Course name; Finite element 1
Instructor; Professor M. Shishesaz, mshishehsaz@scu.ac.ir
Shahid Chamran University of Ahvaz
Graduate school, Mechanical Eng. Dept.
Course policy; Homework; 15%, Projects 35%, Final exam 50%

Main textbooks:

- Logan, D. L. A first course in the finite element method, sixth edition, 2018, Cengage Learning.
- J. N. Reddy Introduction to the Finite Element Method, Second Edition, McGraw-Hill, Inc.

Additional textbooks;

- Barbero, Ever J. Finite element analysis of composite materials using Abaqus, 2013 by Taylor & Francis Group, LLC.
- Barbero, Ever J. Finite element analysis of composite materials using ANSYS, 2014 by Taylor & Francis Group, LLC.

Main goals;

This course is designed to cover the following subjects;

- Basic idea behind finite element method
- Description and application of direct stiffness method
- Description and application of energy method
- Finite element solution of trusses
- Finite element solution of sturm-liouville equation
- Finite element solution of beams
- Finite element solution of frames
- Application of the following weighted residual methods
- point collocation method
- subdomain collocation method
- Method of least squares
- Galerkin's method
- Introduction to constant strain triangular element (CST element)
- Introduction to plate element

Course outline;

- Introduction to the use of finite element (first week).
- Introduction to the use of commercial finite element software programs (second week).
- Application of direct stiffness method to the solution of structural problems (third week).
- Solution of trusses using finite element method (fourth week).
- Introduction to the use of energy method or solving structural problems.
- Introduction to calculus of variations and functional (fifth week).
- Application of calculus of variations and energy method to the finite element solution of sturm-liouville equation (sixth week).
- Introducing a few examples with their solutions (seventh week).
- Application of direct stiffness method to the solution of beams with concentrated and distributed loads (eighth week).
- Finite element solution of frames using direct stiffness method (ninth week).
- Application or weighted residual methods to the solution of structural problems as (tenth and eleventh week);
  - ❖ Point collocation method
  - ❖ Subdomain collocation method
  - ❖ Method of least squares
  - ❖ Galerkin's method
- Introduction to the f two dimensional problems (twelfth week).
- Introduction to the constant stain triangular element (CST) and its application to the solution of plated structure under in-plane loading (twelfth and thirteenth week).
- Finite element solution of plate under transverse load (fourteenth and fifteenth week).
- Introduction to isoparametric elements (sixteenth week).

End of the term