

Electron Microscopy—BSC 864/L
Syllabus—Fall 2007

Optional Reference: Electron Microscopy 2nd ed. by J.J. Bozzola and L.D. Russell; ISBN 0-7637-0192-0

This practical course is designed to introduce you to the transmission electron microscope (TEM), associated equipment (i.e., ultramicrotome, knife maker), and developing and printing black and white film. Lecture and laboratory will be indistinguishably interwoven, and the same grade will be given for both components of the course.

Topic

Overview of TEM, ultramicrotome, knife maker
Visible light, electrons, and lenses
TEM basics (turn on/off, specimen exchange, brightness, focus, photography)
Illumination system
Exer. 1. Focusing on a carbon black test specimen¹
Imaging system
Exer. 2. Grids and grid coating
Vacuum system
Exer. 3. Negative staining (bacterial flagella)⁴
Photography/darkroom (print photos from exer. 1 & 3); Examination (35 points)
Alignment of illumination system
Alignment of imaging system
Exer. 4. Correcting objective lens astigmatism²
Practical examination (align TEM; 18 points)
Resolution and calibration
Exer. 5. Resolution & calibration³
Ultramicrotome
Exer. 6. Glass knife making; semithin sections⁴
Exer. 7. Ultrathin sections; heavy metal staining¹
Complete prints in the darkroom
Final examination (25 points)

¹negative and print required; ²negative only required; ³calculations required; ⁴microscope slide required

The grade will be based on two written examinations covering theoretical and practical material and on mastery of laboratory material. The nature of the laboratory is such that you must master each exercise before moving on to the next. Seven exercises will be assessed by a combination of photographic prints, negatives, calculations, and a microscope slide (semithin sections). A practical examination of TEM alignment is also required. Six points each will be assigned to the seven practical exercises and 18 points will be assigned to TEM alignment (total 60 points) to be averaged with the written examinations (total 60 points) to determine your final grade. Exercises not completed during the week they are assigned are graded for half credit; examinations taken and/or submitted after the due date are graded for half credit. You may retake the practical examination once to improve your score.

- A: 90% (108–120)
- B: 80% (096–107)
- C: 70% (084–095)
- D: 60% (072–083)