

JCL 208 (Aug) (3-0-0)**Characterization of Materials*****Instructor: Bivas Saha***

Spectroscopic Characterization: Basics of light-matter interaction, Dielectric function, Drude theory, Interband and Intraband transitions, Joint densities of states, Absorption of light in solids, Frequency dependence of optical properties, Impurities and Excitons, Luminescence and Photoconductivity, Optical study of lattice vibration, Thermal emission, Emitters and Absorbers.

Electron Spectroscopy: Photoemission and photo-absorption spectroscopy, angle resolved photoelectron spectroscopy, Electron diffraction and electron energy loss spectroscopy, Auger Electron Spectroscopy.

Structural Characterization: X-ray diffraction - symmetric vs. asymmetric scan in thin films, Reciprocal space map (RSM), X-ray reflectivity (XRR). Inelastic X-ray and Neutron scattering. Basics of materials characterization with atom-probe techniques.

Electronic Properties and Device Characterization: Basic measurement techniques on electrical, optical and thermal properties in materials. Hall measurement, Seebeck and thermal transport measurements.

LEDs and Lasers, Photodetectors and Solar Cells.

Reference Books:

1. Solid State Physics, Part II, Optical Properties of Solids. M. S. Dresselhaus.
2. Physics of Semiconductor Devices, S. M. Sze and K. K. Ng.