COE 3001 Mechanics of Deformable Bodies (3-0-3)

Catalog Description
Stress and Strain and their transformation, axial deformation, torsion, shear and bending moment diagrams, stresses in beams, beam deflection, combined stresses and column buckling
Pre-requisite: COE 2001

Educational Objectives
This course is intended to introduce concepts of mechanics of materials, with emphasis on problem identification, formulation and solution. Students will apply skills learned in statics and mathematics to solve mechanics of solids problems. Students will demonstrate an ability to set up and solve mechanics of materials problems such as beam bending and stress transformation.

Introduction/Problem Solving Procedure **1 hr**

Stress and Strain **4 hrs**
Definition of stress and strain
Stress-strain diagrams
Elasticity, plasticity and Hooke's Law

Axial Deformation **5 hrs**
Deformation of axially loaded members
Statically indeterminate structures
Thermal deformation

Torsion **4 hrs**
Torsion of circular bars
Torsion testing
Power transmission in circular shafts

Stress and Strain Transformation at a Point **6 hrs**
Principal stresses
Maximum shear stress
Mohr's circle
Membrane stresses, pressure vessels and pipes
Principal strains, maximum shear strain

Shear Force and Bending Moment Diagrams **3 hrs**

Stresses in Beams **7 hrs**
Normal stress in beams
Properties of sections
Shear stress in beams
Built-up beams

Unsymmetric bending
Principal stresses in beams

Combined Stresses **2 hrs**
Beams under bending and axial loading

Beam Deflection **7 hrs**
Curvature and beam deflection equation
Boundary conditions
Statically indeterminate beams
Energy methods

Column Buckling, **3hrs**
Energy and equilibrium
Buckling of columns with different boundary conditions
Eccentric loading and imperfection
Secant formula

Exams: **3 hrs**
Total: **45 hrs**