

CE 3055 – Structural Analysis

Course Objectives: This course introduces students to the basic techniques required by practicing engineers for analyzing the majority of common structures and structural elements, including trusses, beams, frames, arches, and cables. The course begins with a basic review of statics and mechanics of materials, proceeds through analysis of determinate structures, and ends with analysis of indeterminate structures. Some computer analysis may be used for illustrative purposes.

Prerequisites: CE 3030

Computer Programs: Several computer programs will be used throughout the course of this class. They will be available on the computers on the second floor of Mason. The programs are:

MATLAB is a multi-purpose mathematical program that combines numeric computation, advanced graphics and visualization, and a high-level programming language. It can be used for simple calculations or complicated programming. MATLAB is also available at the student center for a discounted price.

RISA-3D is an educational structural analysis program. You can download RISA-3D at:

<http://www.risatech.com/products/2d/2d3edu.htm>

Textbook: Structural Analysis by, Hibbeler,

COURSE ORGANIZATION

- TuTh 8:00-9:30 am 142A Mason, Office Hours: TBD
- TA: Berk Taftali, 522 Mason, Office Hours: TBD
- Assigned work will include weekly reading in the reference books and homework problems. You are encouraged to **work in groups**, however, you must hand in your own assignment.
- Late assignments will be marked down 50%! Assignments will not be excepted more than 24 hours late. You can drop your lowest HW assignment!
- There will be weekly quizzes, based on the week's homework. You can drop your lowest quiz grade.
- There will be two 2 - hour midterms and one 3-hour comprehensive final examination. The exams will be closed book with one 8 1/2 by 11 sheet of notes.

GRADING

- Your grade will be determined from the following grading scheme shown below:
Homework (10%), Quizzes (20%), Midterms (30%), and Final (40%)

Solutions to homework, and exams will be posted on the course webpage.

TENTATIVE EXAM SCHEDULE

Midterm 1:	Tuesday, September 18, 2001
Midterm 2:	Thursday, October 25, 2001
Final:	Wednesday, December 12, 2001 11:30am.

COURSE CONTENT

Review of Statics/Mechanics

- **Introduction**
Overview of Course, The design process: relationship of analysis to design, Basic structural elements, classifying structures, loads **1 Lecture (8/21)**
Chapter 1
- **Statics of Structures, Reactions**
Free- body diagrams, determinacy of structures, idealization of structures **1 Lecture (8/23)**
Chapter 2
- **Trusses**
Types of trusses, analysis of trusses, methods of joints, methods of sections **2 Lectures (8/28-30)**
Chapter 3
- **Beams and Frames**
Shear and moment diagrams, principles of superposition, deflected shapes **3 Lectures (9/4, 6,11)**
Chapter 4

Midterm 1 – September 18

Structural Analysis of Determinate Systems

- **Cables and Arches**
Characteristics of cables, variation of cable force, analysis of cable supporting gravity
Types of arches, three-hinged arch **1 Lecture (9/20)**
Chapter 5
- **Influence Lines – Determinate and Indeterminate Systems**
Construction of influence lines, Muller-Breslau Principle **2 Lectures (9/25, 27)**
Chapter 6
- **Deflections of Beams and Trusses**
Double Integration, Moment Area, Elastic Load, Conjugate Beam, Work-Energy **4 Lectures (10/9-23)**
Chapter 8

Midterm 2 – October 25

Structural Analysis of Indeterminate Systems

- **Force Method (Flexibility Method)**
General methodology, beams and trusses, support settlements, temperature change **3 Lectures (10/30-11/8)**
Chapter 9
- **Displacement Methods (Method of Consistent Deformations)**
Slope-deflection, frames with sidesway, frames without sidesway **2 Lectures (11/13-15)**
Chapter 10
- **Moment Distribution**
General principles, moment distribution of beams, moment distribution of frames
sidesway and no sidesway **2 Lectures (11/20-27)**
Chapter 11
- **Approximate Analysis Methods**
Portal Method, Cantilever Method, Trusses **2 Lectures (11/29-12/4)**
Chapter 7

Instructor out of town on the following days;

Th, September 13

Tu-Th, October 2-4