MSE 323: Materials Characterization Laboratory

Course description: Laboratory exercises on materials characterization: X-ray, TEM, SEM.

Number of credits: 2 (1-3). This course is required.

Course Coordinator: David Field and Collin Merriman

Prerequisites by course: MSE 321 or c//

Prerequisites by topic: Atomic structure, bonding, introduction to crystal structures, optics, interference, diffraction.

Postrequisites: MSE 425: Senior Thesis I  
MSE 426: Senior Thesis II

Textbooks/other required materials: None

Course objectives:
1. To provide hands-on experience with SEM
2. To provide experience on examining the fracture surfaces of materials and identifying the fracture mechanism
3. To enable students to use EDS to determine chemical composition
4. To provide experience in using EBSD in the SEM
5. To provide hands-on experience with TEM
6. To allow students to obtain, record, and index diffraction patterns from a variety of materials
7. To allow students to obtain bright field and dark field images


Expected learning outcomes:
1. To be able to operate a SEM in SEI mode and obtain images of fracture surfaces
2. To use these images to identify fracture mechanisms
3. To be able to use EDS for chemical identification and to use this information to identify the materials used in semiconductor device fabrication
4. To be able to obtain, record, and correctly index electron diffraction patterns
5. To be able to obtain a range of images and correctly interpret them

Class schedule: None

Laboratory schedule: One 3-hour laboratory session per week, for one semester.

Contribution to meeting the professional component: Engineering Topics
**Relationship of course to student outcomes:**
3 strongly supported; 2 supported; 1 minimally supported

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*Prepared by:* Andrea Butcherite and Dr. David Field  
*Date:* May 30, 2018