EML 5526 Finite Element Analysis and Applications
Spring 2012 syllabus

Basic Information

Catalog Information: Credits 3, Pre-requisites: None for graduate students, EML4507 for UG

Instructor: Dr. Ashok V. Kumar, Associate Professor, Department of Mechanical and Aerospace Engineering. Office: MAE-A 222, Phone: 392-0816, Email: akumar@ufl.edu.

Class time and location: MWF 6th period (12:50 PM -1:44 PM) in NEB-201

Office hours: Instructor MWF 4:00-5:00 PM

Teaching Assistants: Min Cheol Song (minsong@ufl.edu), Elango Balu (elango.balu@ufl.edu)


Course objectives and outcomes

Catalog description: Fundamentals of finite element analysis including, discrete system analysis, static and dynamic analysis of structures, steady state and transient heat transfer analysis. Modeling, analysis and design using FEA software.

The objective of the course is to teach the fundamentals of finite element method with emphasize on the underlying theory and implementation issues as well as providing hands on experience using finite element software to model, analyze and design systems of relevance to mechanical engineers.

The outline of the course is as follows:

I. Background
   a) Introduction and notations
   b) Discrete systems and direct stiffness method
   c) Solution of linear simultaneous equations

II. 1-D problems
   a) Heat conduction example
   b) Truss elements
   c) Beam Elements

III. 2D problems
   a) Heat conduction
   b) Linear elasticity (Structural Analysis)
      i) Review of linear elasticity
      ii) 2D models (Plane stress, Plane strain, Axi-symmetric)
      iii) Linear and higher order 2D elements

IV. 3D elements and modeling issues
   a) 3D elements
   b) Mesh generation and element selection issues
   c) Brief introduction to: Plate and Shell elements

V. Transient Heat transfer and Fluid flow analysis
VI. Dynamic analysis of structures including vibrations
   a) Newmark method for analysis of second order systems
   b) Modal superposition method

Course assessment
Examinations: There will be in-class examinations worth 60% of the final grade.
Graded Homework: Homework will be posted online.
Final Project: The final project will represent 3-4 weeks of effort. These can involve implementation of software or application of commercial software for some detailed analysis or design.
Grading: Examinations: 60%, Hwk & Mini-projects: 20%, Final Project: 20%.

Academic Honesty:
All students admitted to the University of Florida have signed a statement of academic honesty committing them to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action.
This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.

Other course information
Reference books:

Attendance: is very important since some of the material covered in class is not in the textbooks. If you have to miss a class, make sure you watch the lecture online.
Make-up Policy: Late assignments will receive 75% credit if submitted by the next lecture and will not be graded thereafter. Make up exams will be given only for students with medical reasons for missing the exam. Documentation in the form of a doctor’s note must be provided for make-up exams and homework.