Transmission Electron Microscopy  
Biology Course Numbers: 5510/5511  
Spring  
Credit 4.0

This is a techniques course designed to allow the student to become proficient in using the Transmission Electron Microscope so as to aid their work in real research projects. The goal is to have all students produce publishable quality images/data on their projects. Much of the grading in the course will focus on a research quality poster made in Powerpoint and an oral presentation of the poster. Posters will be posted in the hall outside rooms C307 to C302. The student will also become proficient in producing publishable quality digital photographic plates in Photoshop and in analyzing image data by measuring in image analysis programs like Image J or NIH Image.

The course is largely a hands-on laboratory course but there will be many lectures and demonstrations in order to comprehensively cover most of TEM. As quickly as possible you will learn how to prepare specimens for TEM, section and stain specimens, and then observe them yourself in the Transmission Electron Microscope.

INSTRUCTORS: Drs. Jason Bond and Tom Fink, Office Rooms. C307-C302, Howell Science Building  
Email: bondja@ecu.edu, finkt@ecu.edu  
Office Hours: Tom Fink: 9 AM to 5 PM M-F, and at night by appointment. Room C302.

TIME AND ROOM:  
Times (to start out, later flexible) of Lecture/Laboratory:  
(1) Tuesday: 6-8:50 PM  
(2) Thursday: 6-8:50 PM

TEXTS:  

(3) The instructor will have numerous other texts and information sources available in the laboratory, on Blackboard, or online (see Microscopy SharePoint Website:  
https://collab.ecu.edu/sites/microscopy/default.aspx
Course Grade Based on the Following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Laboratory Quizzes/Tests (3-4)</td>
<td>40%</td>
</tr>
<tr>
<td>Poster</td>
<td>40%</td>
</tr>
<tr>
<td>Oral Presentation</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Tests/Quiz dates will be announced and will focus on lecture/laboratory topics especially including practical details for optimally using the TEM to produce publishable quality images/data and then in presenting that data (e.g. certain proficiency in Powerpoint and Photoshop, measuring off images, etc.).

A real research project will be selected by the student and instructor from selected areas in the Biology Department. Students will interact will Biology faculty and staff in choosing and working on a project. This not only aids learning to use the TEM but at the same time utilizes an expensive and valuable research tool to further studies in the Biology Department at ECU. The oral and poster presentations will be made in PowerPoint. We will use a University template and the size of the poster will be 42” x 33.5”.

Lecture/Laboratory Topics:

1. Electron Microscopy History and Basic Design  1
2. The Transmission Electron Microscope (TEM)  6
3. Specimen Preparation for TEM  2
4. Safety in the Electron Microscopy Lab.  21
5. Ultramicrotomy  4
6. Specimen Staining and Contrast Methods for TEM  5
7. Production of the Film Electron Micrograph  8
8. Digital Image Processing and Analysis in the Computer  18
12. Interpretation of Electron Micrographs  19
13. Survey of Biological Ultrastructure  20
15. Miscellaneous Localization and Enhancement Techniques  12
16. Tracers  17
17. Immunocytochemistry  9
18. Enzyme Cytochemistry  10
19. Autoradiography  11
20. Freeze Fracture Replication  14
21. Intermediate and High Voltage Microscopy  16