



**MECHANICAL
ENGINEERING**

Electron Diffraction and Imaging

Type of Course	: New
Course Snapshot	: Elective / UG ,PG
Pre-requisites	: Basic optics and physics
Course Duration	: 30 hours/ 12 weeks

COURSE OUTLINE:

In all the lens systems that we use to magnify image, the light fall on a crystal structure and the gets scattered. When all the scattered rays join together it forms image. The scattering of image and diffraction depends on the nature of the object on which the rays falls. This course gives us an idea on the crystal structure, lens and lens defects etc. During the course you shall get familiarized to different techniques used in microscopes, how to interpret the results to obtain best information about the sample.

INSTRUCTOR:

Prof. Sundararaman M
Department of Metallurgical and Materials engineering
IIT Madras



ABOUT INSTRUCTOR:

Prof. Sundararaman is presently visiting professor in Department of Metallurgical and Materials engineering, IIT Madras, Research interests: Phase transformation, Structure property correlation, materials characterization, electron microscopy.

COURSE PLAN:

Crystal structure, Symmetry, Reciprocal space Different type of projections (polar and stereographic) Electron Microscope (Properties of waves, Wave nature of electron, de Broglie equation, electron optics, lens and lens defects, Components-source to detector) Fundamentals of diffraction, Computation of intensity of diffraction patterns, different types of diffraction (Selected area, Kikuchi,

Convergent Beam and nano-diffraction) Contrast theory (Kinematical and dynamical theory), Imaging of different types of defects (zero, one, two and three dimensional defects) Phase contrast microscopy, Basic of Electron crystallography (combining diffraction and High resolution transmission electron microscopy) Brief Introduction to recent techniques in electron microscopy (Holography, Scanning TEM, Z- contrast microscopy, Orientation Microscopy, etc)