ME622: Finite Element Methods in Mechanical Engineering

Wednesday, 6-9pm, MEC224

(Last updated on January 17, 2017)

Instructor

Prof. Shawn Chester, MEC305, shawn.a.chester@njit.edu

Office Hours

Wednesday before class, MEC305, and you can always send an email to make an appointment, or try dropping in

Prerequisites

CS 101, Math 222, and Mech 237.

Text

Fish and Belytschko. A First Course in Finite Elements. John Wiley & Sons lnc., 2007.

Grading

Exam 1: 40%, Exam 2: 40%, Project: 15%, Particiaption: 5%.

Policy

The NJIT honor code will be upheld and any violations will be brought to the attention of the dean of students. Also, failure to show for an exam results in a grade of zero, unless the dean of students contacts me otherwise. *Mobile phones and similar electronic devices are expected to remain silent and not in use — the sight of a mobile phone during an exam results in a grade of F for the class.* Only non-programmable calculators are allowed during exams.

Expectation

Students are expected to gain a basic working knowledge of the FEM. This includes the ability to develop a weak form, select element types and interpolation functions, assemble global matrices, and obtain solutions, for 1D and 2D problems. Attention is focused on the mechanical engineering topics of heat transfer and linear elasticity. **This is not a class on how to use commercial finite element software, it is a class on the theory behind the method, accordingly <u>commercial software is not used.</u>**

Communication

This course will make use of Moodle for dissemination of various materials. Also, you will be regularly contacted via email at your NJIT email address.

Required Background

The finite element method is a particularly robust numerical method for many partial differential equations often encountered in engineering applications. The theory behind the finite element method makes heavy use of ideas and techniques from linear algebra, in particular matrix and vector calculus and algebra. Also, since the finite element method is used for the solutions of partial differential equations, a working knowledge of differential equations is essential.

Problem Sets

Homework is regularly assigned. Assignments will be regularly collected, but only graded if you are on the borderline between grades. The solutions will be posted online and no late assignments will be collected after the solutions are posted.

Project

An *individual* programming project focusing on a simple finite element implementation extending the material covered in class. A small written report and corresponding code are required. A starter Matlab code will be provided as a base to build upon. Please reference the associated project specific requirements for details.