Course Description
Continuing study of framing materials and systems for buildings using advanced concepts of structural analysis. Included are earthquake resistant structures, composite beams, plastic theory, statically indeterminate structures, long spans, moment distribution, multi-story structures, etc.

Lecture: 3 Hours.  Prerequisite: Architecture 362.

Instructor Information
Name: John K. Dobbins, Architect
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Office Hours (Fall, 2012): MWF, 10:00 am – 11:50 am & by Appointment
E-mail: jdobbins@siu.edu

Textbooks/Supplies


A calculator with trigonometric functions and a memory is highly recommended. A math program such as MathCAD or Microsoft Excel may also be used, but is not required.

Course Objectives
1. Define and solve problems using the fundamentals of moment distribution.
2. Solve problems involving statically indeterminate structures.
3. Identify and analyze several types of multi-story framing, finding stresses and deflections of each type.
4. Apply the theories of earthquake design to practical structural problems.
5. Become familiar with the fundamentals of composite design and be able to solve problems involving composite design.
6. Identify several special structural systems used in modern buildings.
7. Solve problems involving plastic and ultimate strength theories.
8. Gather information regarding structural failures in buildings and analyze such information seeking causes and solutions.
9. Perform structural calculations and size, plan, and design the structural layout of a specific project. *

* It is required that students use their senior studio project. Only students not enrolled in senior studio may use a different project. Students not enrolled in senior studio are required to identify their semester project within two weeks of the start of the semester. The instructor must approve projects used in place of the senior studio project.

**Topical Outline**

(not in order of presentation)

I. Moment Distribution 7.5%
II. Statically Indeterminate Structures 15.0%
III. Multi-Story Framing Systems 6.5%
IV. Special Structural Systems 6.5%
V. Earthquake Resistant Design 12.5%
VI. Designing for the Effects of Wind 12.5%
VII. LRFD Composite Design 15.0%
VIII. Structural Failures in Buildings 5.0%
IX. Student Structural Design Projects 19.5%

**Important Notes:**

Percentages shown in the **Topical Outline** represent the approximate amount of course time devoted to each topic. Some variation may occur, as needed, to develop understanding among course participants.

Topic IX, Student Structural Design Projects, represents the course time devoted to the individual analyses of student projects. A great deal of out-of-class time will be needed to complete the project.

**Expectations**

1. Students are expected to actively participate in each session by asking and answering questions, exploring solutions by discussing notes, concepts, and ideas in an informal manner.
2. Students are expected to turn in all assignments and projects on time. **LATE WORK WILL NOT BE ACCEPTED.** Therefore, it is critical that all work be completed on time. Late work will receive a zero for the grade.
3. Students are also expected to comply fully with the policies of Southern Illinois University at Carbondale.
4. Disable cell phones, paging devices, etc. so as not to disrupt class. Please arrive on time so as not to disrupt class.
5. The use of any tobacco product is forbidden in class. This includes tobacco in all of its forms and extends to all rooms and spaces in which any portion of the class is conducted, as well as those spaces necessary to access classroom areas. It also includes any field trip or outside activity that is a part of the class’ activities. Failing
to comply with this class policy will be considered a violation of the Student Conduct Code of Southern Illinois University Carbondale, article II, section 4. Students are directed to article III, section B, which states that the punishment shall be: “A failing grade (F) may be assigned for the course in which the violation occurred.”

6. No visitors are allowed in class without the advance permission of the instructor. Requests for visitors must be made at least two full class sessions in advance of the proposed visit.

7. Unless work is assigned as a team, each student shall do his or her own work. Please review the Student Conduct Code of Southern Illinois University Carbondale – especially those areas related to University policy regarding acts of academic dishonesty and the definition of plagiarism.

**Calculation of the Final Grade**

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exam 1:</td>
<td>25.0%</td>
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<tr>
<td>Exam 2:</td>
<td>25.0%</td>
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<tr>
<td>Exam 3:</td>
<td>25.0%</td>
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<tr>
<td>Homework Assignments:</td>
<td>15.0%</td>
</tr>
<tr>
<td>Semester Structural Design Project:</td>
<td>10.0%</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100.0%</strong></td>
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The grade of INC will not be assigned unless all the requirements of the University and the Department are met. Those requirements include: 1) an extraordinary circumstance outside the student’s control that interfered with completion of the course, 2) the student was passing the course at the time the INC grade is issued, and 3) an approved INC grade agreement has been executed between the student and the instructor. Students given an INC may not enroll in any course for which this course is a prerequisite until the INC has been satisfied.

**Semester Structural Design Project**

The semester project will involve taking a building through the calculations needed to plan and lay out its structural system. Students will choose a structural system appropriate to their particular project, and will compute the loads, size the framing members, size and plan joists, decking, etc. as required by their project. Typical shear and moment diagrams are to be included for representative portions of the structure.

Students will incorporate earthquake resistance in their projects, and will illustrate how their project accommodates seismic requirements with calculations and detail drawings, as appropriate. Specific seismic calculations are not typically included in the project.
All projects are to be presented in book format with 8-1/2” x 11” pages bound on the left edge. Specific project requirements will be provided in class, but in general, all projects should incorporate pages that illustrate the design of the building, text to discuss the framing choices made, and specific calculations and diagrams to illustrate the structural solution.

While it may not be possible to perform every calculation on some projects, enough must be performed to illustrate a solid grasp of the structural system as a whole, from foundation to penthouse.

A proper bibliography and footnote references will be required. Students may supplement the written project with one appropriately sized sheet of drawings. For example, a framing plan and appropriate structural details may be included on this sheet.

An example of the semester project will be shown to the class in the first portion of the semester. Word processing and spreadsheet workbooks of the semester project are strongly encouraged although not required. Most modern word processors easily handle mathematical notations and equations as required in this project. It is also easy to insert AutoCAD drawing files directly in the word processing document, allowing a link between CAD images of the project and the calculations for the project. Electronic copies of CAD files, spreadsheet documents, and word-processed files are required in addition to the written document.

StruCalc software is available in Quigley 106 for students to use while completing this project. Other programs are available as well. A fully-functional free demonstration version of the program is provided by StruCalc. Use the Downloads tab to access the program. Please wait to install this program until you are ready to perform your calculations. The demo version works for seven days.

**Other Course Information**

While no Extra Credit Assignments are planned, it is possible that one may be given if the instructor feels it will be helpful to the students in the course. If given, its exact value and the manner in which it will be counted will be announced in class.

It is essential that students work on the class project throughout the semester. Toward that end, progress will be checked on the project on a regular basis starting with the fifth week of the semester or when a progress check is appropriate based on the senior studio schedule. Students will need to make (and keep) regular appointments with the instructor to discuss their project during office hours.

**Emergency Procedures**

Southern Illinois University is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT’s website at [www.bert.siu.edu](http://www.bert.siu.edu), Department of Safety’s web site at [www.dps.siu.edu](http://www.dps.siu.edu) (use the disaster drop down) and in Emergency Response Guideline pamphlets. Know how to respond to each type of emergency.
Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. **It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.** The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.