

ASEN 5007 Introduction to Finite Element Methods

Course Syllabus - Fall 2011

I. FEM Discretization and the Direct Stiffness Method (9 lectures).

Basic concepts of structural modeling

Review of the stiffness method of structural analysis.

Modeling stiffness, loads and displacement boundary conditions.

Advanced modeling: general constraints, substructuring.

II. Formulation of Finite Elements (9 lectures).

Mathematical interpretation of finite elements, variational formulation.

Development of continuum elements, shape functions, consistent loads.

Isoparametric elements for plane stress.

Numerical integration

Convergence requirements.

III. Computer Implementation of the Finite Element Method (8 lectures).

Pre processing: model definition.

Element level calculations.

Equation assembly.

Equation solver.

Post processing: strain and stress recovery.

Textbook: No required books. Instructor supplies Lecture Notes on web site:
<http://caswww.colorado.edu/courses.d/IFEM.d/Home.html>

Software: Mathematica 4.0 or higher version (present version is 7.0).

You can get *Mathematica* it **free** from ITS as a one-year non-transferable license; check
<http://www.colorado.edu/ITS/tpsiteLic>. See also Chapter 4 of Notes.

If you prefer to have a permanent copy that you can use after leaving CU, purchase **Mathematica for Students** at the CU Bookstore for your home computer or laptop. You will need to show your Buff One card at the register to prove student status. Can be also directly ordered on the web from Wolfram Research Inc (WRI); you will need to supply proof of enrollment. *Mathematica* will begin to be used in assignments by early September.