

Bioimaging 477H (4 credit hours)

Contact Instructor

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Teams: chat me directly

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Meet with Me / Office Hours

Office Hours: TBD or as needed (first day class pool will be used to determine)

Physical Office Location: Morrill 2 427

Online: via Bioimaging 477H Microsoft Teams

When and where the class meets in-person (synchronous)

Days/Time: Tuesday and Thursdays at 1:00 – 4:00 pm

Building/Room/Zoom: Integrated Sciences Building (ISB) Room 360

Physical layout: 8 microscopes with computer, groups of 2 people per (16 students total)

Class Support – Microsoft Teams (called Bioimaging 477H)

All course materials are available on the Bioimaging 477H Microsoft Teams site, which an invitation will be emailed to each student. Microsoft Teams can be opened in an internet browser, a desktop application, and also on mobile device application (mobile has less functionality).

The eBook for the class is entitled *Quantitative Imaging in Cell Biology* and is posted to Teams (see Files). We will focus on the first 6 chapters as this book covers content well beyond the scope of this course.

Why use Microsoft Teams? Teams provides assignments/surveys, chat, video conferencing, calendars, channel-based messaging and communication, data storage and integration (PDFs, Word, Excel, PowerPoint, Microscope images), as well as having other abilities we may access. Microsoft Teams is used by many major companies to do business and thus is another leaning component of this course. Note: As the Instructor of the Bioimaging 477 Team I have access to all things posted on to this Team. I suggest you be courteous and professional to your Teammates online and in person which will impact your Participation assessment. Your fellow Teammates will grade you in this course as part of the Participation assessment.

COVID-19 Statement

Please do your part to self-monitor and protect yourself and your community. Make-up days and remote/asynchronous assignments will allow for flexible learning so as to not compromise the health and safety of the class.

- If you have a fever, please DO NOT come to class and instead schedule a test with University Health Services (UHS) via <https://www.umass.edu/uhs/covid-19-testing>.
- If you travel during the semester, please comply with MA and CDC recommendations for self-monitoring and testing.
- If you are a student that received vaccination exemption for medical and religious reasons, you will need to show compliance with asymptomatic testing before each class. [COVID-10 Vaccine info please click here](#).
- ➔ • If you miss a class due to symptoms or illness there will be “Make-up” class days as well as other remote/asynchronous assignment to allow for flexible learning so as to not compromise the health and safety of the class. (Please see Attendance section below).

Masks will be required for the course to maintain a safe environment for the joint use of space and equipment during the ongoing pandemic. Disposable masks will be available for your use during class. I strongly recommend that you consider double masking via use of a disposable surgical mask under your own fabric or other mask. Beyond masks, we will suggest hand washing regularly and cleaning often touched surfaces with 70% ethanol to maintain a clean and safe environment.

What digital technology tools and equipment will you need for this course?

Optional but beneficial: It would be beneficial if you have a personal laptop computer for personal access to Teams and analysis software and a mouse which aids image analysis. However, this is not necessary as the class has 8 computers each which are attached to a microscope. For those who wish to have a laptop computer or mouse that do not currently have one for use during class, please communicate your need to us (we will specifically ask this question in the first day class poll). I will work hard to obtain one for you.

Course Description

This course is an all seniors upper-level biology Course-based Undergrad REsearch (CURE) lab class. We will work as a team to learn Microscopy, Image Analysis, Data Management and Presentation, Cell Culture and Preparation for Imaging, and finally learn Experimental Technique (see Learning Objective below). The class/team's cumulative goal is to investigate and report novel data. This will come in the form of a final project report.

Learning Objectives

Course materials, lectures, discussions, in-class activities are designed to help you:

- Use a microscope to capture brightfield and epifluorescence image/s of human cells.

- Perform human cell culture and prepare cells for imaging through many different means.
- Troubleshoot acquiring quantitative images
- Quantify microscope images via image analysis.
- Manage and communicate data acquired from microscope images
- Ask and answer novel experimental investigations with proper controls.
- Communicate/present a final project report encompassing all learning objectives
- Develop skills and behaviors to bridge the divide between university and a future job.

How this class can improve your C.V. and job applications

One major goal of this course will be to begin to transition your mindset from being a university student to being a team player in your future occupation. The tangible items that can aid this transition into the future professional school or occupation of your choice were previously mentioned above but more clearly summarized below.

