به نام خداوند جان و خرد

K. N. Toosi Univ. of Technology,
Faculty of Mechanical Engineering,

دانشگاه صنعتی خواجه نصیرالدین طوسی
دانشکده مهندسی مکانیک

Semester: 1393-2

Course:

Introduction to the Finite Element Method

Instructor: Dr. M. Asgari (Email: asgari@kntu.ac.ir)
Time: Monday and Wednesday, 15:30-16:45.
Office hours: Wednesdays, 9:00- 12:00
T.A hours: Mondays, 12:30-14:00
Web site: http://wp.kntu.ac.ir/asgari/courses.html

Syllabus (Main Topics):

- Introduction and Basic concepts of Finite Element Method

- Direct Approach for Discrete Systems
  - Derivation of the Stiffness Matrix for Spring Elements
  - Derivation and Assembling of the Stiffness Matrix for Bar Element
  - 2-D and 3-D Truss systems

- Introduction to MATLAB for FEM Programming

Mini Project_1: Computer Code for Truss Analysis

- Strong and Weak Forms for Field Problems

- Approximation of Trial Solutions and Weight Functions

- Finite Element Formulation of Field Problems

Mini Project_2: Computer Code for 2D Solid Problem

- FEM for Solid Mechanics
  - Beam Elements and Frame Structures
  - 2-D Problems (Plane Stress and Plane Strain Stiffness Equations)
  - Solid Elements for 3-D Problems
  - Axisymmetric Elements

- Introduction to Commercial FEA Software Packages

- FEM for Heat Transfer

- *FEM for Fluid Flow*

- *FEM for Transient and Dynamic Analyses*

Reference Texts:

- Daryl L. Logan A First Course in the Finite Element Method 2007.

- *Class Notes and Lectures.*

Additional References:

- Jacob Fish, Ted Belytschko, A First Course in Finite Elements, Wiley 2007.
- Singiresu S. Rao, The Finite Element Method in Engineering, Fourth Edition 2004.
- J.N. Reddy, An Introduction to the Finite Element Method, McGraw-Hill Education 2005.
- Cook, Malkus, Plesha, Witt, Concepts & Applications of Finite Element Analysis J. Wiley 2002.
- Frank L. Stasa, Applied Finite Element Analysis for Engineers, Oxford University Press 1995.
- O. C. Zienkiewicz and R. L. Taylor, The Finite Element Method, McGraw Hill, 2004.

Grading Policy:

Regular Homework	10%
Mini Projects 1 & 2: ***Programing*** for simple problems	15%
Final Projects: FE modeling and analysis of an engineering problem using ***ANSYS***	15%
Midterm Exam:	30%
Final Exam:	30%
Seminars:	+5%

* A high quality project may have up to 10% extra grade.
* A minimum grade of **7** *from exams* is mandatory for passing the course.
* If the *Project* is not submitted, course grade will directly be F.
* *Late* homework or late project will not be graded.

Ethics:

- All work prepared and submitted in this course in the form of projects and problem solutions are *expected to be original* and produced by the submitting student.
- Any portion that may have been borrowed from a previous work must be clearly identified and *referenced*. The origin of each figure, photograph, table as well as text used from other sources must be clearly identified.
- Cheating or *copying* on homeworks or project, are grounds for *failing* the course.

"You cannot teach a man anything, you can only help him find it within himself."

Galileo Galilei