Course Outline for ENGR 427: Wood Structures

Elective
Civil Engineering

Bulletin Description
ENGR 427: Wood Structures (3 units)
Prerequisite: ENGR 323 Structural Analysis
Design of Wood Structures. Design procedures and specifications of wood members subjected to tension, compression, flexure and combined bending and axial forces. Design building codes and seismic provisions of wood structures.

Textbooks

References

Coordinator
Dr. Christopher Wenshen Pong, P.E., Professor of Civil Engineering

Prerequisites by Topic
1. Structural Analysis
2. Differential Equations
3. Experience in the use of structural analysis programs

Course Objectives1
1. To learn the fundamentals of wood structural properties and behaviors. [A.1, B.1]
2. To become informed about the optimum wood design criteria and procedures. [B.3]

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1 Numbers in brackets refer to the educational objectives and outcomes of the School of Engineering.
3. To understand the basic principles and design methods of wood members. [A.2, B.1, B.4]
4. To develop the ability to analyze and design simple wood buildings. [A.1, B.4]
5. To clarify code requirements and specifications and understand the background of code [B.4, C.3]

Topics
1. Principles of structural design
2. Properties of wood member
3. Wood member and design criteria.
4. Design loads
5. Beam design
6. Wood connections
7. Plywood panels
8. Horizontal diaphragms
9. Combined bending and axial load
10. Shear walls
11. Nailed and stapled connections.
12. Seismic design provisions

Professional Component
Engineering Science  0%
Engineering Design  100%

Evaluation
1. Homework and Projects.................. 15%
2. Two midterm exams...................... 50%
3. Quizzes.................................. 15%
4. Final Exam................................ 20%

Performance Criteria²

Objective 1
1.1 The student will demonstrate knowledge of wood structural design criteria. [1, 2, 3, 4]
1.2 The student will demonstrate knowledge of wood structural behavior when wood is subjected to bending, axial load and torsion. [1, 2, 3, 4]

Objective 2
2.1 The student will demonstrate knowledge of whether optimum design has been achieved. [1, 2, 3, 4]
2.2 The student will demonstrate knowledge of wood structural design procedures. [3]

² Numbers in brackets refer to the evaluation methods used to assess student performance.
Objective 3

3.1 The student will demonstrate knowledge of the Allowable Stress Design method. [1, 2, 3, 4]

3.2 The student will demonstrate knowledge of the design of columns. [1, 2, 3, 4]

3.3 The student will demonstrate knowledge of the design of beams. [1, 2, 3, 4]

3.4 The student will demonstrate knowledge of the design of connections. [1, 2, 3, 4]

3.5 The student will demonstrate knowledge of the design of shear walls. [1, 2, 3, 4]

Objective 4

4.1 The student will demonstrate skill in solving practical engineering problems through project assignments. [1]

Objective 5

5.1 The student will demonstrate an understanding of the design building codes and the background of codes. [1, 3]

5.2 The student will demonstrate skill in applying codes and specifications to design wood structural members. [1, 2, 3, 4]

Fall Semester, 2007
Instructor: Dr. Christopher Wenshen Pong
Office: SCI 121
Email: wspong@sfsu.edu
Homepage: http://online.sfsu.edu/~wspong
Phone: (415) 338-7738

Class/Laboratory Schedule
Two 75-minute lecture sessions/week

Prepared by
Dr. Christopher Wenshen Pong, August 23, 2008
ENGR 427 Wood Structures

Fall Semester 2008
Instructors: Dr. Wenshen Pong, P.E. and Murat Bozkurt, P.E.
Office: SCI 165
Office Hours: Mondays: 14:00-15:00, Tuesday 14:00-15:00 and Wednesday 14:00-15:00
or by appointment
Email: wspong@sfsu.edu and muratbozy@yahoo.com
Homepage:http://online.sfsu.edu/~wspong
Phone: (415) 338-7738
Class Location: HH 543
Class Schedule: Wednesdays 18:10-20:55

