BME1460 S

Cellular and Molecular Bioengineering II

Spring 2025 Syllabus

Course Meetings

BME1460 S

Section	Day & Time	Delivery Mode & Location
LEC0101	Tuesday, 10:00 AM - 1:00 PM	In Person: MY360

Refer to ACORN for the most up-to-date information about the location of the course meetings.

Course Contacts

Instructor: Professor Jonathan Rocheleau
Email: jon.rocheleau@utoronto.ca
Class hours: Tuesdays 10 am – 1 pm. All lectures will be held in person. Slides posted the day of the lecture on Quercus.
Office Hours: By appointment only.

Course Overview

Fluorescence microscopy and associated biophysical methods are integral to many areas of biological research including biomedical engineering, cell biology, and molecular biology. This course covers the theory, mechanics, and application of fluorescence microscopy. Students will gain expertise in basic and advanced quantitative fluorescence microscopy in the context of working with living samples.

Course Learning Outcomes

The course topics include sample preparation (immunofluorescence-, dye-, and fluorescent protein-labeling), multidimensional imaging, confocal microscopy, two-photon microscopy, and other advanced imaging techniques. The course will also cover the associated biophysical methods used to probe live cell dynamics such as fluorescence recovery after photobleaching (FRAP), Förster resonance energy transfer (FRET), and fluorescence correlation spectroscopy (FCS). By centering on applications to living samples, students will gain the theoretical background and practical knowledge to design and implement live cell imaging experiments.

Prerequisites: None
Corequisites: None
Exclusions: None

Course Materials

Required

It is necessary to log onto the Quercus website to obtain the linked material, papers, course notes, updates and information about the lectures and evaluations. The course notes and papers can only be accessed from the website. Students are expected to set defaults such that they receive all notifications for the course from Quercus. Some information (e.g. sample problems) will only be provided in class.

As part of university policy, students are required to ensure that all Quercus communications are sent to their official university-issued email address. Students should reply to course messages and Quercus notifications using the Inbox tool.

Optional

Some of the course notes are based on:

1. https://www.microscopyu.com/
2. https://zeiss-campus.magnet.fsu.edu/

Marking Scheme

Assessment	Percent	Details	Due Date
Student Led Lectures	30%	Groups of 3-4 will give a 30 min lecture on topics related to quantitative fluorescence microscopy. The topics will be set by the instructor. Groups will be formed based on polled interest in the topics. Purpose: (1) introduce advanced methods (2) reiterate fundamental concepts from lectures, and (3) instill ownership of learning	During Class Time, TBD

Assessment	Percent	Details	Due Date
Journal Club	50%	Two groups of 2-3 will be assigned by the instructor per journal article. The groups will be determined after the first class, and the articles will be distributed one week before each presentation. On the assigned date, Group 1 will present first focussing on the microscopy method used in the manuscript (15 min max). Group 2 will present next focussing on the results obtained using the microscopy method. (15 min max). Every student will present two papers over the semester, one presenting the method (i.e., Group 1) and one presenting the results (i.e., Group 2). Purpose: (1) exposure to cutting edge applications in QFM, (2) link QFM to hypothesis driven research, (3) instill ownership of learning and (4) generate discussion.	During Class Time, TBD
Participation	20%	1. Exit pass quizzes (online). The lowest mark will be dropped. 2. Participation in class surveys 3. Class surveys (e.g. evaluation of lectures) 4. Engagement in class discussion	No Specific Date

Late Assessment Submissions Policy

Late submissions will have 10%/day deducted.

Policies & Statements

University Land Acknowledgement

I wish to acknowledge this land on which the University of Toronto operates. For thousands of years, it has been the traditional land of the Huron-Wendat, the Seneca, and the Mississaugas of the Credit. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

Learn more about Canada's relationship with Indigenous Peoples here.

Indigenous Students' Supports

If you are an Indigenous engineering student, you are invited to join a private Discord channel to meet other Indigenous students, professors, and staff, chat about scholarships, awards, work opportunities, Indigenous-related events, and receive mentorship. Email Professor Bazylak if you are interested.

Indigenous students at U of T are also invited to visit Nations House's (FNH) Indigenous Student Services for culturally relevant programs and services. If you want more information on how to apply for Indigenous specific funding opportunities, cultural programs, traditional medicines, academic support, monthly social events or receive the weekly newsletter, go to the FNH website, email or follow FNH on social media: Facebook, Instagram, or TikTok. A full event calendar is on the CLNX platform. Check CLNX often to see what new events are added!

Wellness and Mental Health Support

Your personal wellness and mental health are important. The University of Toronto and the Faculty of Applied Science & Engineering offer a wide range of free and confidential services that can support your well-being.

