# FINITE ELEMENT METHOD AND COMPUTATIONAL STRUCTURAL DYNAMICS

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**PRE-REQUISITES :** Basic course in Calculus

**INTENDED AUDIENCE :** Post graduate students in Civil / Structural / Geotechnical / Mechanical/Aerospace Engineering and Mathematics

**INDUSTRIES APPLICABLE TO :** Firms involved in CAD/CAE

**COURSE OUTLINE :**

Easy availability of computing power has made the computer aided engineering accessible to a wider section of the engineering workforce. To harness the potential of available computational resources, one needs to harmonize the twin aspects of theory and practice. While most of the graduate courses teach finite element method, its application to a range of problems using software tools is generally left out. The objective of this course is to approach the finite element theory from a perspective of effective computer implementation with an extensive set of tutorial problems based on public domain software tools.

**ABOUT INSTRUCTOR :**

Prof. Manish Shrikhande's areas of interest: Computational mechanics, Random vibrations, Structural Reliability, Strong Motion Studies, Soil-Structure Interaction, Vibration Control, Probabilistic mechanics.

**COURSE PLAN :**

**Week 1:** Floating point arithmetic and scientific computing

**Week 2:** Mathematical modeling and approximate solutions

**Week 3:** Finite Elements of 1 dimension

**Week 4:** Finite Elements of 2 dimensions

**Week 5:** Finite Elements of 2 dimensions – regular elements

**Week 6:** Finite Elements of 2 dimensions – distorted elements, numerical integration

**Week 7:** Finite Elements of 3 dimensions

**Week 8:** Finite Elements for Plates and Shells

**Week 9:** Solution of Large Scale Linear Simultaneous Equations

**Week 10:** Solution of Large Scale Algebraic Eigenvalue Problem

**Week 11:** Time Marching Methods for Initial Value Problems

**Week 12:** Fourier Transforms and Analysis in Frequency Domain