**CE 478**

**“Timber and Masonry Design”**

## SYLLABUS

**Text:** Design of Wood Structures ASD/LRFD. 7th edition, by Breyer, etc.

Publisher: McGraw-Hill ISBN 978-0-07-1745604 (Required text)

Design of Reinforced Masonry Structures, by Brandow, Ekwueme, Hart Publisher: Concrete Masonry Association of California & Nevada

(Book will be arranged for by Professor)

Handouts will include material from the National Design Specifications, Building Code Requirements for Masonry Structures, TMS 402-11/ASCE 5-11 and IBC, product material from manufactures, and other technical material.

**Location:** KAP 158 Monday and Wednesday 2:00-3:20pm

**Prerequisite:** CE 207 and CE 225

**Professor:** Gregg E. Brandow, PhD, PE, SE 213-740-1040 tel

KAP 268C [brandow@usc.edu](mailto:brandow@usc.edu)

**TA: TBA**

**Introduction and Wood Design:**

The class is organized to be an introduction to the design of wood and masonry structures. The course is organized into three topics: Wood design, Masonry design, and Seismic design of wood and masonry buildings. In the first third of the class, the topics will cover the unique properties of wood through the design of the structural elements of a wood building:

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| **Day** | **Date** | **Class Subject Material and Test Schedule** | **Chapter (CH) Assignments** |
| Mon  Wed | 8/21  8/23 | Introduction/ASD/LRFD  No class, Professor at NCEES | Chapter 1, 2, 3.1-3.2, 4 |
| Mon  Wed | 8/28  8/30 | Properties of wood, Beam design  Beam design, framing systems | Chapter 6.1-6.12 (Sawn) |
| Mon  Wed | 9/4  9/6 | Labor Day – No class  Glued Laminated Beams | Chapter 5 (GLB), 6.13 |
| Mon  Wed | 9/11  9/13 | Beam Design – lateral stability  Axial, tension and combined loading | Chapter 6.14-6.17  Chapter 7 |
| Mon  Wed | 9/18  9/20 | Plywood  Connections | Chapter 8  Chapter 11, 12, 13 |
| Mon | 9/25 | Connections |  |

**Masonry Design:**

In the second third of the course, masonry design will be discuss with the emphasis on masonry structures constructed of concrete masonry units (CMU). The topics will cover the evolution of masonry construction, the properties of masonry and the design of masonry structural elements of a building:

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| **Day** | **Date** | **Class Subject Material and Test Schedule** | **Chapter (CH) Assignments** |
| Wed | 9/27 | Properties of Masonry | DRMS Chapters 1,2, & 5 |
| Mon  Wed | 10/2  10/4 | **Midterm Exam (Wood)**  Flexural Design (LRFD) |  |
| Mon  Wed | 10/9  10/11 | Shear, Columns, wallsAxial and bending |  |
| Mon  Wed | 10/16  10/18 | Shear walls  Shear walls |  |
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**Seismic Analysis and Design:**

In the final third of the course, seismic analysis and design flexible diaphragm buildings will be discuss with the emphasis on wood diaphragms, plywood and masonry shear walls. The topics will cover all the elements of the seismic lateral force resisting system including the diaphragms, chords, collectors, and the design of plywood and masonry shear walls:

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| **Day** | **Date** | **Class Subject Material and Test Schedule** | **Chapter (CH) Assignments** |
| Mon  Wed | 10/23  10/25 | Lateral forces, diaphragms  Chords, collectors, shear walls | Chapters 2.8-2.15, 3.3-3.6  Chapters 9,10,15 |
| Mon  Wed | 10/30  11/1 | Seismic forces & performance  Plywood shear walls |  |
| Mon  Wed | 11/6  11/8 | Irregular diaphragmsMasonry Shear Walls | DRMS Chapter |
| Mon  Wed | 11/13  11/15 | Masonry Walls (out-of-plane-forces)  Sub-Diaphragms | Chapters 15 |
| Mon  Wed  Mon  Wed  Fri | 11/20  11/22  11/27  11/38  12/8 | Building Design Project  No Class Thanksgiving  Building Design Project  Review  **Final Exam 2-4 pm** |  |

**Policies**

**Examinations:**

All examinations will be open book and open notes. Make-up examinations will be given under extraordinary circumstances only. Honor system is observed.

**Grading/Values:**

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| Homework | 20% |
| Midterm | 30% |
| Building Design Project | 10% |
| Final Exam | 40% |

**Course Content:**

1. **Objective**
   1. Fulfill structural design elective.
   2. Introduction to wood and masonry design.
   3. Understand the analysis and design process as applied to wood and masonry buildings.
   4. Learn to organize design calculations.
2. **Instructions**
   1. Course material is included in reading assignments, lectures, example problems, homework, examination, and design project.
   2. Lectures are focused on key ideas, work example problems, and will leave less important detail for reading.
   3. Students will be expected to read chapters before class and turn in assignment on time.
   4. Tardiness will not be tolerated.
   5. Absences are only excused with prior notification via e-mail and/or telephone.
3. **Extra Credits (no extra credit)**
4. **Course Content**

The course is an introduction to the wood and masonry design and will not cover all the topics in the texts or required to be proficient in the practice of structural design. It is intended to provide a basis on which those pursuing a design career can build their skills and knowledges. Wood and masonry have been combined in this course in order to provide the undergraduate with this introduction recognizing that the constraints of the curriculum will not allow individual courses in wood and masonry. Students are expected to enter the course with knowledge and basis understanding of statics, shear and moment diagrams, and the development of design loads. The prerequisite for this course is CE 207 and CE 225.

1. **Topics Include, but are not limited to**
   1. Sawn lumber design
   2. Glued laminated lumber design
   3. Engineered wood products
   4. Masonry
   5. Seismic forces
   6. Lateral force resisting system
   7. Diaphragm sub-diaphragm design
2. **Statement for Students with Disabilities**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website and contact information for DSP: http://sait.usc.edu/academicsupport/centerprograms/dsp/home\_index.html, (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) [ability@usc.edu](mailto:ability@usc.edu).

1. **Statement on Academic Integrity**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. *SCampus*, the Student Guidebook, ([www.usc.edu/scampus](http://www.usc.edu/scampus) or <http://scampus.usc.edu>) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

1. **Emergency Preparedness/Course Continuity in a Crisis**

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies.