ARCH 2615 Building Technology II: Structural Elements

Spring/2016

Tuesdays and Thursdays 9:45 - 11:00 am
Jonathan Ochshorn
Office hours: TBA. Subject to change; see http://www.ochshorndesign.com/cornell/officeHours/officeHours.html

Grading: Letter grades only for architecture distribution credit

I. Rationale: This purpose of this course is to understand concepts and procedures for the design, manufacture, and construction of structural components (e.g., walls, columns, beams, slabs) in steel, concrete, masonry, and timber.

II. Course Aims and Objectives:

Aims

A. Students learn how to design structural elements, according to the following matrix:

<table>
<thead>
<tr>
<th></th>
<th>Wood</th>
<th>Steel</th>
<th>Reinforced concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension</td>
<td>Not considered</td>
<td>Steel hangers and threaded rods</td>
<td>Not considered</td>
</tr>
<tr>
<td>Compression</td>
<td>Wood columns</td>
<td>Steel columns</td>
<td>Reinforced concrete columns</td>
</tr>
<tr>
<td>Bending</td>
<td>Wood joists and beams</td>
<td>Steel beams and girders</td>
<td>Reinforced concrete T-beams</td>
</tr>
</tbody>
</table>

B. Students learn about the manufacture and construction of wood, steel, reinforced concrete, and masonry structural elements.

Specific Learning Objectives (NAAB criteria):

| B.5            | Structural Systems    | Ability to demonstrate the basic principles of structural systems and their ability to withstand gravitational, seismic, and lateral forces, as well as the selection and application of the appropriate structural system. |

III. Format and Procedures:

Lecture format.

IV. My assumptions:

I teach the material based on current codes promulgated by relevant industry organizations: American Institute of Timber Construction, American Institute of Steel Construction, and the American Concrete Institute. The course looks at determinate structures in wood and steel, and at indeterminate framed structures in reinforced concrete for which moment values can be found. I use the allowable stress design method for wood, the available strength design method for steel, and the strength design method (a version of LRFD) for reinforced concrete.
V. Course Requirements:

1. Class attendance and participation policy: Individuals with flu-like illnesses need to stay out of circulation. For those well enough to attend class, attendance is required (with notes from text submitted for each missed class).

2. Course readings:

   Required text: Ochshorn, *Structural Elements for Architects and Builders, Second Edition*

3. How many credits? 3

4. Additional requirements: n/a

VI. Grading Procedures: Grades will be based on three prelims, a final exam (or project), and 6 homework assignments (of which 3 are graded). Because attendance is required, a grade penalty may be assessed for excessive absences. Notes from the text must be submitted for any missed class; doing so may reduce, but not eliminate, the grade penalty for excessive absences. The course grade is based on the following:

1. Homework assignments (12% grade)

2. Prelims, as follows:
   - I. Wood (22% grade)
   - II. Steel (22% grade)
   - III. Masonry and reinforced concrete (22% grade)

3. Final exam (22% grade)

VII. Academic Integrity: Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work, except in the cases of projects that are specifically structured as group endeavors.

You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an e mail attachment file, a diskette, or a hard copy.

Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
VIII. Accommodations for students with disabilities
In compliance with the Cornell University policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances, so arrangements can be made. Students are encouraged to register with Student Disability Services to verify their eligibility for appropriate accommodations.

IX. Course Schedule

Week 1
Jan 28 Overview

Week 2
Feb 2 Wood properties
Feb 4 Wood systems

Week 3
Feb 9 Load combinations
Feb 11 Structural design of wood compression elements

Week 4
Feb 16 February break (no class)
Feb 18 Structural design of wood beams (bending) Assignment #1 issued

Week 5
Feb 23 Structural design of wood beams (shear) Assignment #1 due
Feb 25 Structural design of wood beams (deflection) Assignment 2 issued (not collected)

Week 6
Mar 1 Review
Mar 3 Prelim 1 (wood)

Week 7
Mar 8 Steel properties and systems
Mar 10 Structural design of steel tension elements

Week 8
Mar 15 Structural design of steel columns Assignment #3 issued
Mar 17 Structural design of steel beams (bending)

Week 9
Mar 22 Structural design of steel beams (shear and deflection) Assignment #3 due, Assignment #4 issued (not collected)
Mar 24 Case study of steel building

Week 10
Mar 29 Spring break (no class)
Mar 31 Spring break (no class)

Week 11
April 5 Masonry properties and systems
April 7 Review
Week 12
April 12 Prelim 2 (steel)
April 14 Reinforced concrete properties

Week 13
April 19 Reinforced concrete systems
April 21 Reinforced concrete (Structural design of columns; moment values) Assignment #5 issued

Week 14
Apr 26 Reinforced concrete (Structural design of T beams) Assignment #5 due/Assignment No. 6 issued (not collected)
Apr 28 Review

Week 15
May 3 Prelim 3 (reinforced concrete and masonry)
May 5 Final project issued

Week 16
May 10 No class
May 12 Study period (no class)

Exam week
Final exam: (TBA) or Final project: (TBA)