ME257 Jan 3:0

Finite Element Method

Instructor

C. S. Jog
Email: jogc@iisc.ac.in

Teaching Assistant

Email:

Department: Mechanical

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

The course teaches the basics of the finite element method at the first year post graduate level. The emphasis is

on developing the finite element method for any given set of partial differential equations, and not merely

using the method. Hence, it is meant for first year post graduate students. These students need to have taken a

course on Solid mechanics and some course on Mathematics where Tensors is covered.

Prerequisites

ME242

Syllabus

Introduction to the calculus of variations, variational formulations in elasticity and heat transfer, abstract

formulation, equivalence of

three forms (differential, potential energy, variational), approximation techniques, advantages of FEM, steps in

FEM, FEM for elasticity

and heat transfer, model-1D problem, higher-order shape functions, truss structures, beams and frames,

equation solving, 2-D structural problems,

isoparametric formulation, Gaussian quadrature, stress computation, axisymmetric problems, convergence of

the FEM, effect of element distortion,

eigenvalue and time-dependent problems, unsteady heat equation (parabolic), hyperbolic problems.

Course outcomes

The students will not only learn how to use the finite element method, but also how to formulate and code a

finite element method for any given set of partial differential equations. Thus, the finite element method is

developed as a tool for the numerical solution of partial differential equations, and not confined only to

structural mechanics applications the way it is typically taught.

Grading policy

Assignments (including miniproject): 20

Midterm Test: 30

Endsem: 50.

Assignments

Resources