

**FALL 2006 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

A copy is on reserve in the Media Center (Love Library basement)

**EM Facility instrument tutorials**

**EM Facility website:** <http://www.sci.sdsu.edu/emfacility/555class>

Through the use of texts, images, the world wide web, and equipment demonstrations, you will discover 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.

**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 day one THROUGH March 1 class)**

**October 18, 2006 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                  | pp151-167            |
| 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 11, 2006 in LS 269**

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