

USC CEE Home
Finite Element Analysis - CE 529a, Fall 2008

Course Outline

Office: KAP 234C

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Class Homepage: www-classes.usc.edu/engr/ce/529a/

Text: Cook, Concepts and Applications of
Finite Element Analysis, 4th Ed., Wiley.

Grading: 25 percent homework
25 percent project
25 percent midterm (only one midterm exam)
25 percent final

Emphasis:

Variational Models

1. Calculus of variations.
2. Constraints – Lagrange multiplier
3. Constraints – penalty
4. Galerkin method.

Continuum Finite Elements

1. 1-D interpolation methods
2. 2-D interpolation methods – rectangles and triangles.
3. 3-D interpolation methods – hexahedron, tetrahedron, prism.

Isoparametric Elements

1. Mappings – physical system and natural coordinate system.
2. Numerical integration – Gauss quadrature.

Numerical Implementation of the Finite Element Method

1. Column storage schemes.
2. Assembly in active column form.
3. Static column solvers.
4. Mesh generation.

Finite Elements for Elasticity Problems

1. Plane stress – plane strain.
2. Stress calculation.
3. Incompressible problems.
4. Pressure, enforced displacement, and thermal loading.

Finite Elements for Axisymmetric Elasticity Problems

Finite Elements for Plate Problems

Finite Elements for Shell Problems

Finite Elements for Dynamic Problems

Introduction to Nonlinear Finite Element Analysis

Adaptive Methods