Finite Element Method and Applications 20-149

1. COURSE TITLE

Finite Element Method and Applications 20-149 (1st Semester 1386-87)

2. INSTRUCTOR

- Lecturer: M. Ghaemian Room 417 Ext. 4240

3. COURSE OUTLINE

Chapter One: Foundation of Solid Mechanics and Variational Methods
Chapter Two: The Theory of the Finite Element Method, Introduction and some Basic Concepts
Chapter Three: Finite Element Analysis of Plane Elasticity
Chapter Four: Finite Element Analysis of Steady-State Field Problems
Chapter Five: Finite Element Method for Bending Problem
Extra … 2**D creeping flow, General procedures for solving nonlinear discrete equations**

Applications

Linear elasticity(Plane stress, plane strain, axisymmetric), beam bending, plate bending, shell, transient problem(time dependet), Field problems e.g. fluid flow, heat flow, Numerical analogous for problems with material and geometric (large deflection) nonlinearity

4. CLASS-HOURS

Three (3) hours of lectures per week (Sundays and Tuesdays 13:30 – 15:00)
One (1) hour of tutorial per week

5. OBJECTIVE AND SCOPE

The main objective of the course is to familiarize the students with the basic concepts in finite element method.

6. TEXT

The material, related to the course follows the treatment presented in the course note. The following textbooks are references for different parts of the note:

Introduction to the finite element method By: Desai and Abel
Introductionb to approximate solution techniques, numerical modeling and finite element method By: V.N. Kliakin
Numerical Methods in Finite element analysis By: Bathe and Wilson
The finite element method, By: Zienkiewicz
Finite element modelling of stress analysis By: Cook
Energy methods in applied mechanics, By: Langhaar
Finite elements of nonlinear continua, By: Oden

7. EVALUATION

The course is consisted of **6 set of assignments**, **one term project and 4 end-of-chapter examinations**.

The evaluation scheme is as follows:	points
Five (5) set of assignments	20
One term project	30
End-of-chapter exams	20
Final Examination	30
Total	**100**

Assignments have equal weights and each is marked out of (100). The end-of-chapter examinations also have the equal weights and will be held in the class times based on the schedule given below.

For the term project, A basic finite element program (FEB.FOR) will be provided. The program FEB.FOR

is for linear static analysis of 2-D plane stress structure. It uses 4-node isoparametric element which is suitable for 2-D analysis of concrete gravity dams.
You are asked to introduce 8-node isoparametric element (will be developed in the class) into the FEB.FOR.

8. COURSE SCHEDULE

Month/day	Chapters	Assignments
7/1	Chapter 1	-Assignment 1 -Term Project Introduction
7/3		
7/8		
7/10		
7/15		
7/17	End-of-chapter Exam 1	
7/22	Chapter 2	-Assignment 2 -Assembling of Total Stiff ness Matrix -Skyline Method -FEB.FOR
7/24		
7/29		
8/1		
8/6		
8/8		
8/13	End-of-chapter exam 2	
8/20	Chapter 3	-Assignment 3 -Assignment 4 -FEB.FOR
8/22		
8/27		
8/29		
9/4		
9/6		
9/11		
9/13	End-of-chapter exam 3	
9/18	Chapter 4	-Assignment 5 -FEB.FOR
9/20		
9/25	End-of-chapter exam 4	
9/27	Chapter 5	-Assignment 6 -FEB.FOR
9/2		
10/4		