

Fall 2020

BIOL 645-001: Biological Imaging Techniques

Gal Haspel

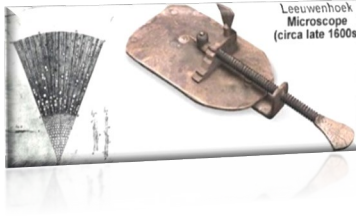
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Syllabus



Biological Imaging Techniques

BIOL645 / BIOL498

Fall 2020

Instructor: Gal Haspel

Tue 11:00a-12:20p online and Thu 11:00a-1:50p in CKB 326

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 day followed by a lab session in the same week. In typical lab sessions students, working in teams, will address a cell physiological problem using microscopy techniques as well as learning basic cell biological techniques. 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.

The COVID-19 pandemic will, of course affect our imaging course this semester. We will work together to keep everyone safe without compromising academic quality. The course will run with most of the lectures online and the labs in CKB 326 with facemasks, physical distances, disinfection, and common sense. When sharing microscopes and other equipment we will make sure to disinfect between users (see poster and <https://www.leica-microsystems.com/science-lab/how-to-sanitize-a-microscope>). We will establish teams early in the course and try to keep those with minimal change. If at any time you feel unsafe or uncomfortable with the precautions that we take, let me know as soon as possible.

Course outline: see specific dates and details on Canvas)

Week	Dates	Topics
1		Introduction, The scientific figure, Scientific integrity in imaging
2		Magnification
3		Compound microscopes
4		Resolution
5		Illumination contrast I: Polarized light microscopy Phase Contrast
6		Illumination contrast II: DIC, Oblique Illumination, Modulation Contrast
7		Staining, Fixing, Clearing, Fluorescence
8		Tagging: Immunocytochemistry, fluorescent proteins
9		<i>Spring Break</i>
10		Student presentations I
11		Confocal Microscopy (and optional training for departmental confocal)
12		Digital image processing and reconstruction
13		Poster review session
14		Cell dynamics and Optogenetics
15		Super-resolution , micro-CT and micro-MRI
16		Student presentations II, poster printing

Syllabus

Course prerequisites: Basic knowledge of cell biology and basic optics is recommended.

Textbook: no textbook, but extensive online material will be provided.

Grading:

50%: Even split among two presentations, poster, and participation (12.5% each)

50%: Even split among laboratory reviews (about 5% each)

- Two weeks in the course are dedicated to student presentations. All students will choose a field that was advanced by imaging and microscopy to present for the first day, and choose an advanced imaging method for the second.
- For each lab day, students are expected to write short reviews (1-3 pages) about the concepts addressed including their results of the day. The reviews are due no later than the following week.
- There will be a pairs-assignment to produce presentation posters.

Grading Scale	
A	90-100
B+	85-89
B	80-84
C+	75-79
C	70-74
F	0-69

Office hours: By WebEx Tue 12:30-1:30, in person Thu 2-3pm, and by appointment.

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Phone: (973) 596-8198

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

COVID-19 Safety Requirements: All persons physically present in any department facility or classroom shall comply fully with the NJIT COVID-19 safety policy at all times. Masks must be worn before entry to all department facilities, and social distancing guidelines must be followed. Individuals who are unable to wear a face mask due to medical reasons should contact the Office of Disability Services or Human Resources. Students who enter a classroom without wearing a mask properly, or remove their mask, will be cautioned by the instructor. The same is true for students who disregard the seating order or guidelines for social distancing. Students with obvious symptoms of respiratory illness should not come to campus and will be asked to leave. Students who do not comply with a request by a department instructor to adjust their behavior, in accordance with the University Policy, will be subject to disciplinary actions. Instructors have the right to expel the student or terminate the class session at which any student fails to comply with the University Policy.

Microscopy-specific procedures are posted on Canvas and on posters in CKB326.

Academic Integrity: The University Code on Academic Integrity is strictly enforced! *Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found*

at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu