

Oral Qualifying Exam - Electron Microscopy

NON-EXHAUSTIVE TOPICAL AREAS

- Construction of the electron microscope (Electron sources, lenses, apertures, stages, detectors, aberration correctors, image filters)
- Scattering Processes (Elastic and inelastic processes)
- Diffraction (reciprocal space, diffracted beams, diffraction patterns, Kikuchi lines and Maps, CBED)
- Imaging (wave optics, kinematical theory of image formation, dynamical theory of image formation, Two-beam bright and dark field images, weak-beam dark field images, Phase contrast imaging)
- Spectroscopy (X-ray microanalysis, Electron energy loss spectroscopy)

LEVEL (BASED ON UIUC COURSES)

MSE 481 and 598 EM

TEXTBOOKS

- D. B. Williams and C. B. Carter "Transmission electron microscopy", Plenum
- P.B. Hirsch, A. Howie, R.B. Nicholson, D. W. Pashley and M. J. Whelan "Electron Microscopy of Thin Crystals" Krieger.
- J. W. Edington "Practical Electron Microscopy in Materials Science" Van Nostrand, New York.
- L. Reimer Transmission Electron Microscopy. Springer-Verlag.
- B. Fultz and J.M. Howe, Transmission Electron Microscopy and Diffractometry of Materials, Springer