

Faculty of Science Course Syllabus
Department of Biochemistry & Molecular Biology
Laboratory Research Techniques in Biomedical Sciences
BIOC 4501 & 5501
Fall 2024

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

We acknowledge the histories, contributions, and legacies of the African Nova Scotian people and communities who have been here for over 400 years.

Instructor(s):	Dr. Marignani, paola.marignani@dal.ca X: @pmarignani
Lectures:	Tuesday and Thursday at 10:05- 11:25 a.m.
Laboratories:	N/A
Tutorials:	N/A
Course delivery:	In person

Course Description

This course covers fundamental principles of biotechnology from a medical perspective. Relevant topics are discussed, such as gene silencing technology, fundamental signal transduction, production of transgenic mouse models, single cell transcriptomics, and machine learning in biological sciences.

Course Prerequisites

BIOC 3400.03 or instructor's permission.

Course Exclusions

N/A

Learning Objectives

Technologies that facilitate the identification of disease processes are rapidly moving fields of science. The course provides a combination of fundamental knowledge and cutting-edge developments along with consideration of ethical, and legal aspects of biotechnology endeavors.

Course Materials

There is no textbook purchase required for this course. Study materials (PDF lecture notes) will be provided on Brightspace. Emails will be responded to between the hours of 9 am -4:30 pm, Monday to Friday. Please allow 24 hours from the time you email for a response.

Course Assessment

Evaluation will include the following components:

Component	Weight (% of final mark) for BIOC 4501	Weight (% of final mark) for BIOC 5501	Date
MCQ #1	30%	30%	October 3, 2024
MCQ #2	30%	30%	November 7, 2024
Essay	30%	20%	November 19, 2024
Graduate Student Presentations	na	10%	October 22, 2024
MCQ #3	10%	10%	November 28, 2024

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (<50)
A- (80-84)	B- (70-72)	C- (55-59)	

Course Policies (General, Regarding Missed or Late Academic Requirements and Regarding Academic Integrity)

- The **three MCQ exams** will cover material from the lectures and graduate student presentations. The questions will be taken directly from the PowerPoint presentations.
- If a student is unable to complete an exam at the scheduled time due to illness or for other valid reasons*, the student must submit a **Student Declaration of Absence** form (available on Brightspace) either electronically or in printed form within 3 days of the event. A maximum of 1 declarations of absence will be accepted per student.
 - The student will be able to write the exam at a time and date suitable to both the student and Dr. Marignani. Students will only be able to make-up one MCQ exam.
 - Missed exams will be scored with a zero grade

***Travel for holidays and/or leisure will not be accommodated. Do not schedule holidays or events during exam dates. A score of 0% will be issued. In the event of direct family death, provide letter from funeral parlour.**

- There will be **no food allowed** in the classroom during this course. If a student has food, it must be stored in a backpack or other suitable case. Water and covered beverages may be brought into the classroom.

Course content

Course material will be covered in the classroom. The Brightspace learning environment will be used to upload PowerPoint lecture slide decks just prior to class. Students are encouraged to read materials related to topics prior to lecture.

In all, the course will involve several components.

1. **Lectures:** There will be lectures at 10:05 a.m. on Tuesdays and Thursdays. Some will involve substantial student participation including discussions, debates, presentations, etc.
2. **Independent study:** In addition to lecture attendance, this course will require diligent independent study of the material in order to develop broadly based and in-depth knowledge of the methods and concepts covered. There are no books associated with this course. Please access [PubMed](#) directly.
3. **Communication and assistance:** Appointments for consultation can be set up by email and these can be held in person or by MS Teams. Any appointment, whether in -person or via Teams will be arranged within regular working hours (9 am to 4:30 pm, Monday to Friday).

Course schedule:

BIOC 4501 Fall 2024		
Date	Lecturer	Topic
Sept 3	PM	Overview of course
5	PM	Principles of Signal Transduction I- Domains and Kinases
10	PM	Principles of Signal Transduction II- Tumour Suppressors
12	PM	Principles of Signal Transduction III - Cytoskeleton
17	PM	How to use Bots for writing scientific documents.
19	PM	Artificial Intelligence in Healthcare
24	PM	Metabolomics and Proteomics
26	MB	Gene silencing overview (shRNA)
Oct 1	MB	CRISPR History/Controversy
3	MB	EXAM #1 MCQ 30%
8	PM	Ethics in Biomedical research (Risk Assessment for all types of experiments) Biosafety Guest
10	PM	Ethics in Biomedical research (Animals)
15	PM	Ethics in Biomedical research (Humans experimentation)
17	PM	Reporter gene expression
22	PM	Graduate student presentation
24	PM	Polymerase chain reaction
29	PM	qRT-PCR and Basics of Transcriptomics
31	JK	Transcriptome-Single Cell microfluidics
Nov 5	JK	Basic ML platforms for scRNA seq analysis
7	JK	Exam #2 MCQ 30%
19	PM	Protein expression in cells (FRET) and ESSAY DUE DATE
21	PM	Gene-editing 2 (Cre-Lox models)
26	PM	Immunodetection Assays
28	PM	Exam #3 MCQ 10%
Dec 3	No class	No Class- Monday classes

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Fall/Winter 2023-2024
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University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: <http://www.dal.ca/cultureofrespect.html>

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

<https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=1&topicgroupid=31821&loaduseredits=False>

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

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Student Resources and Support**

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html

Student Advocacy: <https://dsu.ca/dsas>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

Dalhousie COVID-19 information and updates: <https://www.dal.ca/covid-19-information-and-updates.html>