

MECH 632. ADVANCED MECHANICS OF MATERIALS.

Credits: 4

Offered by: Mechanical Engineering (Graduate Studies)

Terms offered: Fall 2025

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Description

Review of stress, strain, equilibrium and boundary conditions. Constitutive equations for linear and non-linear elasticity; viscoelasticity; rubber elasticity. Implementation of nonlinear constitutive relations for mechanical engineering applications. Material selection charts and overview of the major classes of materials (metals, polymers, ceramics, cellular materials, composites and biomaterials). Microscale mechanisms and their relation to macroscopic performance. Plasticity in metals: deformation maps, micromechanics, failure criteria, post-yield flow, creep and temperature effects. Structure and properties of polymers, models for plasticity and crazing. Fracture and fatigue, Weibull statistics for ceramics and glasses. Selected advanced topics and discussion of modern materials.

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