Scheduled Coverage:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Book Sections</th>
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<tbody>
<tr>
<td>1</td>
<td>Wood Buildings &amp; Design Criteria</td>
<td>1.1-1.11</td>
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<tr>
<td>2</td>
<td>Design Loads</td>
<td>2.1-2.18</td>
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<td>3-6</td>
<td>Behavior of Structures under Loads and Forces</td>
<td>3.1-3.7</td>
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<td>7</td>
<td>Properties of Wood and Lumber Grades</td>
<td>4.1-4.26</td>
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<td>7</td>
<td>Structural Glued Laminated Timber</td>
<td>5.1-5.9</td>
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<td>8-9</td>
<td>Beam Design</td>
<td>6.1-6.21</td>
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<tr>
<td>10-11</td>
<td>Combined Bending and Axial Forces</td>
<td>7.1-7.19</td>
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<td>12</td>
<td>Plywood and Other Structural-Use Panels</td>
<td>8.1-8.16</td>
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<td>13</td>
<td>Horizontal Diaphragms</td>
<td>9.1-9.13</td>
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<tr>
<td>14-15</td>
<td>Shear Walls</td>
<td>10.1-10.15</td>
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<tr>
<td>16</td>
<td>Wood Connections</td>
<td>11.1-11.9</td>
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<td>17</td>
<td>Nailed and Stapled Connections, Other Connections</td>
<td>12.1-12.17</td>
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Notes on Evaluation:
First announced quiz: 9/15/08
First midterm: October 22, 2008
Second midterm: November 19, 2008
Final exam: December 17, 2008, 18:10 to 21:00

* All exams will be open-book. There will be no make-up exams and no incomplete grades without a verified excuse.
* Homework will be assigned weekly and shall be submitted on Wednesday the following week. No late homework will be accepted.
* Some homework will require one doer and one checker to work together. Both doer and checker will receive the same grade. Assignment of the doer and checker will be at random.
* Projects will be assigned during the semester and shall be submitted on time. No late projects will be accepted.
Notes on Prerequisites:
Engineering students must have a copy of the course approval form on file.

Grading Policy:
A from 100 to 94  A- from 93 to 90
B+ from 89 to 86  B from 85 to 83  B- from 82 to 80
C+ from 79 to 76  C from 75 to 73  C- from 72 to 70
D+ from 69 to 66  D from 65 to 63  D- from 62 to 60  F below 60

Relationship to Other Courses:
This is an essential design course for the students who are interested in pursuing a career as structural engineers. Emphasis will be given to seismic design for wood structures. The design of members subjected to tension, compression, flexure and torsion will be investigated in this course. In addition, structural design provisions and codes will also be discussed. The prerequisite courses, such as, ENGR 323, Structural Analysis and ENGR 309, Engineering Mechanics of Solid are necessary. Experience in the use of computer programs is also required.

Important things to do:
Please visit www.structuremag.com for free subscription of Structure Magazine
Please visit www.gostructural.com for free subscription of Structural Engineer Magazine
Please visit www.awc.org for free educational resources offered American Wood Council

Policy on Add, Drop and Withdrawal:
Students are responsible for their class enrollments. Students should check their enrollment records periodically throughout the semester to ensure that the enrollment record is correct. Particularly, all students should check their enrollment record a day or two after any enrollment changes are made and take immediate action if the university record does not reflect the changes. Also make sure to maintain a record of any adds, drops, or withdrawals. First week through fourth week of instruction is the open add/drop period. No late add will be allowed after the deadline.

What do I expect from you and what should you know to make the grade you want?
- Not interested in students memorizing equations.
- More interested in students learning where to look for information, how to apply the engineering concepts and equations to engineering problems, how to interpret the design problems, how to solve the problems creatively and economically, and how to articulate your findings.
- Practice lots of design examples.
- Participate constructively in class analysis and discussion.
- Ask questions and offer constructive personal insights and opinions in classes.
• Always sit in your assigned seat.
• Be Prepared for Class.
• Take good notes.
• **Do your homework honestly and turn in on time.**
• Come to class every time (not just most of the time). Attendance counts as part of your grade.
• **No cheating. I maintain a zero tolerance policy toward cheating. All submissions must be original work of the student.** If there is the slightest evidence of cheating, no credit will be given for the entire project or homework assignment.
• See me during my office hours if you feel it is necessary.
• **Do not distract other students by talking, eating**, etc.
• Well prepare for the quizzes and exams

Notes:
No cell phone calls. No food. Allowances for special circumstances or emergencies will be made on a case-by-case basis.