

**CBIO 8050**  
**Techniques in Modern Microscopy**  
[www.uga.edu/caur/courses/cbio.htm](http://www.uga.edu/caur/courses/cbio.htm)

**Instructor:**

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The course is designed to give a practical introduction to a wide variety of microscopic imaging techniques available on the UGA campus and that may be used in research. We will cover a variety of light and electron microscopic imaging techniques, as well as photographic and digital imaging, image processing, some analysis techniques, and a variety of other topics. The purpose of the course is to make you aware of the variety of microscopic techniques that are available, able to perform microscopy and sample preparation techniques, as well as to make you a critical reviewer of images presented in the scientific literature. This course is designed to be highly practical and hands-on. It has been scheduled as a lecture-lab course, with the lecture portion from 2-3:00 and the lab portion from 3:15-5:00 on Tuesdays and Thursdays. The nature of the course may require work outside of the assigned class times.

**Texts:**

**Basic Methods in Microscopy: Protocols and Concepts from Cells, a Laboratory Manual (Paperback)** by [David L. Spector](#) (Editor), [Robert D. Goldman](#) (Editor)

**Electron microscopy: Principles and Techniques for Biologists**

by John J. Bozzola, Lonnie D. Russell. (Electronic Resource through UGA library)

**Molecular Expressions** web site: <http://www.molecularexpressions.com/index.html>

Assigned reading as warranted.

The EM Lab has a good selection of reference books specific to your area of work and may be checked out at any time.

Other resources are listed on the CAUR website.

**Exams and project:**

There will be two examinations in this course – a mid-term and a final. These will consist of a variety of short-answer questions, definitions, fill-in-the blanks, etc. Additionally, students will be required to do two projects: one is a TEM project assigned by the instructor, the other to be determined by the student and instructors and can be based on the student's research. The projects are to be written up as journal submissions and will include a set of images (plates) documenting biological structures done with the techniques covered in the course. These plates are to be created as figures appropriate for submission to a journal in the student's area of study, with complete figure legends (captions describing the figures). You will be expected to provide copies on the Instruction to Authors section of the journal chosen. You will also present your project as if given at a scientific meeting – 15 minutes, to provide experience in presentation of data.

This class will conform to the Academic Honesty Policy set forth by the University as outlined at <http://www.uga.edu/honesty/ahpd/ACOH%20May%20'07.pdf>

## Course Schedule

<b>Date</b>		<b>Lecture</b>	<b>Lab</b>
8.16		Research Ethics/Lab Safety	Tour of CAUR
8.18		Brightfield and Phase/Darkfield	Brightfield/Phase/Darkfield
8.23		Polarization and DIC imaging	Polarization/DIC
8.25		Biological sample prep for LM and EM	Bio Preparation for LM and EM
8.30		Filters and fluorescence	Widefield fluorescence
9.1		Lasers/confocal/multiphoton	Confocal/multiphoton
9.6	KD	Electron Microscopy	Negative staining for EM
9.8	KD	Electron Microscopy	Learning TEM operation
9.13	KD	Thin Section for EM	Ultramicrotomy
9.15	MA	Sectioning for Light Microscopy	Microtomy (Vet school)
9.20		SEM sample prep	SEM sample prep
9.22		SEM	VP and HV SEM
9.27		Detectors – SEM and Confocal	Project Discussion
9.29		Immunolabelling	Immunolabeling
10.4		Cameras and image capture	Project work day
10.6		<b>Midterm Exam</b>	Project work day
10.11		Cryo Fixation and Processing	Cryo fixation for TEM
10.13		Image Processing	Cryo fix for SEM
10.18		Materials preparation and imaging	Demo by Dr. Fan
10.20	PS	X-ray and Electron Diffraction (last day of <b>Withdrawals</b> )	Electron diffraction, XRD
10.25		Cryo fixation and preparation	Cryo preparation for TEM/SEM
10.27		X-ray detection and analysis	SEM EDS
11.1		Preparation of reports/ Photoshop basics	Preparation of reports
11.3		Fluorescent proteins, In Situ Hybridization	GFP, CFP, YFP
11.8		TIRF, FRAP, FRET	FRAP and FRET
11.10		Atomic Force Microscopy	AFM-Demo at NanoSEC
11.15		Presentation skills and Powerpoint	Powerpoint basics
11.17		Project workday	Project workday
11.21-25		<i>Thanksgiving Break</i>	
11.29		<b>Project presentations</b>	Presentations
12.1		<b>Project presentations</b>	Presentations
12.8		<b>Final Exam</b>	Projects Due

\* all lectures and labs by JPS unless noted after date. KD – Katy Dye, Cellular Biology

PS – Paul Schroeder, Geology      MA – Mary Ard, Vet Path