Finite Element Analysis
Course: ENGR 01 410 - 2 (510 - 1), Spring 2015
MW 2:00pm to 3:15pm Classroom James Hall 3-112

Instructor: Dr. Tirupathi R. Chandrupatla, P.E.
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Course Content. Fundamental concepts for the development of finite element analysis are introduced. The element stiffness matrices are developed using shape functions defined on the elements. Aspects of global stiffness formation, consideration of boundary conditions, and nodal load calculations are presented. Mesh division and problem modeling considerations are discussed in detail. Topics of scalar field problems and natural frequency analysis are covered. Computer applications are included.

Homework assigned is due at the beginning of the class on the day announced by the instructor. Any reading assignments are to be completed by the next class meeting. Homework must be carried out on engineering paper and neatly stapled. Each student must prepare a portfolio file for the course. The course will also include other *assignments*, and a *project* that involves computer usage.

Exams: There will be two tests. The project presentations will take place during the final examination period.

Grading Policy:

Home Work and Projects	20
Test 1	30
Test 2	30
Final Project – Report & Presentation	20
Total	100

* Final Projects will be of different levels for undergraduate and graduate students. Regular attendance is required.

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Text: T.R.CHANDRUPATLA and BELEGUNDU, A.D., *Introduction to Finite Elements in Engineering*, FOURTH EDITION, Prentice Hall, Upper Saddle River, New Jersey, 2012.

Week	**Topics**	**Chapters**
1 Jan 21	Fundamental concepts Matrix Algebra (Brief review/ Reading assignment)	Ch. 1 Ch. 2
2 Jan 26, 28	Fundamental Concepts One Dimensional Problems	Ch. 2 Ch. 3
3 Feb 2, 4	One Dimensional Problems	Ch. 3
4 Feb 9, 11	Trusses	Ch. 4
5 Feb 16, 18	Beams and Frames	Ch. 5
6 Feb 23, 25	2-D Stress Analysis – Constant Strain Triangle	Ch. 6
7 Mar 2, 4	Review **TEST 1**	
8 Mar 9, 11	Axisymmetric Stress Analysis; Term projects	Ch. 7
9 Mar 16-20	**SPRING BREAK**	
10 Mar 23, 25	2-D Isoparametric Elements Numerical Integration, Mesh Generation	Ch. 8 Ch. 12
11 Mar 30, Apr 1	3-D Stress Analysis	Ch. 9
12 Apr 6, 8	3-D Stress Analysis Field Problems – Heat Transfer, Fluid Flow, …	Ch. 9 Ch. 10
13 Apr 13,15	Field Problems – Heat Transfer, Fluid Flow, …	Ch. 10
14 Apr 20, 22	Dynamic Analysis	Ch. 11
15 Apr 27, 29	Review **TEST 2**	
16 May 6 - 12	Final Project Presentations	