

## **ME601      Advanced Finite Element Methods**

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Credit: 3-0-0-3

Approval: Approved in 2nd Senate

Prerequisites:

Students intended for: MS/PhD

Elective or Compulsory:

Semester: Odd/Even:

### **Course Outline:**

Basic concepts: The standard discrete system, Finite elements of an elastic continuum-displacement approach, Generalization of finite element concepts- weighted residual and variational approaches. Element types: triangular, rectangular, quadrilateral, sector, curved, isoparametric elements and numerical integration. Automatic mesh generation schemes. Application to structural mechanics problems: plane stress and plane strains. Axisymmetric stress analysis, introduction to three dimensional stress analysis. Introduction to use of FEM in steady state field problems- heat conduction fluid flow and non linear material problems, plasticity, creep etc., Computer procedure for Finite element analysis

### **Text & Reference Books:**

1. J N Reddy, An introduction to the Finite Element Method, McGraw – Hill, New York, 1993.
2. R D Cook, D S Malkus and M E Plesha, Concepts and Applications of Finite Element Analysis, 3d ed., John Wiley, New York, 1989.
3. K J Bathe, Finite Element Procedures in Engineering Analysis, Prentice-Hall, Englewood Cliffs, NJ, 1982.
4. T J R Hughes, the Finite Element Method, Prentice-Hall, Englewood Cliffs, NJ, 1986.
5. O C Zienkiewicz and R L Taylor, the Finite Element Method, 3d ed. McGraw-Hill, 1989.