Instructor: Dr. T. Budd

Prerequisites: any 200-300 level science course.

Class meeting time: Monday 1:15 – 4:15

The course deals specifically with the lab skills related to transmission electron microscopy (TEM) and their application to biological research. This course will also examine the structure of cells (often referred to as ultrastructure) and of tissues as seen with the TEM. The methods learned will include specimen isolation and preparation (fixation, embedding, staining), glass knife making, ultramicrotomy, image acquisition using the TEM, black and white photography and the actual use and care of the electron microscope.

Students who take only the TEM module will prepare a specimen assigned by the instructor. These results will be written up as a lab report and presented orally to their classmates. Students taking the concurrent project module will do a microscopy project of their own design based on primary literature findings and prepare the results as a journal article and orally present the results to their classmates. **The successful completion of this course requires a good deal of independent work outside of normal class hours.**

The first half of the course will concentrate on the practical aspects of TEM. The second half will deal with the ultrastructure of cells and their organelles in order to help you interpret the images acquired.

Evaluation of the student will consist of a series of quizzes and on practical exams covering the techniques of electron microscopy, the ability to master the skills of the TEM, and on the quality of the project write-up and presentation.

**This course is not for procrastinators.**
COURSE SCHEDULE AND DEADLINES

Week 1  Introduction, overview of specimen to image process for TEM, specimen preparation, safety, make reagents.

Week 2  Read and know the specimen preparation handout, knife making, capsule trimming, ultramicrotomy, post-staining. Obtain, fix, and embed specimen this week.

Week 3  Practice, practice, practice. Make perfect knife and perfect trimmed capsule.

Week 4  Practice, practice, practice. Make good sections, post stain, view them under the TEM.

Week 5  Know the controls of the EM.
LAB PRACTICAL: controls, start up, inserting grids, image focusing.

Week 6  Complete first quiz on specimen preparation.
LAB PRACTICAL: beam energy, saturation of the filament, centering apertures, image intensity.

Week 7  Project proposal due (if taking the project module).
LAB PRACTICAL: loading the cameras, taking a micrograph, film development, printing the image.

Week 8  First print and negative due.
Begin study of cell ultrastructures.

Week 9  Master the operation of the TEM,
Complete second quiz on EM operation.

Week 10-12 Complete portfolio of micrographs

THANKSGIVING

Week 14  Complete cell structure study (sect. II) and third quiz.

Week 15  Lab report or project presentations
Last day of classes Write-ups due, 4:00 PM, EST, NBS.

YOUR GRADE WILL BE DETERMINED AS follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
<th>Scale</th>
<th>Grade Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes (3)</td>
<td>30%</td>
<td>4.0</td>
<td>90% +</td>
</tr>
<tr>
<td>Lab practicals</td>
<td>30%</td>
<td>3.5</td>
<td>85 - 90%</td>
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<tr>
<td>Presentation</td>
<td>10%</td>
<td>3.0</td>
<td>80 - 85%</td>
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<tr>
<td>Write-up</td>
<td>20%</td>
<td>2.5</td>
<td>75 - 80%</td>
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<tr>
<td>Subjective</td>
<td>10%</td>
<td>2.0</td>
<td>70 - 75%</td>
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etc.