

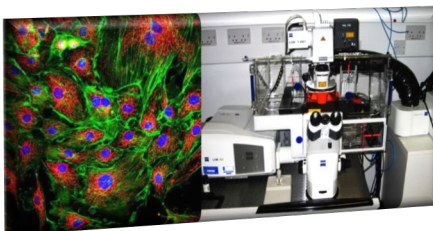
## BIOLOGY 645-001: BIOLOGICAL IMAGING TECHNIQUES

<b>INSTRUCTOR:</b>	Dr. Gal Haspel ▪ <a href="mailto:gal.haspel@njit.edu">gal.haspel@njit.edu</a>	<b>COURSE SCHEDULE:</b> M: 10:00AM-11:20AM W:10:00AM-12:50PM
<b>OFFICE:</b>	420B Central King Bldg.	<b>CLASS MEETS:</b> Central King Bldg. 326
<b>OFFICE HOURS:</b>	W: 2:00pm – 3:00pm and by appointment	

**COURSE DESCRIPTION:** Imaging tissues, cells, and organelles is an integral part of modern biology. This combined lecture and lab course will introduce the students to a variety of approaches to examine biological structures at different scales (from molecules to organisms): conventional light microscopy, fluorescent microscopy, modern high resolution light microscopy, and electron microscopy. In addition, the course will cover optical approaches to study the dynamics of cellular function, including calcium and voltage imaging, and molecular interactions.



Classes will be composed of a lecture followed by a lab session. In typical lab sessions students, often working in teams, will address a cell physiological problem utilizing microscopy techniques as well as learning basic cell biological techniques such as handling/maintaining cells and introducing probes. Students will be required to keep laboratory notebooks where they keep record of that day's experiments. Course grade will be based on lab reports, presentations of an imaging technique or cell biology subject.



**COURSE PREREQUISITES:** Basic knowledge of cell biology and basic optics is recommended. Graduate student status or permission of the instructor.

**REQUIRED TEXT:**

None, but extensive online material will be provided.

**IMPORTANT RULES COURSE POLICIES:**

- **Academic Integrity:** The University Code on Academic Integrity is strictly enforced! ([Academic Integrity](http://www.ncas.rutgers.edu/oas/ai) ▪ <http://www.ncas.rutgers.edu/oas/ai>).
- **Electronic Devices:** The use of cell phones and other electronic devices during class or exam times is prohibited.
- **Attendance and Participation:** Students must attend all classes and laboratory steps. Absences from class will be recorded. Two (2) absences will result in a warning. More than 2 absences may result in removal from the class. Absences also will hinder your ability to fully participate in class discussions and problem solving sessions and, therefore, affect your grade. There will be no makeup for missed laboratory sessions.

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### GRADING POLICY:

GRADING	POINTS
Literature Presentations & Participation	50%
Laboratory Reports	50%
<b>TOTAL</b>	<b>100%</b>

GRADUATE GRADING SCALE			
A	90-100	C+	75-79
B+	85-89	C	70-74
B	80-84	F	0-69

- Two days in the course are dedicated to student presentations. All students will be assigned research methodology papers on both days that they will present.
- For each lab day, students are expected to write short reports (1-3 pages) about their results of the day that are due no later than the following week.
- There will be a pairs-assignment to produce presentation posters.

### COURSE OUTLINE:

WEEK	LECTURE TOPICS	
Week 1	Introduction, The scientific figure, Scientific integrity in imaging	
Week 2	Magnification	
Week 3	Compound microscopes	
Week 4	Resolution	
Week 5	Illumination contrast I: Polarized light microscopy Phase Contrast	
Week 6	Illumination contrast II: DIC, Oblique Illumination, Modulation Contrast	
Week 7	Staining, Fixing, Clearing, Fluorescence	
Week 8	Tagging: Immunocytochemistry, fluorescent proteins	
Week 9	Student presentations I	
Week 10	Confocal Microscopy (and optional training for departmental confocal)	
Week 11	Digital image processing and reconstruction	
Week 12	Poster review session	
Week 13	<b>NOV. 28 – DEC. 01: THANKSGIVING BREAK</b>	
Week 14	Cell dynamics and Optogenetics	
Week 15	Super-resolution , micro-CT and micro-MRI	
Week 16	Student presentations II, poster printing	
<b>FINALS</b>	<b>FINAL EXAM WEEK: DECEMBER 14-20, 2019</b>	