

Syracuse University  
College of Engineering and Computer Science  
Department of Civil and Environmental Engineering

CEE 4XX Advanced Timber Design

SEMESTER YEAR  
LECTURE TIME

**COURSE DESCRIPTION**

Structural design using mass timber. Topics covered include dimensional features, structural properties, and behavior under loads using current NDS and ASCE 7 in both ASD and LRFD for mass timber. **Research methods application.**

**INSTRUCTOR INFORMATION**

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**PREREQUISITE**

CEE 331 Analysis of Structures and Materials

**REQUIRED TEXTBOOKS**

1. Breyer, Cobeen, and Martin, *Design of Wood Structures ASD/LRFD*, 8<sup>th</sup> ed., McGraw Hill, 2019. ISBN 978-1260128673

**REQUIRED CODE REFERENCES**

1. ASCE 7-22, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, American Society of Civil Engineers, 2022. ISBN 978-0-7844-8349-7 (PDF)
2. NDS 2018, *National Design Specification for Wood Construction with Commentary*, American Wood Council, 2018. ISBN 978-1-940383-47-7
3. NDS Supplement 2018, *National Design Specification Design Values for Wood Construction*, American Wood Council, 2018. ISBN 978-1-940383-48-4

All required codes will be provided by instructor on Blackboard. No need for students to purchase these code books.

## COURSE OBJECTIVES

The primary objectives of this course are to:

- A. Determine loads to be used in the design of residential and non-residential mass timber structures from references such as ASCE 7-22 and NYS Building Code;
- B. Design GLT members as frames for mass timber structures using NDS 2018;
- C. Design CLT members as diaphragms for mass timber structures using NDS 2018;
- D. Analyze and design mass timber truss structures using NDS 2018.
- E. Understand current and future development of mass timber buildings in North America.

## COURSE OUTCOMES

At the completion of the class, each student should be able to:

1. Recognize various mechanical properties of strength and modulus of mass timber materials. [Student Outcome 1] †
2. Understand the characteristics of mass timber structural behaviors under various loading conditions. [Student Outcomes 1] †
3. Understand the important design procedures of mass timber structural members using appropriate design codes and through application of research methods. [Student Outcome 1] †
4. Understand current and future development of mass timber buildings in North America by application of research methods. [Student Outcome 7] †
5. Develop a term research paper on various topics of mass timber structures. [Student Outcomes 2, 5] †\*

\* Graduate students only.

† The Accreditation Board for Engineering and Technology (ABET), which accredits engineering programs in the U.S., has established the following objectives for undergraduate engineering programs:

Engineering programs must demonstrate that their graduates have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## POLICIES AND PROCEDURES

**1. Blackboard and Email:** A Blackboard course site has been created for this class and can be accessed at <http://blackboard.syr.edu/>. You are expected to check the course site regularly for course materials, assignments, and additional resources. I will make announcements via your SU email account, which you are also expected to check regularly.

**2. Course Delivery:** The course is delivered by Zoom meetings. **Students are required to attend lectures synchronously with video on** unless you have made an arrangement with the instructor prior to scheduled classes. Should you have any emergency conditions that you can't attend synchronously, please inform the instructor prior to class meetings at your earliest convenience. Lectures will be recorded and posted on Blackboard after the class.

**3. Homework:** Approximately ten homework will be assigned during the semester. Homework is due on Blackboard at the beginning of the class on the scheduled due date. Assignment and due date will be posted on Blackboard and announced in class. Answers to homework assignments will be available on Blackboard approximately on the same day when the assignment is returned. **No late homework will be accepted!** If you need an extension on a particular homework due date, please contact the instructor as soon as possible.

**4. Exams:** There will be one midterm exam and one final exam. Both tests are comprehensive. Midterm exam will be tentatively on the Thursday of Week 6 and final exam will be on the Thursday of Week 12. See Tentative Schedule section. **No makeup exams will be accommodated except for those conditions allowed by university policy on absences!**

**5. Quiz:** five random quizzes will be administered in five lecture meetings. No makeup quiz will be allowed for students on unexcused absences. Also see 11 - Attendance.

**6. Term Research Paper:** Details will be made available around Week 3.

**7. Calculation of Course Grade:** A weighted average grade will be calculated as follows:

Homework	20%	A	93-100%	C+	77-79.99%
Midterm exam	30%	A-	90-92.99%	C	73-76.99%
Final exam	30%	B+	87-89.99%	C-	70-72.99%
<b>Term research paper</b>	<b>15%</b>	B	83-86.99%	D	60-69.99%
Quiz	5%	B-	80-82.99%	F	Below 60%

I do not curve grades in this course. It is theoretically possible for everyone in the class to get an A. Your performance depends only on how you do, not on how everyone else in the class does.

**8. Academic Integrity:** Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to

learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered as described in the Violation and Sanction Classification Rubric. Syracuse University students are required to read an online summary of the University's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term checkin on MySlice.

The Violation and Sanction Classification Rubric establishes recommended guidelines for the determination of grade penalties by faculty and instructors, while also giving them discretion to select the grade penalty they believe most suitable, including course failure, regardless of violation level. **Copying or plagiarism (other students, textbooks, the internet, etc.) will lead to a grade of F in this course.**

**9. Students with Disabilities:** Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. My goal as your instructor is to create learning environments that are useable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, I invite you to meet with me to discuss additional strategies beyond accommodations that may be helpful to your success.

If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS) located at 804 University Avenue, third floor or go to the ODS website at [disabilityservices.syr.edu](http://disabilityservices.syr.edu) and click current students tab to register on-line. You may also call 315.443.4498 to speak to someone regarding specific access needs. ODS is responsible for coordinating disability-related accommodations and will issue 'Accommodation Letters' to students as appropriate. Since accommodations may require early planning and are not provided retroactively, please contact ODS as soon as possible.

**10. Faith Tradition Observances:** Syracuse University's religious observances policy, found at [http://supolicies.syr.edu/emp\\_ben/religious\\_observance.htm](http://supolicies.syr.edu/emp_ben/religious_observance.htm), recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students should have an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors no later than the end of the second week of classes for regular session classes and by the submission deadline for flexibility formatted classes. Student deadlines are posted in MySlice under Student Services/Enrollment/My Religious Observances/Add a Notification.

**11. Attendance:** The University policy on class attendance states that "Attendance is expected in all courses at Syracuse University". It is essential that you attend all Zoom lecture meetings. Only university/college approved absences will be accommodated for missing homework and/or exams.

## TENTATIVE SCHEDULES

Week No.	Dates	TOPIC	READING
1		Introduction, Design Criteria and Design Loads	Chapters 1, 2
2		Design Loads and Introduction of Adjustment Factors	Chapter 2
3		Wood Properties and Grades	Chapter 4
4		Glulam Timber	Chapter 5
5		GLT Beam Design	Chapter 6
6		GLT Beam Design Problems	
7		Design of GLT Tension and Compression Members	Chapter 7
8		Design of GLT Beam-Columns	
9		Design of CLT Slab	Provided Lecture Notes
10			
11		Design of CLT Shearwall	
12			

Notes: I reserve the right to make changes to this syllabus as the semester progresses. Although any updated syllabus will be posted on Blackboard and notified by email, you are responsible for any announcements in addition to syllabus updates made in class regarding changes whether you are present or not.