

**Western University - Faculty of Engineering**  
**Department of Civil and Environmental Engineering**

**CEE 9628b –Prestressed Concrete**  
**Course Outline – 2021/2022**

**Objectives:**

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

**Prerequisite:**

This course is intended for graduate students with bachelor's degree in civil engineering.

**Topics:**

<b>Topic</b>	<b>Description</b>	<b>Learning Activities</b>	<b>Tentative Schedule</b>
Introduction	principles and methods of prestressing, material properties, partial loss of prestress.	Weekly Activities	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, shear interface of composite beams.		Week 12

**Instructor:**

Dr. Maged A. Youssef, P. Eng., ([youssef@uwo.ca](mailto:youssef@uwo.ca)).

**Contact Hours:**

2.5 lecture hours per week (in-person or through ZOOM)

### **Course Materials:**

There is no set textbook for the course. There are a number of 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/>.

### **Course Content**

The lecture notes and online lecture videos are copyrighted to the instructor and legally protected. Do not post these videos and lecture notes on any other website or online forums. The recording of live sessions of the course without the permission from the instructor is prohibited. The illegal posting and sharing of the copyrighted course content could be subjected to legal actions.

### **Specific Learning Outcomes**

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

### **Computing:**

Assignments will require using computer software such as Microsoft Excel.

### **Evaluation:**

The final course mark will be determined as follows:

Weekly Assignments	50%
Final Exam: (open book)	50%
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Total	100%

### **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 of 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.

When deemed necessary, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

### **Use of English:**

In accordance with Senate and Faculty Policy, students may be penalised up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of 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.

### **Scholastic Offences:**

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_grad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)

### **Plagiarism:**

University policy states that plagiarism, defined as the "act or an instance of copying or stealing another's words or ideas and attributing them as one's own." (excerated from Black's Law Dictionary, West Group, 1999, 7th ed., p. 1170) is a scholastic offence. In submitting any written work as part of the coursework requirements for this course students must ensure that this work is written 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.

All required papers 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 papers 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>).

A student who is found guilty of plagiarism in respect of any written work submitted as part of the coursework requirements for this course will be given a grade of zero for the submitted work. Repeated acts of plagiarism, either in this course or any other course subsequent to a first offence, will result in the student being given a failing grade for the course in which the subsequent offence occurs, and may also incur further penalties such as requiring the student to withdraw from the program in which they are enrolled in.

### **Accessibility:**

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 encouraged to register with Student Accessibility Services, a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both SAS 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.

For more information, see <http://www.sdc.uwo.ca/ssd/>

### **Conduct:**

Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others. Late comers may be asked to wait outside the classroom until being invited in by the Instructor. Please turn off your cell phone before coming to a class, tutorial, quiz or exam.

On the premises of the University or at a University-sponsored program, students must abide by the Student Code of Conduct: <http://www.uwo.ca/univsec/pdf/board/code.pdf>.

### **Sickness and Other Problems:**

Students should immediately consult with the Instructor or Department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see attached). The student should seek advice from the Instructor or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

### **Course Absences due to Daily COVID Screening Questionnaire:**

Missed assessments (e.g., presentations, essays, quizzes, tests, midterms, etc.) require formal academic considerations (typically self-reported absences and/or academic counselling). Methods for dealing with missed work and course content are at the discretion of the instructor. Students should be aware that some learning outcomes cannot be easily made up and may need to be completed in a subsequent year. Your instructor will provide you with further information as to how this applies within this course.

Students who demonstrate a pattern of routinely missing coursework due to self-reported COVID symptoms, and therefore do not demonstrate mastery of the learning outcomes of the course, will not receive credit for the course.

### **Health and Wellness:**

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre. Numerous cultural events are offered throughout the year. For example, please check out the Faculty of Music web page <http://www.music.uwo.ca/>, and our own McIntosh Gallery <http://www.mcintoshgallery.ca/>. 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. Campus mental health resources may be found at [http://www.health.uwo.ca/mental\\_health/resources.html](http://www.health.uwo.ca/mental_health/resources.html).

**Notice:**

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