

ME607 Materials Science For Failure Analysis

Credit: 3-0-0-3

Approval: Approved in 2nd Senate

Prerequisite:

Students intended for: MS/PhD

Elective or Core: Elective

Semester: Odd/Even:

Course content:

1. Introduction remarks on Materials Science in the context of Engg.:
2. Structure of perfect and imperfect solids; Elastic deformation and stress distribution, stress-strain relations under uniaxial loading.
3. Introduction, theoretical strength of crystals and the motion of dislocation, energy of a dislocation and stable Burgers vectors.
4. Slip planes and slip systems, relation between dislocation movement and plastic flow, dislocation generation, other modes of Deformation in crystalline solids.
5. Some strengthening mechanisms.
6. The phenomenon of yield point and strain hardening. Theories of yielding and strain hardening.
7. Recovery, mechanisms of deformation at elevated temperatures, creep.
8. Mechanism of fracture. Ductile - Brittle transition, fracture Design criteria for materials, environmental effects.
9. Mechanical behavior of engineering materials under fatigue.
10. Selection of materials and Processes, case studies.

Text & Reference Books:

George E. Dieter, Mechanical Metallurgy, McGraw Hill Book Company.

R. W. K. Honeycombe, Plastic Deformation of Metals, EWP

William D. Callister Jr., Materials Science and Engineering, Willey India (P) Ltd.

Knott, Fundamentals of Fracture Mechanics.

A. H. Cottrell, Mechanical Properties of Matter, Willey

K. J. Brown, Introduction to Mechanical Behaviour of Materials, Willey.