
“Thirty spokes share the wheel's hub;
It is the center hole that makes it useful.
Shape clay into a vessel;
It is the space within that makes it useful.
Cut doors and windows for a room;
It is the holes which make it useful.
Therefore profit comes from what is there;
Usefulness from what is not there.”

Lao Tzu, Tao Te Ching

Instructor Information

Randy Thoms

Office: 107A Quigley Hall

Office Hours MWF, 2:00 pm – 2:50 pm & by Appointment

Telephone 453-3734 (Dept.), 453-1129 (Fax)

E-mail rwhelms5@siu.edu

Course Description

Elementary study of forces and force systems using graphic and analytic methods. Basic structural concepts: reactions, shear and moment diagrams, axial, eccentric and combined loading on beams and columns. Review of principles used in the design of floor and roof structural systems: load analysis, acting and resisting stresses. Analytic and graphic truss stress analysis. Introduction to steel design. Lecture three hours. Prerequisite: ARC 242, MATH 111, PHYS 203a and major in Architectural Studies or consent of director.

Course Objectives

- Provide a basic understanding of force systems, the graphical, analytic, and arithmetic resolution of unknowns, and application in the design of structural frames.
- Provide a basic understanding of the principles of statics, elasticity, and strength of materials for application in the design and investigation of structural components.
- Apply elementary mathematical skills that will enable continued study in the usage of structural materials.
- Develop of an understanding of the principles of structural behavior in withstanding gravity and lateral forces and the evolution, range, and appropriate application of contemporary structural systems.
- Develop basic skills in the Load & Resistance Factor Design (LRFD) Method of steel design.
- Understand codes, regulations, and standards issues related to building structural design using steel.
- Develop an appreciation for the aesthetic, economic and functional characteristics of steel structural framework and its influences upon architectural design.
- Introduce the topic of sustainable design in architectural structures, focusing on embodied energy, permanence, reusable materials, resources, and integration.
Textbooks/Supplies


A calculator that features trigonometric functions and a memory is necessary.

Expectations

1. Students are expected to actively participate in class sessions by asking and answering questions, exploring solutions through discussion of class topics, notes, and concepts in an informal manner.

2. Students are expected to use the texts required by this course to assist in their study of course materials, completion of assignments, and preparation for exams.

\[
\sum \gamma_i Q_i \leq \phi R_n
\]

3. Students are expected to attend all class sessions, arriving on time. Disable cell phones, paging devices, etc. so as not to disrupt class. Students who violate this rule will be asked to leave class and cannot return to class with the device that disrupted class. A penalty assignment will be issued to all students.

\[\phi_i = 0.90 \quad \phi_i = 0.75 \quad \phi_c = 0.90 \quad \phi_v = 0.90\]

4. Students are expected to submit all work at the designated times and places for the work. Only projects submitted at the proper time and place will be considered for full credit. Late projects will be marked down at the discretion of the instructor a minimum of 20% of the possible score on the project.

\[M_p = F_y Z \leq 1.5M_y\]

\[M_y = F_y S\]

5. Unless work is designated a team project, each student shall complete his/her own work. Please review the Student Conduct Code – especially those areas related to university policy regarding acts of academic dishonesty and the definition of plagiarism.

6. No tobacco products may be consumed in the class.

7. Drawings, details, articles, and other files available from web sites, CD ROMs, and other electronic media may NOT be used in this class except for appropriate research and study activities or when an assignment specifically asks for these types of materials.

8. No visitors are permitted in class.

Grade Scale

A = 100 – 90  B = 89 – 80  C = 79 – 70  D = 69 – 60  F = 59 – 0

Grading

Homework Assignments*  30%
Exam 1  20%
Exam 2  20%
Exam 3  15%
Exam 4  15%
TOTAL  100%

*Note: Homework projects
The INC (Incomplete) grade will only be used in exceptional circumstances beyond the control of the student. A student must be passing the class at the time the INC is issued. Because ARC 362 requires this class as a prerequisite, an INC must be completed prior to the start of ARC 362.

Students who do not officially withdraw from the class by the deadline listed in the Schedule of Classes will receive a grade in this class. Nonattendance of a course does NOT withdraw you from the course.

When ARC 361 students are required to miss this class for another class, students understand that a make-up class session will be held. The instructor will announce make-up class sessions as soon as possible so that students are aware of the date and time the make-up class session will be held. Attendance is expected.

Students are required to place the final answer to each problem in a clearly delineated box on all homework assignments. All work must be shown on homework problems to receive credit for correctly completing the problems. When required by a problem, sketches must be drawn to correct proportions and appropriate scales.

### Topical Outline

**Topics**

(INCLUDING, BUT NOT LIMITED TO)

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<th>I. System of Forces</th>
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<td>B. Components</td>
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<th>II. External Forces and Stresses</th>
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<td>A. Loading diagrams</td>
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<td>B. Shear and moment diagrams</td>
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<th>III. Properties of Cross Sections</th>
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<td>B. Elastic</td>
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<th>IV. Internal Stresses and Strain</th>
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<td>A. Stresses</td>
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<td>B. Strain</td>
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<th>V. Basic Design of Structural Members</th>
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<td>A. Beams</td>
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<td>B. Columns</td>
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<th>VI. Design of Trusses</th>
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VII. Steel Structural Design

B. Structural Elements and Systems
C. Bending Systems - Beams, Girders, Open Web Joists
D. Axially Loaded Systems, Combination Load Systems
E. Connections – Bolts, Welds, Plates

Exam Schedule
Except for the final, exams are given during evening hours. The location of exams will be announced in class. All students are expected to make necessary arrangements to attend the exam sessions. Those with legitimate conflicts may petition for an alternate exam time. The phrase legitimate conflicts is meant to indicate a situation beyond the student’s control. Work schedules, family schedules, etc. should be arranged to allow attendance at exam sessions. Students given an alternate exam time may be given a different exam. All exams are scheduled from 6:30 pm to 8:30 pm, unless announced otherwise in class. Devices equipped with wireless technology are not permitted in the room. Please see the Class Schedule for a listing of exam dates including the final exam.

Class Email List
Your email has been received from the university. A distribution list is used to send email to the class. Students who use email services that block group mails as spam are advised to create an email rule allowing class emails to be delivered to your account. In many cases, using an SIU email account will solve this problem.

NAAB SPCs
Architecture 361 meets this Student Performance Criteria as defined by the National Architectural Accrediting Board for pre-professional education in architecture:

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.

If you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with Disability Support Services (DSS) to help us determine appropriate academic accommodations. DSS (618,453.5738; http://disabilityservices.siu.edu/) typically recommends accommodations through a verification form provided to the student.

Any information you provide is private and confidential and will be treated as such.