

MECH-308 – Finite Element Analysis – Spring 2010

Instructor: Charles J. Roberts, PE, MS
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Office Hours: MW 12:00-1:30 PM, T 10:00-10:50 AM, T 12:00-12:50 PM,

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: Concepts and Applications of Finite Element Analysis, Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt, 4th Edition, Wiley & Sons, 2001, (**or other approved text**, see instructor)

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 21, 2010 @ 8:00 9:50 AM, OCNL 254.

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

Exam 1	30 %
Final	25 %
Homework	30 %
Final Project	15 %

Important Note

All graduates of the Mechanical Engineering Program must demonstrate basic competency in a set of program learning outcomes. These program outcomes are listed in the University Catalog and on the Department of Mechanical Engineering, Mechatronic Engineering, and Manufacturing Technology website. This course assesses basic competency in program outcome k (an ability to use the techniques, skills, and modern mechanical engineering tools necessary for engineering practice). This competency is demonstrated by receiving at least 70% of each of the three homework problems.

1. Stress in a plate with an eccentrically located hole, using COSMOS
2. Performing a thermal analysis using EXCEL.
3. Performing a modal analysis using EXCEL & COSMOS.

Failure to demonstrate this competency will result in an F in the course.

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.