

Western University
Faculty of Engineering
Department of Civil and Environmental Engineering

CEE 9548 – Advanced Design and Behaviour of Steel

COURSE OUTLINE 2024-2025

DESCRIPTION

This course covers the behaviour and design of structural steel. The course begins with an introduction to steel structures and the standard for the design and construction of steel structures (CSA S16). The concept of structural stability and its application in the design of steel structures are discussed. Topics presented in this course include the stability of structures, steel beam-column members, steel plate girders, lateral torsional buckling, and the design and analysis of industrial steel structures.

ENROLLMENT RESTRICTIONS

Enrollment in this course is restricted to graduate students in CEE, as well as any student who has obtained special permission to enroll in this course from the course instructor as well as the Graduate Chair (or equivalent) from the student's home program.

INSTRUCTOR CONTACT INFORMATION

Course instructor: Saber Moradi, PhD, PEng

Email address: saber.moradi@uwo.ca

Office: CMLP 1303

Office hours: Thursdays 11:00 am - 12:00 pm

COURSE FORMAT

face-to-face (in-person)

TOPICS

Week #	Description	Learning Activities
1	Intro. to Steel Structures, CSA S16	Lecture
2	Industrial Steel Buildings	Lecture, Reading Assignment
3	Design of Industrial Steel Buildings	Lecture, Reading Assignment
4	Design of Industrial Steel Buildings	Lecture, Reading Assignment
5	Theory and Applications of Structural Stability	Lecture, Reading Assignment
6	Reading Week (No Class: October 12 to 20)	
7	Structural Stability of Steel	Lecture, Reading Assignment
8	Midterm Exam	Midterm Exam
9	Stability of Steel Beam-Columns	Lecture, Reading Assignment
10	Stability of Steel Beam-Columns	Lecture, Reading Assignment
11	Lateral Torsional Buckling	Lecture, Reading Assignment
12	Presentations	Project Presentations

SPECIFIC LEARNING OUTCOMES

Degree Level Expectation	Weight	Assessment Tools	Outcomes
Depth and breadth of knowledge	30%	<ul style="list-style-type: none"> • Assignments • Project • Examinations 	<ul style="list-style-type: none"> • Understanding of advanced concepts and theories • Awareness of important current problems • Understanding of computational and/or empirical methodologies to solve related problems
Research & scholarship	20%	<ul style="list-style-type: none"> • Project • Reading Assignments 	<ul style="list-style-type: none"> • Ability to conduct critical evaluation of current advancements in the field of specialization • Ability to conduct coherent and thorough analyses of complex problems using established techniques/principles and judgment
Application of knowledge	30%	<ul style="list-style-type: none"> • Assignments • Project • Examinations 	<ul style="list-style-type: none"> • Ability to apply knowledge in a rational way to analyze a particular problem • Ability to use coherent approach to design a particular engineering system using existing design tools
Communication skills	20%	<ul style="list-style-type: none"> • Project • Presentations 	<ul style="list-style-type: none"> • Ability to communicate (oral and/or written) ideas, issues, results and conclusions clearly and effectively

COURSE MATERIAL

Lecture notes will be made available through the course website on OWL at <http://owl.uwo.ca/>, along with other useful reference material and data for assignments.

Lecture notes and any posted files are copyrighted and legally protected. Please do not post these files on any other website or online forums.

ASSESSMENTS

Assessment Type	Material Covered	Weight
Take Home Assignments	All Topics	15%
Presentations (Reading Assignments)	Weekly Topics	10%
Midterm Exam (Formula Sheets and Handbook allowed)	Weeks 1-7	25%
Final Project: Building Analysis and Design (Group – Max. 3 Students/group)	All topics: Analysis and Design	20%
Final Exam (Formula Sheets and Handbook allowed)	All topics	30%

Examination:

The steel design handbook and formula sheets (tentatively, two A4 sheets) are allowed to be used.

Assignments:

- Online submission on OWL is needed. The written work should be submitted in one PDF.
- Late submission (homework, project draft report, etc.) will be penalized 10% per day late. Homework submitted after the solutions have been provided will not be accepted. Extensions are to be discussed with the course instructor, not the teaching assistants.
- On the project, bonus marks may be considered for extra work that can be published as a journal paper (this should be discussed with the instructor in advance).
- Marks (up to 20%) may be deducted for poor presentation and writing – your submission must be neat and well-organized.
- For the assignments, individual submission is required unless stated otherwise.
- All required course submissions will be assessed on technical/academic merit and the quality of communication skills exhibited.
- The instructor will aim to provide grades and feedback on homework within 2 weeks of submission.

Activities in which collaboration is permitted:

- Final Project

Activities in which collaboration is NOT permitted:

- Assignments
- Midterm and Final Exams

REQUIRED REFERENCE

- Handbook of Steel Construction – 12th Edition – Canadian Institute of Steel Construction, 2021. This handbook includes the standard for the design of steel structures (CSA S16:19).

OPTIONAL COURSE READINGS

- Limit States Design in Structural Steel – 11th Edition, 2021 by G.L. Kulak and G.Y. Grondin.

STATEMENT ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE (AI)

The use of AI in the preparation of the project and 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.

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

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>).

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. Information on 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.

STATEMENT ON GENDER-BASED AND SEXUAL VIOLENCE

Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who is going through or has gone through these traumatic events. If you are experiencing or have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts at the following website:

https://www.uwo.ca/health/student_support/survivor_support/get-help.html. To connect with a case manager or set up an appointment, please contact support@uwo.ca.

SICKNESS

Students should immediately consult with the Instructor (for a particular course) or Associate Chair (Graduate) (for a range of courses) 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.