UMT205 Jan 3:0

Mechanical Behavior of Materials

Instructor

S. Karthikeyan
Email: karthik@iisc.ac.in

Teaching Assistant

Email:

Department: UG Materials program

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

The course is intended to provide an introduction to mechanical behavior of metals, ceramics, polymers and glasses. The emphasis is on students understanding how different classes of materials have different properties, and how this influences their selection for specific structural applications.

Prerequisites

none

Syllabus

Structures, vector mechanics (statics) and types of loads; Introductory concepts in stress and strain and their transformation; Linear elasticity in single and poly-crystals and in amorphous solids; Stresses in constrained systems â€“ thermal and misfit stresses; Viscoelasticity and hyperelasticity in polymers; Stress concentration; Fracture mechanics and toughening mechanisms; Introduction to plastic deformation; Uniaxial stress-strain curve and flow instabilities; Effect of strain, strain-rate and temperature of flow stress; Continuum-based yield criteria; Plastic deformation mechanisms â€“ slip, twinning and diffusion; Introduction to dislocation theory â€“ slip systems, critical resolved shear stress, strengthening mechanisms. Creep and fatigue.

Course outcomes

An understanding of loads and stresses experienced by structures, how they fail, and how to select materials based on their behavior for different structural applications.

Grading policy

50% from two midterms, 15% from term paper, 35% from final exam

Assignments

Four assignments (not graded)

Resources