- C.V. experience line items including microscopy, immunofluorescence, cell culture, cell manipulation via molecular biology techniques, experimental design, data analysis, and data presentation
- Prospect of a letter of recommendation (formal request and sufficient time required)

Teaching/Mentoring approach

A simple guide for early scientists to become an independent thinker and work in a lab setting.

Priority – When in lab, students should be focused on lab. This also includes time management and deciding the worthiest tasks to accomplish.

Think – Being mindful during experiments to either focus on a task at hand or to question or learn about a procedure to help the student realize, “why am I doing, what I am doing?”

Communicate – builds on the foundation of Think by forcing a student to ask and answer questions with others in lab. This allows for instructors to determine student comprehension.

Repeat – speaks to the importance of practicing to improve while acknowledging that failure is just a steppingstone to success. Repetition and recapitulation are key parts of science.

Attendance & Participation

It is my expectation and hope that you will be able to attend all classes in person for this hands-on lab class where we have unique access to equipment and personal teaching, training, and practice. While in class you will be expected to focus on lab class activities. If you need to handle personal things, please step outside of the classroom. The class is run as both a larger team and smaller teams. When you are in lab class you are expected to work on lab class activities through engagement with the equipment and materials, teaching staff, and your fellow student colleagues. If you are not able to attend there will be chances to make-up missed days.

If you cannot make it to class for any reason it is my expectation that you email me or message me in Teams to tell me that you are missing the class. Failure to notify me by the end of the day of a class you missed will count as an unexcused absence.

Our Class Attendance Agreements

Strong participation means completing learning activities, being actively involved in discussions, asking interesting questions, and demonstrating that you read and have thought about the material. Participation translates through showing curiosity about others' perspectives on an issue, demonstrating respect for others' opinions and ideas through acknowledging their view and asking for clarification when you aren't sure. We can teach you everything you need to know, but we need your help to understand what you do and do not know.

Attendance and active participation are 25% of your grade. Please inform me of excused absences as soon as possible and best if it can be before class, which include - illness, family matters, religious, university sanctioned, or other extenuating circumstances. Please communicate through email or Teams clearly stating if the absence is excused listing one of the categories above or unexcused and include the specific date being missed. We will then communicate or meet in person to discuss plans for make-up. Two unexcused absences are permitted. Any absences beyond two will require make-up assignments outside of class.

Make-up

There will be two Make-up days for those who missed to do those labs in class. The rest of the class will use these days to get more hands-on training and teaching in things they are interested in or to work on projects of interest.

Make-up assignments (asynchronous) will be available with prior planning to aid learning the same material that was missed for an in-person class (synchronous). If you are ill but feeling well enough, it maybe possible for you to engage in the class remotely for Microsoft Teams.

Use of Electronic Devices

Please put non-Teams notifications on your devices into silent mode for the duration of class. If there is a personal matter you need to handle, please step out of the classroom.

Internet activity not related to the class should not occur in the classroom. To handle personal matters or to take a mental break please step out of the classroom to do things not related to the class. This idea of separating work and leisure is an important skill to develop for your future workplace behavior. Non-class related internet activity will result in loss of participation grade.

What are you expected to do throughout the semester? A.k.a.

Assignments, Quizzes & Other Assessments

Please read the handout before coming to class.

Assignments will be provided for most classes. The assignment will be to fill our questions that help solidify the current modules learning material. The assignments will be posted, handled, and graded on Teams.

Midterm will be an open-book/note test on October 18th. You will have one class in lab with the microscope at your disposal and time out side of class, likely both before and after this day in class, to complete the Midterm. The goal for you to understand the microscope, how to use it, and the concepts surrounding it before we enter the CURE part of the class. Outside of university, you will be able to rely on your notes, internet, and other materials to competently answer questions in your future careers. I hope to foster this behavior while also decreasing stress associated with testing.

CURE project and Final Presentation will be held on the last day of class December 8, 2022. The final presentation will encompass your CURE project in this class and we will provide outlined details on the presentation later in the semester.

How will you be graded?