As a U of T Engineering student, you have a Departmental Undergraduate Advisor or a Departmental Graduate Administrator who can support you by advising on personal matters that impact your academics. Other resources that you may find helpful are listed on the U of T Engineering Mental Health & Wellness webpage, and a small selection are also included here:

- U of T Engineering's Student & Community Wellness Coordinator
- Health & Wellness and the On-Location Engineering Wellness Counsellor
- Health & Wellness Peer Support Program
- Accessibility Services & the On-Location Advisor
- Graduate Engineering Council of Students' Mental Wellness Commission
- SKULE™ Mental Wellness
- U of T Engineering's Learning Strategist and Centre for Learning Strategy Support
- Registrar's Office and Scholarships & Financial Aid Office & Advisor

We encourage you to access these resources as soon as you feel you need support; no issue is too small. You may reach out to the counsellors at U of T Telus Health Student Support for 24/7 free and confidential counselling support.

If you find yourself feeling distressed and in need of more immediate support visit uoft.me/feelingdistressed or U of T Engineering's Urgent Support – Talk to Someone Right Now.

Accommodations

The University of Toronto supports accommodations for students with diverse learning needs, which may be associated with mental health conditions, learning disabilities, autism spectrum, ADHD, mobility impairments, functional/fine motor impairments, concussion or head injury, visual impairments, chronic health conditions, addictions, D/deaf, deafened or hard of hearing, communication disorders and/or temporary disabilities, such as fractures and severe sprains, or recovery from an operation.

If you have a learning need requiring an accommodation the University of Toronto recommends that students register with Accessibility Services as soon as possible.

We know that many students may be hesitant to reach out to Accessibility Services for accommodations. The process of accommodation is private; we will not share details of your needs or condition with any instructor.

If you feel hesitant to register with us, we encourage you to reach out for further information and resources on how we can support. It may feel difficult to ask for help, but it can make all the difference during your time here.

Phone: 416-978-8060
Email: accessibility.services@utoronto.ca

Equity, Diversity and Inclusion

Looking for community? Feeling isolated? Not being understood or heard?

You are not alone. You can talk to anyone in the Faculty that you feel comfortable approaching, anytime – professors, instructors, teaching assistants, first-year or upper years academic advisors, student leaders or the Assistant Dean of Diversity, Inclusion and Professionalism.

You belong here. In this class, the participation and perspectives of everyone is invited and encouraged. The broad range of identities and the intersections of those identities are valued and create an inclusive team environment that will help you achieve academic success. You can read the evidence for this approach here.

You have rights. The University Code of Student Conduct and the Ontario Human Rights Code protect you against all forms of harassment or discrimination, including but not limited to acts of racism, sexism, Islamophobia, antisemitism, homophobia, transphobia, ableism, classism and ageism. Engineering denounces unprofessionalism or intolerance in language, actions or interactions, in person or online, on- or off-campus. Engineering takes these concerns extremely seriously and you can confidentially disclose directly to the Assistant Dean for help here.

Resource List:

- Engineering Equity, Diversity & Inclusion Groups, Initiatives & Student Resources
- Engineering Positive Space Resources
- Request a religious-based accommodation here
- Email Marisa Sterling, P.Eng, the Assistant Dean, Diversity, Inclusion & Professionalism here
- Make a confidential disclosure of harassment, discrimination or unprofessionalism here or email engineering@utoronto.ca or call 416.946.3986
- Email the Engineering Society Equity & Inclusivity Director here
- U of T Equity Offices & First Nations House Resources

Plagiarism Detection Tool

Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (https://uoft.me/pdt-faq).

Academic Integrity

All students, faculty and staff are expected to follow the University's guidelines and policies on academic integrity. For students, this means following the standards of academic honesty when writing assignments, collaborating with fellow students, and writing tests and exams. Ensure that the work you submit for grading represents your own honest efforts. Plagiarism is representing someone else's work as your own or submitting work that you have previously submitted for marks in another class or program and is a serious offence that can result in sanctions. Speak to me or your TA for advice on anything that you find unclear. To learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see the U of T Academic Integrity website.

Quercus Information

This course uses the University's learning management system, Quercus, to post information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. The site is dynamic and new information and resources will be posted regularly as we move through the term, so please make it a habit to log in to the site on a regular, even daily, basis. To access the course website, go to the U of T Quercus log-in page at https://q.utoronto.ca. Once you have logged in to Quercus using your UTORid and password, you should see the link or "card" for this course. You may need to scroll through other cards to find this. Click on this link to open our course area, view the latest announcements and access your course resources.There are Quercus help guides for students that you can access by clicking on the

"?" icon in the left side column.

SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.

Lecture Capture by Instructor

If lecture recordings are provided, they are only for the exclusive use of enrolled students, for their personal learning. Lecture recordings are not to be shared in any way beyond enrolled students.