

WESTERN UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CEE 9538 – Introduction to Wood Design (With 4438B)

Course Outline 2024-2025

Description

This course is intended to extend the Civil Engineering Program in the area of structural engineering to include the design and analysis of wood structures. Recent advances have led to an increase in the prevalence of engineered wood structures, notably multistory buildings. As wood is a green building material, it is expected that its use will continue to grow as efforts to address climate change expand. Students completing this course will be well positioned to lead the emergence of wood as a structural material and participate in the design and construction of wood structures. The general objectives are for student to be able to:

- Understand the physical and mechanical properties of wood and structural wood products.
- Understand the design procedures for wood structures and fire safety
- Design different wood elements in accordance with provisions of CSA standards CAN/CSA O86-14,
 - Axially Loaded Members
 - Flexural Members
 - Combined Axial and Flexural Members
- Design wood shear walls and diaphragms under lateral loads in accordance with the provisions of CSA standards CAN/CSA O86-14.
- Design wood connections
- Understand different wood structural systems

Prerequisites

Bachelor's degree in Civil Engineering

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 that they have not taken a course listed as an Antirequisite. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite, Corequisite or Antirequisite conditions.

Instructor Contact Information

Dr. Ahmed (Mahdy) Hamada, *P.Eng.*
 email: ahamada2@uwo.ca
 Office Hours: TBA or By Appointment

Course Format

In Person Face to Face

Topics

Topic #	Description	Learning Activities	Tentative Timeline
1	Introduction to Wood Materials and Structures	Three (3) hours In-Person Lecture	Week 1
2	Design Code + Tension Members	Three (3) hours In-Person Lecture	Week 2
3	Compression Members	Three (3) hours In-Person Lecture	Week 3
4	Bending Members + Axial and Bending	Three (3) hours In-Person Lecture	Week 4
5	Lateral Load Systems + LFW Diaphragms	Three (3) hours In-Person Lecture	Week 5
5	LFW Diaphragms	Three (3) hours In-Person Lecture + in-person Quiz 1 on Tuesday, Feb. 11, 2025	Week 6
6	Reading Week	Reading Week – No Lecture	Week 7
7	Shear Wall Analyses	Three (3) hours In-Person Lecture	Week 8
8	Light-weight Shear Walls Design	Three (3) hours In-Person Lecture	Week 9

9	Code Consideration + Shrinkage + Fire	Three (3) hours In-Person Lecture	Week 10
10	Connections	Three (3) hours In-Person Lecture + in-person Quiz 2 on Tuesday, Mar. 18, 2025	Week 11
11	Introduction to Heavy Timber Systems	Three (3) hours In-Person Lecture	Week 12
12	Introduction to Wood Structural Systems	Three (3) hours In-Person Lecture	Week 13
13	Project I Presentations	Five (5) hours in-person	Week 13
14	Project II Discussion	In-person Oral Discussion and Exam	Week 14

Specific Learning Outcomes:

Degree Level Expectation	Weight	Assessment Tools	Outcomes
Depth and breadth of knowledge	20%	<ul style="list-style-type: none"> • Assignments • Final Projects I and II • Oral Examinations 	<ul style="list-style-type: none"> • Understanding of advanced concepts and theories • Awareness of important current problems in the field of study • Understanding of computational and/or empirical methodologies to solve related problems
Research & scholarship	15%	<ul style="list-style-type: none"> • Project I Report and Presentation 	<ul style="list-style-type: none"> • Ability to conduct literature review for 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	35%	<ul style="list-style-type: none"> • Assignments • Final Projects I and II • 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
Professional capacity / autonomy	5%	<ul style="list-style-type: none"> • Final Projects I and II 	<ul style="list-style-type: none"> • Awareness of academic integrity • Ability to implement established procedures and practices in the coursework • Defends own ideas and conclusions • Integrates reflection into his/her learning process
Communication skills	15%	<ul style="list-style-type: none"> • Project I Report and Presentation 	<ul style="list-style-type: none"> • Ability to communicate (oral and/or written) ideas, issues, results and conclusions clearly and effectively
Awareness of limits of knowledge	10%	<ul style="list-style-type: none"> • Final Projects I and II 	<ul style="list-style-type: none"> • Awareness of the need of assumptions in complex scientific analyses and their consequences • Understanding of the difference between theoretical and empirical approaches • Ability to acknowledge analytical limitation due to complexity of practical problems

Assessments

Assessment Type	Material Covered	Tentative Due Date	Weight
Take Home Assignments	All Topics		20%
In-person Quizzes (two) (Open Book)	Topics 1-5 and topics 6-10	Feb. 11, 2025 and March 18, 2025	30%
Final Project I	Report and Presentation of State-of-Art	April 8, 2025	20%

Report and Presentation (Group – Max. 3 Students/group)			
Final Project II Building Analyses and Design (Group – Max. 3 Students/group)	Building Analyses and Design for whole course materials	April 11, 2025	30%

Note: Students who have failed this course previously must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted.