Assignment Grade Distribution

- 25% (Participation, which includes Teamwork and Respect)
- 25% (Assignments)
- 25% (Midterm)
- 25% (Final Project)

Grading Scale

A = 90 – 100; B+ 87 – 89; B = 80 – 86; C+ 77 – 79; C = 70 – 76; D+ 67 – 69; D 60 – 66; F < 60

Disability Accommodation and Inclusive Learning Statement

Your success in this class is important to me and your fellow colleagues/classmates – we are a team. We all learn differently and bring different strengths and needs to the class. If there are aspects of the course that prevent you from learning or make you feel excluded, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

If you have a disability and require accommodations, please let me know as soon as possible. You will need to register with Disability Services (161 Whitmore Administration building; phone 413-545- 0892). Information on services and materials for registering are also available on their website www.umass.edu/disability. Since our class is relatively small (16 students) I can help you with this, you are not expected to do this by yourself.

There are also a range of resources on campus, including:

- [Writing Center](http://www.umass.edu/writingcenter) - <http://www.umass.edu/writingcenter>
- [Learning Resource Center](http://www.umass.edu/lrc) - <http://www.umass.edu/lrc>
- [Student Success](https://www.umass.edu/studentsuccess/) - <https://www.umass.edu/studentsuccess/>
- [Center for Counseling and Psychological Health \(CCPH\)](http://www.umass.edu/counseling) - <http://www.umass.edu/counseling>
- [English as a Second Language \(ESL\) Program](http://www.umass.edu/esl) - <http://www.umass.edu/esl>

Names & Pronouns

Everyone has the right to be addressed by the name and pronouns that they use for themselves. You can indicate your preferred/chosen first name and pronouns on SPIRE.

To learn more read: [Intro Handout on Pronouns](#)

Title IX

If you have been the victim of sexual violence, gender discrimination, or sexual harassment, the university can provide you with a variety of [support resources](#) and accommodations. UMass is committed to providing these resources with minimal impact and costs to survivors on a case-by-case basis. Resources are available to survivors with or without them filing a complaint. No upfront costs are charged to any currently enrolled students for University Health Services or the Center for Counseling and Psychological Health, and no fees exist for services in the Dean of Students Office, the Center for Women and Community, Student Legal Services, or by live-in residential staff.

What you need to know about Academic Honesty and Plagiarism

We want our learning environment to be honest and fair. UMass Amherst has an [Academic Honesty Policy](#) that includes cheating and plagiarism as forms of dishonesty. What is [plagiarism](#)? Generally speaking, it is any attempt to take credit for work done by another person. Yet, all scholars rely on the work of others to shape their own knowledge and interpretations. If you have any questions about what may constitute plagiarism, please consult with me and/or our Writing Center: [Writing, Plagiarism, & Academic Honesty at UMass Amherst Writing Center](#). And here is a link to the [Academic Dishonesty Guide for Students](#).

Course Schedule

The course schedule will be updated in Microsoft Teams throughout the semester.

Week	Class # and Date	Questions/themes we will explore this session:	Quick reminders
1	1. Sept 6	Learn your microscope	· Students Info Survey · Assignment
	2. Sept 8	Transmitted light and alignment	· Assignment
2	3. Sept 13	Cameras and calibration	· Assignment and Quiz
	4. Sept 15	Numerical Aperture and resolution	· Assignment
3	5. Sept 20	Fluorescence	· Assignment and Quiz
	6. Sept 22	Fluorescence photobleaching	· Assignment
4	7. Sept 27	Immunofluorescence procedure	· Assignment and Quiz
	8. Sept 29	Immunofluorescence imaging	· Assignment
5	9. Oct 4	Live cell imaging and cell culture	· Assignment and Quiz
	10. Oct 6	FLEXIBLE DAY and cell culture	· Assignment
6	11. Oct 11	Transfection and cell culture day 3	· Assignment and Quiz
	12. Oct 13	Transfection imaging	· Assignment
7	13. Oct 18	Midterm	· Midterm
	14. Oct 20	FLEXIBLE DAY	
8	15. Oct 25	CURE Begins	
	16. Oct 27	CURE	
9	17. Nov 1	CURE	
	18. Nov 3	CURE	
10	19. Nov 8	CURE	
	20. Nov 10	CURE	
11	21. Nov 15	CURE	
	22. Nov 17	CURE Ends	

12	Nov 23		
	Nov 25		
13	23. Nov 30	Neurobiology microscopy	
	24. Dec 2	Presentation preparation	
14	25. Dec 7	Presentation preparation	
	26. Dec 7	CURE Presentation Day	·Final Project due