

# ES220 Mechanics of Materials

## Course Objectives

Contents	Objectives
Tension, Compression and Shear	Students will be able to understand basic concepts of stress, strain and their relations based on linear elasticity. Material behaviors due to different types of loading will be discussed.
Axially loaded Members	Students will be able to understand and know how to calculate stresses and deformation of a bar due to an axial loading under uniform and non-uniform conditions.
Torsion	Students will be able to understand and know how to calculate stresses and deformation of a torsional bar. Thin-walled theory for non-circular cross-section will be discussed and applied..
Shear Forces and Bending Moments	Students will understand how to develop shear-moment diagrams of a beam and find the maximum moment/shear and their locations.
Stress in Beams	Students will understand how to calculate normal and shear stresses on any cross-section of a beam. Different cross-sections (including I-beam) will be discussed and applied.
Analysis of Stress and Strain	Students will be able to understand how to use Mohr's circle to calculate principal stresses and angles in plane stress cases.
Applications of Plane Stress	Students will be able to apply all knowledge learned in the course to calculate stresses on a structure under combined loadings. Design of pressure vessels and beams will be discussed.
Deflections of Beams	Students will be able to calculate deflections of a beam under combined loads by using methods of moment-area and superpositions.
Columns	Students will be able to understand stability and buckling phenomena for a slender member under an axial compressive force.