Finite Element Analysis
(ME 707)
Fall 2011

Tue, Thu 10:00-12:00PM
SOC B63

Course Description

The objective of this course is to teach the theoretical foundations and appropriate use of finite element methods. Through this class, students are expected to understand fundamentals of finite element analysis of solids and structures. Finite element analysis of heat transfer and fluids will also be introduced.

Instructor

Dr. Katherine Yanhang Zhang
Office: ENG 219
Telephone: (617) 358-4406
E-mail: yanhang@bu.edu

Office Hours

Tue: 12:00PM-2:00PM. In addition to the regularly scheduled hours, the instructor is also available by appointment.

Textbook

A first course in finite element method (5th Edition), by Daryl L. Logan, 2012. ISBN 978-0-495-66825-1

References

Finite element procedures. K.J. Bathe. Prentice Hall, 1996.
Concepts and applications of finite element analysis. R.D. Cook, D.S. Malkus, M.E. Plesha, and R.J. Witt, John Wiley & Sons, Inc, 4th edition, 2002

Grading

Your grade in this course will be assessed by homework, project, and exams.

Homework + Lab	30%
Exam 1	30%
Exam 2	40%
Total:	100%

Exam Days (Tentative)

Exam 1: Oct. 25 (Tu)
Exam 2: Dec. 13 (Tu)

Attendance

You are required to attend the class and are responsible for all materials and announcements in the class. Make-up class is only available in very special circumstances, such as illness.

Homework

Homework will be assigned weekly and will be due in one week. Some homework problems will require the use of finite element software. Discussions on the homework are encouraged. However, copying other people's homework will result in no credit.

Lab*

Tutorials will be assigned weekly during the first half of the semester. The purpose of the tutorials is to help you learn finite element software – ANSYS. Associated with each tutorial, you will also be asked to solve one homework problem using ANSYS and compare the results. For those of you who know other finite element software such as ABAQUS, NASTRAN, etc., you may finish the problem with the software that you are familiar with.

Course Content

1. Introduction to finite element method. (0.5 week)
2. Formulation of the finite element method for linear static analysis of solids and structures (6 weeks)
    a. Stiffness method and potential energy approach.
    b. Truss, beam, and plate elements.
    c. Isoparametric elements
3. Formulation of the finite element method for nonlinear static analysis (3.5 weeks)
    a. Geometric nonlinearities
    b. Material nonlinearities
4. Formulation of the finite element method for fluid flows and heat transfer (2 weeks)
5. Introduction to Fluid-structure Interaction and Meshless Method (if time permitted)
6. Exams (1 week)

*More details about the subject will be forthcoming.