



Program and Degree: BSc in Aerospace Engineering	
Course Description	
Course Title	Design of Machine Elements
Prerequisites	Dynamics, Strength of Materials
The course aims	
Contents	<p>1) Introduction to Mechanical Design: Course Overview; Design Process and Problem Analysis; Materials Selection; Units and Standards.</p> <p>2) Load and Stress Analysis : Stress, Strain; Material Strength, ductile and brittle Materials; The Factor of Safety; Shear Force and Bending Moments, Torsion, Stress Concentration, Stresses in Pressurized Cylinders, Stresses in Rotating Rings, Combined Stresses and Mohr's Circle.</p> <p>3) Static Failure Theories: Static Strength; Stress Concentration; Failure Theories for Ductile and Brittle Materials, Introduction to Fracture Mechanics.</p> <p>4) Fatigue Failure: Introduction to Fatigue, Cyclic Stress; Fatigue Regimes; Fatigue Strength and Endurance Limits, The S-N Curve; Fatigue-Life Methods, Endurance Limit Modifying Factors, Fluctuating Stresses, Fatigue Failure Concepts, Torsional Fatigue Strength, Miner's Rule.</p> <p>5) Shafts and power transmission: Shaft Materials and Layout, Shaft design for Static Stress, Fatigue Failure Analysis.</p> <p>6) Screws, Fasteners and the Design of Nonpermanent Joints: Thread Standards and Definitions, The Mechanics of Power Screws, Threaded Fasteners, Joints—Fastener and members Stiffness, Bolt Strength, Tension Joints, Statically Loaded Tension Joint with Preload, Fatigue Loading of Tension Joints, Bolted and Riveted Joints Loaded in Shear.</p> <p>7) Welding- Permanent Joints: Welding Symbols, Butt and Fillet Welds, Stresses in Welded Joints, Static Loading, Fatigue Loading.</p>
Duration	1 Semester (16 weeks)
Course Hours	3 hours/week
Course Type	Required