

**Fall 2004**

**CE 524 Matrix and Computer Methods in Structural Analysis (4)**

- Catalog Data:** Analysis of Determinate and Indeterminate structures utilizing matrices and computers; displacement methods applied to springs, trusses, beams and rigid frames; direct method of finding stiffness matrices, techniques for the analysis of large complex structures for static loads.  
Prerequisite: CEE 326.
- Textbook:** None
- References:** C.K. Wang, **Structural Analysis on Microcomputers**, Hibbeler, R.C., **Structural Analysis**, 4rd. ed., Prentice Hall, 1999.
- Goals:** To teach the understanding of structural performance by teaching the matrix analysis techniques for the solution of wire type structures.
- Prerequisites by Topic:**
1. Indeterminate Structural Analysis
  2. Matrix Algebra
- Topics (2 hour classes):**
1. Matrix operations and Spring Systems (2 class)
  2. Stiff Spring Supports for: Reactions and Settlement: static matrix, Hooke's Law, compatibility matrix (2 classes)
  3. Supports using Penalty Method (2 classes)
  4. Lack of fit and Settlement of supports (2 classes)
  5. Beams and Frames, Direct Stiffness Matrix (2 classes)
  6. Frames with sloping members and multi-bay and multi-story (2 classes)
  7. Rods with Torsion and Grids with Spring Supports, Introduction to Direct Element Method (2 classes)
  8. Direct Element Method using Transformations, Truss, 2D Frame, 3D truss and 3D Frame (2 classes)
  9. Introduction to FEM, Derive [K] using energy method for a Rod, SAP2000 (2 classes)
  10. Model Formulation, Plate Element, Choice of Elements and Dangers of FEM (2 Classes)
- Computer Usage:** General use of microprocessors and programmable calculators to solve simultaneous equations and perform matrix algebra in the solution of homework.