



School of Nano Science

Crash Course

Fundamentals of Mechanics of Materials

Speaker:

Dr. Abbas Montazeri Hedesh

Materials Science and Engineering, K. N. Toosi University of Technology

Course description:

Mechanics of materials (MOM), also called strength of materials, is a topic which deals with the behavior of solid objects subjected to stresses and strains. The study of strength of materials often refers to various methods of calculating the **stresses** and **strains** in structural members, such as beams, columns, and shafts. The methods employed to predict the response of a structure under loading and its susceptibility to various **failure modes** taking into account the properties of the materials such as their yield strength, ultimate strength, Young's modulus, and Poisson's ratio. This course is an introduction to MOM as applied to **elasticity problems** in solid and structural mechanics. The intent of this course is to provide a background in the mechanics of solids for **researchers of different fields** without confusing them with too much detail on why materials behave as they do. The course begins with introducing the concept of stress and strain and their different types that followed by the analysis of the stresses and corresponding deformations in various structural members, considering **axial** loading, **torsion**, and pure **bending**. Accordingly, the concept of stress transformation and Mohr's cycle is presented to determine the principal stresses, principal planes, and maximum shearing stress at a given point. Then, the concept of strain energy density is introduced and its important role in determining the deformations of the structures is thoroughly discussed. The course will then be finished with introducing the theories of elastic failure of the conventional materials.

The aims of this course are:

- To provide an understanding of fundamental knowledge about mechanics of materials and elasticity theory
- To develop tools to analyze structures subjected to various types of loading conditions

Session 1	Date : 2 Nov. 2016	Time: 12-13:30
Session 2	Date : 9 Nov. 2016	Time: 16-17:30
Session 3	Date: 16 Nov. 2016	Time: 16-17:30