

# Finite Element Method and Applications 20-149

## 1. COURSE TITLE

Finite Element Method and Applications 20-149 (1<sup>st</sup> Semester 1388-89)

## 2. INSTRUCTOR

- Lecturer: M. Ghaemian Room 421 Ext. 4242

## 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 ... **2D 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 dependent), 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:

**Finite Element Analysis By: P. Seshu**

**Introduction to the finite element method by: Desai and Abel**

**Introduction to approximate solution techniques, numerical modeling and finite element method By: V.N. Kliakin**

**Finite element Procedures by: Bathe**

**The finite element method, Fifth Edition, By: Zienkiewicz and Taylor**

**The Finite element Method By: Hughes**

**Energy methods in applied mechanics, By: Langhaar**

## 7. EVALUATION

The course is consisted of **6 set of assignments, and one mid term** examination which would be held during the term and a **final** examination.

The evaluation scheme is as follows:	points
Five (5) set of assignments	20
Mid term Examination	30
Final Examination	50
<b>Total</b>	<b>100</b>

Assignments have equal weights and each is marked out of (100). The mid term examination will be held on Sunday of Aban 24<sup>th</sup> and consist of chapters 1, and 2. The final examination consists of all chapters

covered in the class. Students need to pass the final exam in order to pass the course.

**8. COURSE SCHEDULE**

Month/day	Chapters	Assignments
7/5	Chapter 1	-Assignment 1 -Variational Principles
7/7		
7/12		
7/14		
7/19		
7/21		
7/26	Chapter Review	
7/28	Chapter 2	-Assignment 2 -Assembling of Total Stiffness Matrix -Skyline Method
8/3		
8/5		
8/10		
8/12		
8/17		
8/19		
8/24	Mid term examination	
8/26	Chapter 3	-Assignment 3 -Assignment 4
9/1		
9/3		
9/8		
9/10		
9/17		
9/22	Chapter 4	-Assignment 5
9/24		
9/29	Chapter 5	-Assignment 6
10/1		
10/8		
10/13		