Project I Breakdown

- Presentation and Oral Discussion 60%
- Report 40%

Project II Breakdown

Final Project Portfolio:

- Cover Letter 05%
- Design Brief 10%
- Calculations 20%
- Drawings 15%
- Oral discussion & Defence of design 50%

Project I - Max. 3 Students/group

Presentation

Each group will give a 10 minutes presentation on their project followed by an oral discussion and defence of the report topic. Each student is required to be fully aware of all aspects of the report and **participate equally in presenting**. Some of the questions shall be asked individually to any of the group members, and others to the whole group.

Report

The length of the Project II report shall not exceed 20 typed pages (font size 12, double spaced, including all figures, references, title page, etc.). The evaluation of the final report shall be based on the format, layout, completeness, technical content and use of English.

Project II - Max. 3 Students/group

Oral discussion and Defence of design

Each group will give a 5 to 10 minutes presentation on their project followed by an oral discussion and defence of the design. Each student is required to be fully aware of all aspects of the final project, such as analyses, design, and drawings. Some of the questions shall be asked individually to any of the group members, and others to the whole group. Each individual member of the group might receive different mark based on the oral discussion.

Final Project Portfolio

Cover letter and Design Brief

The length of the cover letter is one page and follow the common layout of cover letters directed to the Department of Civil and Environmental Engineering at Western University. The length of the final design brief shall not exceed 10 typed pages (font size 12, double spaced). Design Brief Contents are: Cover Letter, Executive Summary; Introduction, Design Criteria and Codes of Analyses, particulars of design/analysis, lateral deflections results, and Recommendations (or Conclusions). The Design Criteria would include the design standards and technical references used; the particular design criteria adopted also must be indicated succinctly. The particulars of design/analysis would summarize the rationale behind the various design decisions. The evaluation of the final design brief shall be based on the format, layout, completeness, technical content and use of English.

Calculations

Calculations must be well organized, clear, complete, and done on calculation paper. Each calculation page shall be dated, and shall indicate the name or initials of the person who performed the calculations. A final calculation set, which must be current, checked and indexed, shall be submitted with the final design brief. The evaluation of calculations will be based on their clarity, completeness, technical content, originality, and accuracy.

Drawings

Each student is required to prepare a set of drawings. Each drawing shall be dated and shall indicate the name or initials of the person who did the drawing. The drawings shall be developed using AutoCAD or similar drafting software. ETABS drafting tool is not allowed to be used. The evaluation of drawings will be based on their technical content, clarity, completeness, and quality of drafting.

Quizzes and Examination:

Two One-hour quizzes will be held during tutorial hours. These quizzes are tentatively scheduled for Tuesday, February 11 and Tuesday, March 18, 2025.

In-Person written quizzes will be held during these tentative dates shown above.

Assignments:

Each student must turn in the solution of the assignment at 5:00 pm Monday afternoon electronically on OWL. Hardcopy submissions are not accepted unless permission is granted by the instructor. Late assignment will be accepted till 5:00 pm on the Tuesday following the submission date and have to be submitted directly to the instructor. Late assignments will be assessed a penalty of 10% per day, to a maximum of 4 days, after which they will receive a mark of zero. Extensions are to be negotiated with the course instructor, not the teaching assistants.

All required papers, assignments, and projects 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>).

Activities in Which Collaboration is Permitted:

- Project I : Students will be divided into groups. Collaboration between only group members is permitted. One final project report is required from each group.
- Project II : Students will be divided into groups. Collaboration between only group members is permitted. One final project report is required from each group.

Activities in Which Collaboration is not Permitted (work alone):

- Assignments
- Quizzes

Textbook:

Prepared class notes should be uploaded to OWL and brought to all lectures and tutorial sessions.

Optional Course Readings:

List of books

Wood Design Manual 2017 – Canadian Wood Council CWC 2017 and Canadian Standards Association, Mississauga, ON, Canada

Introduction to Wood Design 2018 – Canadian Wood Council CWC 2018 and Canadian Standards Association, Mississauga, ON, Canada

The above references will be on hold in Taylor library, and will be available for one-day borrowing.

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 the live/synchronous 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.

Units:

Both SI and FPS unit systems may be used in lectures, tutorials and examinations.

Computing:

Final project and assignments involve computer modelling using the commercial program S-Timber, spread sheets, and writing report. The full versions of software are available at the PC labs in the engineering building or through online access as per the Faculty of Engineering-IT procedures (please consult with Faculty of Engineering IT for granting access to these software).

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.

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>).

Attendance:

Any student who, in the opinion of the instructor, has not engaged sufficiently in class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Conduct:

Students are expected to follow proper etiquette during synchronous and asynchronous activities to maintain an appropriate and respectful academic environment. Any student who, in the opinion of the instructor, is not appropriately participating in the synchronous and asynchronous learning activities and/or is not following the rules and responsibilities associated with the online learning 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:

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

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.

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:

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.

Use of Recordings:

All of the remote learning sessions for this course will be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals under special circumstances. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

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.