

## **FALL 2007 BIOLOGY 555: ELECTRON MICROSCOPY LECTURE**

**Class meets Wednesday 1:00-1:50 in LS 269**

**TEXT:** **Scanning and Transmission Electron Microscopy 1993.** Flegler et al,  
Freeman and Company Press (a copy is on Reserve at Love Library)

**OTHER:** **Blackboard (SDSU)**

**Principles and Practice of X-Ray Microanalysis CD-ROM**

Oxford Instruments 1999—

Copies in Facility may be viewed in the Facility

**EM Facility instrument tutorials**

**EM Facility website:** <http://www.sci.sdsu.edu/emfacility>

Through the use of texts, images, the world wide web, and equipment demonstrations, you will learn the theoretical basis of operation of, as well as sample preparation for, a transmission and a scanning electron microscope. With this knowledge, you should be able to design sample preparation protocols based on your knowledge of the equipment. A variety of specialized techniques, and the images obtained, will also be presented, along with a discussion of the types of research data obtained from these techniques. You will be able to identify the techniques used to create the images, and explain the use of these techniques to test scientific hypotheses.

**Grades are based on performance on exams and quizzes.**

**17% of grade is quizzes.** There will be a short answer essay quiz in each of the class sessions. Questions will be taken from the previous week's lecture or reading. Your final quiz grade will be the sum of the 10 best quiz answers. There will be no make-up quizzes. If you miss a class, you will have that many fewer quiz questions to form your composite quiz grade.

**33% midterm, 50% final.** The midterm and the final exams will consist of short answer, fill in the blank, and essay questions. Exam questions will be taken from lecture, the assigned readings, or the website. The final exam is comprehensive. Additional reference texts are available in the EM Facility, PS-1

**Students not enrolled in Biology 556 or 557 should visit the Facility to view equipment.**

### **Tentative schedule of lecture topics and readings**

-Microscopes--an overview	pp. 1-11, 93-95
Basic components and how they work and comparison of images and data obtained	
-Vacuum systems	pp. 23-42
-Lenses/ electronics	pp. 13-22
-Transmission Electron Microscopy	pp. 43-64
Image formation/Detectors	
-Scanning Electron Microscopy	pp 65-90
Image formation/Detectors	
-TEM Sample preparation	pp 100-148
shadowing/ coating/negative staining	pp 97-100, 126-136

fixation chemicals/ solutions	pp 100-108
Cryogenics	pp. 108-114
Dehydration/ solvents/Embedding	pp. 114-118

**MIDTERM EXAM (from August 29 THROUGH October 10 class)**

**October 17, 2007 in class**

**--bring essay paper or blue book--**

-TEM Sample preparation	pp 100-148
Sectioning/ Staining	pp. 118-126
Cytochemistry/Antibodies	pp 145-148
Freeze-fracture/etch	pp 136-142
-SEM sample preparation	pp 151-167
fixation solution considerations	pp 100-114, 162-167
Chemicals/Cold	
Dehydration/Critical Point Drying (CPD)	pp. 113-114, 159-167
coating	pp 152-158, 132-136
-Photography/ recording, printing images	pp. 200-219
-Electron Microscopy and X ray analysis	pp. 173-199

**INCLUSIVE FINAL EXAM (from day one through the last lecture)**

**Monday, December 10 in LS 269 from 1300-1500**

**--bring essay paper or blue book--**