Course Objectives:
The purpose of CE 539 is to investigate and discuss the background of the design specification methods, discuss the impact of recent research, demonstrate the application of the design specification requirements to advanced design problems. The course will cover the engineering properties of wood materials, theory and design of wood composites, connections, load-sharing systems, performance criteria, and durability issues for wood structures. The topics covered in the course are determined at the beginning of the term in conjunction with the students’ interests and the topics thought to be particularly important by the instructor.

The course will start with an overview of the various codes and standards that directly affect timber structural design. The determination of design values will follow and then the theory and design of wood composites, connections, and load-sharing systems. Performance criteria and durability issues will be covered as appropriate. Special topics such as seismic, high wind, and vibration will be covered, as well as advanced connection design. Special design considerations associated with Glulam and heavy timber structures will be included in the course materials.

Method of Instruction

The instruction for CE 539 will consist of two lectures of 75 minutes per week. These lectures will introduce the analytical and design process included in the current design specification for the United States, and background upon which these techniques are based. The introduction of each method will be reinforced with homework assignments that apply the information to problems associated with wood structures. Significant additional reading of Technical Journal papers pertaining to the subject matter will be distributed and included in examination scope. The students will have an opportunity to develop the practical applications in a class project and an individual topic presentation.
Course Text:


Supplemental Materials:

Evaluation:
Progress and retention will be evaluated with homework assignments, exams, and projects. Homework/Projects will be assigned regularly to reinforce concepts covered in lecture. A Mid-Term Exam will be given to assess the understanding of the general elasticity components. A Final Exam or an individual design project will be assigned to assess the ability to utilize the different analysis methods presented in the course.

Grading:
The course grade will compromise a weighted average of all assignments. The specific distribution will be:

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework/Projects</td>
<td>30</td>
</tr>
<tr>
<td>Mid-Term Exam</td>
<td>30</td>
</tr>
<tr>
<td>Final Exam/Independent Project</td>
<td>40</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Final course grades will be assigned using the following scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100-93</td>
</tr>
<tr>
<td>A-</td>
<td>92-90</td>
</tr>
<tr>
<td>B+</td>
<td>89-88</td>
</tr>
<tr>
<td>B</td>
<td>87-83</td>
</tr>
<tr>
<td>B-</td>
<td>82-80</td>
</tr>
<tr>
<td>C+</td>
<td>79-78</td>
</tr>
<tr>
<td>C</td>
<td>77-73</td>
</tr>
<tr>
<td>C-</td>
<td>72-70</td>
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<tr>
<td>D+</td>
<td>69-68</td>
</tr>
<tr>
<td>D</td>
<td>67-60</td>
</tr>
<tr>
<td>F</td>
<td>59-0</td>
</tr>
</tbody>
</table>
Notes and Assignments:

Course notes and assignments, along with additional information, will be placed on a course web page in PDF format for the student to download. The information on the class website.

All electronic material will be in Adobe Acrobat format. A free copy of Adobe Acrobat Reader may be obtained from the following website:


Attendance and Deadlines:

Attendance role will not be taken at the lectures. However, students are responsible for daily assignments. Homework will be due at the beginning of the lecture on the due date, which will be shown on all homework assignments. NO LATE ASSIGNMENTS WILL BE ACCEPTED !!! Missing assignments will be given a grade of zero.
Potential Course Topics
(* Topics Will Be Covered)

*Building Codes
  a) Mechanics Based design
  b) Prescriptive Design

*Design Specifications

*Design Philosophy
  a) Gravity Loads
  b) Wind Design
  c) Seismic Design
  d) Vibration Considerations

*Load Path

*Connections
  a) *Large vs Small Dowels
  b) *Multiple-Bolt Connections
  c) *Nails
     a. Diameter Issues
     b. Penetration Issues
     c. Deformed vs Smooth Shank
     d. Hardened vs Mild Steel
  d) Split Rings & Shear Plates
  e) Lag Screws
  f) Wood Screws
  g) *Timber Rivets

*Shear Walls
  a) *Segmented Walls (“Engineered”)
  b) *Prescriptive Walls (“Conventional Construction”)
  c) *Perforated Shear Walls
     i. Designed for Force Transfer
     ii. Not Designed for Force Transfer

*Diaphragms

Arches

*In-Grade Testing

*Design Values
  a) Member Design
  b) Connection Design
  c) Assembly Design

* Annoying Vibration Issues

Duration of Load
Glued Laminated Beam and Column Design

*Individual Mechanical Properties of Wood and Environmental Effects
   a) Bending Stiffness
   b) Modulus of Rupture
   c) Shear Strength
   d) Axial Stiffness
   e) Axial Strength
   f) Connection Performance

Columns
Trusses (Heavy Timber vs MPC)
Timber Frame Design
Wood Concrete Composite Construction
Permanent Wood Foundations
Adhesives and Restrictions of Use
New Specialty Connectors
Student Requested Topics