

MECH-308 – Finite Element Analysis – Spring 2008

Instructor: Charles J. Roberts, PE, MS
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Office Hours: MW 9:00-9:50 AM, TF 10:00-10:50 AM

Course Description: Theory and design procedures for analysis, theory and use of the Finite Element Method to analyze stress, heat transfer, and vibrations problems and to introduce modern FEA computer software.

Course Texts: The Finite Element Method For Engineers, Huebner/Dewhirst/Smith/Byrom, 4th Edition, Wiley-Interscience, 2001

Prerequisites: CIVL-311, MATH-260, MECH 210 & MECH 306

Meetings:
Lecture: MW 8:00-8:50 AM, OCNL 254
Activity: T 8:00-9:50 AM OCNL 438
Activity: F 8:00-9:50 AM OCNL 438

Final Exam: Friday, May 20, 2008 @ 10:00 11:50 AM, LANG 302.

Grading Basis: There will be homework, a final project and 2 one-hour tests. Design problems will be assigned during the term. The final grade will be based on the following proportions:

Exam 1	25 %
Exam 2 (Final)	25 %
Homework	25 %
Final Project	25 %

Important Note

The Mechanical Engineering Program requires that all students achieve a basic level of proficiency in various Program Outcomes. This course will assess the Program Outcome of an ability to use the techniques, skills, and modern mechanical engineering tools necessary for engineering practice. To verify attainment of this Program Outcome, an additional minimum grade requirement of C must be achieved on the following to receive a D or better for the course:

1. Stress in a plate with an eccentrically located hole, using COSMOS
2. Thermal Analysis, using EXCEL.
3. Modal analysis, using EXCEL & COSMOS.

Proficiency of these identified skills, considered to be the minimum expected of students enrolled in this class, is measured in homework and midterm exams. **Failure to the meet the Program Outcomes will result in a course grade of “F”.**

Course topics include:

1. Introduction
2. Review of matrices
3. Direct approach & application of direct approach to elasticity.
4. Stress analysis using spreadsheets & a commercial FEA program.
5. Interpolation functions & method of weighted residues
6. Analysis of steady state conduction using spreadsheets & a commercial FEA program
7. Finite element formulation of vibration and using spreadsheets & a commercial FEA program to conduct modal analysis.