Design of Wood Structures – BMATWT 490S  
Syllabus: Spring 2005

University of Massachusetts, Amherst  
Department of Natural Resources Conservation  
Building Materials and Wood Technology Program

Professor:  Dr. Peggi Clouston, 127 Holdsworth Hall, Tel. 545–1884, clouston@forwild.umass.edu

Credits: 3

Prerequisite: BMATWT 390S, CEE 241 or instructor's consent

Place & Time: 105 Holdsworth Hall, Tuesday and Thursday 11:15–12:30

Course Description and Goals

*Design of Wood Structures* provides students of building construction, architecture and
engineering with a fundamental understanding of structural engineering wood design principles. Students will be able to describe and apply design techniques for individual wood components, including: beams, columns, trusses, wood/steel connections, and diaphragms, using both
conventional lumber products as well as state-of-the-art engineered wood products. Students will also have the opportunity to work in interdisciplinary teams to complete course objectives.

Specific Course Objectives

Students will be able to:

- recognize and apply engineering design terminology
- solve simple design equations
- use design software proficiently
- develop the ability to work productively with others
- appraise the contribution of other team members
- develop appreciation for other disciplines of building

Course Components

- **Lectures:** Class will meet for 75 minute sessions on Tuesday and Thursday mornings to introduce and discuss new topics and to go through sample designs.
- **Assignments:** Homework will be assigned approximately every second week. Due dates will be set when homework is assigned. *Assignments must be submitted on time.* Late submittal (without prior Professor approval) will result in a 5% penalty for each day that it is late (including weekends). No assignments will be accepted after homework solutions have been handed out.
- **Exams:** There will be one mid-term exam and one final exam.
- **Quizzes:** There will be four quizzes spread throughout the term.
- **Connection project:** Students will design, build and experimentally test a timber bending connection. Groups will formally present their design and results to the rest of the class. Groups will be randomly assigned and encouraged to work together as teams for all aspects of the project. All members of the same team will receive the same grade.
Grading and Evaluation
Mid-term exam: 20%
Final exam: 25%
Quizzes – total 4: 20%
Assignments – total 4: 20%
Connection project: 15%

Letter grades will be assigned as follows: A (>92), A– (90.0–91.9), B+ (87.0–89.9), B (83.0–86.9), B– (80.0–82.9), C+ (77.0–79.9), C (73.0–76.9), C– (70.0–72.9), D+ (67.0–69.9), D (60.0–66.9), F<60

Required Text

General Reference


Attendance and Absences
Students are expected to attend and participate in lectures. Unavoidable absences should be discussed directly with the Professor prior to class. Students are responsible for obtaining missed course material and should first attempt to copy another student's notes before contacting the Professor. If you must miss an exam or assignment due to extenuating personal circumstances (per university-accepted reasons), contact the Professor before the event (if possible) to arrange for a solution. Other than for accepted reasons, make-up exams, assignments or projects will not be given. Students should arrive to class on time.
Grievance Procedure
If you have an academic grievance, you may dispute it by submitting a written explanation together with the material in question to the Professor within two weeks of the occurrence of the grievance. If an agreeable solution can not be found, the University Grievance Procedure will be followed (found in the Undergraduate Rights and Responsibilities at http://www.umass.edu/dean_students/rights/).

Special Needs
All reasonable efforts will be made to meet the individual needs of the student. If you have a learning disability or need special accommodation please make an appointment with the Professor to discuss your needs. All discussions will be kept strictly confidential.

Academic Honesty
The University Academic Honesty Policy applies. This policy can be found in the Undergraduate Rights and Responsibilities (at http://www.umass.edu/dean_students/rights/) and covers plagiarism, cheating, fabrication, and facilitating dishonesty. Original, handwritten assignments are required by each student.

Classroom Behavior
As per building policy, it is not permitted to consume food in the classroom. Smoking is also prohibited. Students are strongly encouraged to turn all cell-phones or other electronic communications devices off during class time. Any disruptive behavior will be sanctioned appropriately.
## Course Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Jan. 27</td>
<td>General introduction: Wood as an engineering material (<em>Chapter 1.0</em>)</td>
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| Week 2 | | Wood structure and properties; implications on design (*Chapter 2.0*)  
Lumber products and manufacturing (*Chapter 3.0 and 8.1-8.4*)  
**QUIZ 1** |
| Week 3 | | Design loads: dead, live, snow (*Sections 4.2 & 4.3*)  
Design loads: wind, seismic, load combinations (*Sections 4.4 – 4.7*)  
**Assignment #1 – handout** |
| Week 4 | | Load tracing: roof and floor systems (*Section 4.1; Onouye & Kane, Chapter 4*) |
| Week 5 | | Design methods: ASD vs. LRFD (*Section 4.8 – 4.12*)  
WoodWorks® design software: connections  
**Assignment #2 - handout** |
| Week 6 | | Connections: Z values, nail design (*Sections 5.1-5.3*)  
Connections: lag screws & bolts (*Sections 5.5-5.7*) |
| Week 7 | (Mar. 10) | Connection detailing  
**MID-TERM EXAM** |
| Week 8 | (Mar. 15 & 17) | Spring Recess |
| Week 9 | | Beam design: bending, lateral stability (*Sections 6.1-6.3*)  
Beam design: shear, deflection, bearing (*Sections 6.5-6.10*) |
| Week 10 | | Beam design: Examples and Span tables (lumber, I-joists, PSL, LVL)  
WoodWorks® design software: joists, beams & columns  
**Assignment #3 – handout** |
| Week 11 | | Compression members, Column behavior & design (*Sections 7.1, 7.2*)  
Walls, Beam-columns and eccentricities (*Sections 7.6*) |
| Week 12 | | Tension members, combined bending and tension (*Sections 7.8-7.9*)  
WoodWorks® design software: concept mode  
**Assignment #4 – handout** |
| Week 13 | | Plywood, OSB sheathing design (*Sections 11.1-11.8*)  
Holiday (Patriot’s day) |
| Week 14 | | Sheathing design  
Lateral loads and stability (*Section 12.1; Onouye & Kane, Chapter 4*) |
| Week 15 | | Wood preservatives  
Connection project: Laboratory testing |
| Week 16 | (May 10) | Class presentations |
| Week 17 | (May 16-May 20) | Final EXAM |