ME 682 Nonlinear Finite Element Methods (3-0-0-6)

Fundamentals of finite deformation mechanics-kinematics--Stress measures--Balance laws, Objectivity principle--Newton-Raphson procedure--Finite element formulation for plasticity and nonlinear elasticity--Stress update algorithms for plasticity--Finite element procedures for dynamic analysis-- Explicit and implicit time integration. Finite element modelling of contact problems - Slide-line methods and penalty approach--Adaptive finite element analysis: Automatic mesh generation, Error estimation, Choice of new mesh, Transfer of state variables.

Textbooks/References:

[1] K.J. Bathe, Finite Element Procedures, Second Edition, Prentice Hall, 1996.

[2] T. Belythschko, W.K. Liu and B. Moran, Nonlinear Finite Elements for Continua and Structures, Wiley, 2000.

[3] P.K. Kythe, D.Wei, An Introduction to Linear and Nonlinear Finite Element Analysis: a Computational Approach, Birkhauser, 2004.

[4] P. Wriggers, Nonlinear Finite Element Methods, Springer, 2008.