Course Outline – 2022/2023

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 (2.5 lecture hours per week). Please note that there will be no class during reading week.
### TOPICS

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

<table>
<thead>
<tr>
<th>Degree Level Expectation</th>
<th>Weight</th>
<th>Assessment Tools</th>
<th>Outcomes</th>
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</thead>
</table>
| Depth and breadth of knowledge | 45%    | • Assignments • Final Exam | • Understanding of advanced concepts and theories  
• Understanding of computational and/or empirical methodologies to solve related problems |
| Application of knowledge | 45%    |                  | • Ability to apply knowledge in a rational way to analyse a particular problem  
• Ability to use coherent approach to design a particular engineering system using existing design tools |
| Professional capacity / autonomy | 10%    |                  | • Awareness of academic integrity  
• Ability to implement established procedures and practices in the coursework |
ASSESSMENTS

The final course mark will be determined as follows:

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Weekly Assignments*</td>
<td>50%</td>
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<tr>
<td>Final Exam: (open book)</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

* All assignments should be completed independently

COURSE READINGS

There is no set textbook for the course. There are several textbooks that 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 OWL site at [http://owl.uwo.ca/](http://owl.uwo.ca/). 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 actions.

CHEATING, PLAGIARISM/ACADEMIC OFFENCES

Academic integrity is an essential component of learning activities. Students must have a clear understanding of 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 information above and ask instructor for clarification if needed. Any unauthorized forms of help-seeking or collaboration will be considered an academic offense. 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 of text from another author, they must acknowledge their debt both 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 by academic penalties which may include expulsion from the program. Students are directed to read the appropriate policy, specifically, 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](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 for the purpose of detecting plagiarism of papers subsequently submitted to
the system. Use of the service is subject to the licensing agreement, currently between The University
of Western Ontario and Turnitin.com (http://www.turnitin.com).

CONDUCT

Students are expected to 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 make
their health and wellness a priority. 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, their program director (graduate chair),
or other relevant administrators in their unit. Faculty of Engineering has a Student Wellness
Counsellor. To schedule an appointment with the counsellor, contact Kristen Edwards
(khunt29@uwo.ca) via confidential email and you will be contacted by our intake office within
48 hours to schedule an appointment.

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 problem. Failure to notify the
Instructor or the Associate Chair (Graduate) immediately (or as soon as possible thereafter) will have
a negative effect on any appeal. Obtaining appropriate documentation (e.g., a note from the doctor)
is valuable when asking for accommodation due to illness.
Students who are not able to meet certain academic responsibilities due to medical, compassionate, or other legitimate reason(s), could request for 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 a variety of services devoted to promoting, advocating, and accommodating persons with disabilities in their respective graduate program. 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 program. With the appropriate documentation, the student will work with both AEW and their graduate programs (normally 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.

COURSE DELIVERY WITH RESPECT TO THE COVID-19 PANDEMIC

Although the intent is for this course to be delivered in-person, the changing COVID-19 landscape may necessitate some or all the course to be delivered online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

NOTICE

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