Practical Transmission Electron Microscopy Lab

MATSCEN 6741

Credit Hours:
2.00 - 2.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture
Lab

Course Description:
Transmission Electron Microscopy with emphasis on practical methods.

Prerequisites and Co-requisites:
Prereq: Grad standing; or permission of instructor.

Course Goals / Objectives:
- Operation, alignment, and calibration of the TEM
- Electron Diffraction, Bright Field, Dark Field, and STEM imaging.
- X-ray analysis in the S/TEM.
- Biological sample imaging and preparatory imaging for cryo-TEM
Course Topics:
- Basic Operation I--SEM vs. TEM, identification of column parts, gun operation, saturation, gun tilt/trans, condenser aperture, condenser stig
- Basic Operation II--Eucentric height, rotation center, objective aperture, focus (grain, fresnel fringes), Objective stig. FEG vs. Thermionic
- Imaging--Taking photos, exposure, film exchange, loading & developing
- Diffraction--basic powder diffraction, reciprocal space
- Objective aperture--function of Objective aperture, BF/DF, CTF, defocus
- STEM--microprobe/nanoprobe, HAADF
- Kikuchi Lines/Orientation; Negative staining
- EDX; Screening of Negatively Stained Sample
- EELS; Tissue Sample Preparation I
- HRTEM/HRSTEM; Tissue Sample Preparation II
- Image Analysis--MIPAR, ImageJ/FIJI, Photoshop
- Tomography; Preparation of Cryo-EM Samples
- Titan condenser system; Screening of Cryo-EM Samples (Lecture only)

Designation:
Elective