

Faculty of Science Course Syllabus
Department of Biology
BIOL 4020.03
Advanced Cell Biology
Fall 2019

Instructor: Patrice Côté patrice@dal.ca LSC 7124 902-494-1318
Lectures: 13:05 to 14:25 Tuesdays and Thursdays Killam Library 2600 (LINC/Collider)

Office Hours: Office hours are whenever I am in my office. However, if you want to save yourself some steps, send me an email and we will arrange a mutually convenient time to meet. If you have a question *never hesitate* to see me.

Course Description

This advanced class focuses on how the animal cell interacts with its environment and integrates information to proceed with an appropriate course of action. Consequences of disrupting signaling pathways are also examined. Lectures are supplemented with assigned readings of original research articles for discussion in class.

Course Prerequisites

Prerequisite course: BIOL 2020.03 or BIOA 2001.03 with a minimum grade of B- or instructor's consent.

Prerequisite knowledge/skills (with *keywords*)

- Recall the terminology of cell biology. (*scientific terminology*)
- Explain how proteins are composed of various domains that confer function. (*proteins, macromolecules*)
- Recall the structure, dynamics, and roles of organelles. (*membranes, cell, organelles*)
- Recall the fundamentals of cell signalling. (*cell signalling*)

NOTE: The above is intended as a guide for students to assess their preparation for this course. It is not meant to be a comprehensive or exhaustive list.

Course Objectives/Learning Outcomes (with *keywords*)

- Explain the nature and mode of transmission of signals between cells. (*hormones, cell adhesion*)
- Demonstrate how receptors capture signals (1st messengers) and transmit the information inside the cell. (*hormones, receptors, signal transduction*)
- Explain how signals are amplified inside cells by using second messengers. (*second messengers*)

- Explain how cells can distinguish between various signals. (*receptors, signal discrimination*)
- Describe the roles of calcium in cell signalling. (*calcium, gene regulation*)
- Predict the consequences of abnormal cell signalling. (*hypothesis, prediction, cancer, apoptosis, cell division*)
- Design an experimental strategy to answer a simple question relating to cell signalling, including appropriate controls (*scientific method, hypothesis, experiment*)
- Compose a concise representation of a data set from an original research article. (*scientific literacy, science communication, data analysis, data interpretation*)

Course Materials

Recommended Textbook: Kramer IM, Signal Transduction, 3rd Ed., ©2015, Elsevier Science & Technology, 1126p., PRINT ISBN: 9780123948038, EBOOK ISBN: 9780123948199

This document is available for FREE as an electronic book via the Dalhousie University Libraries. The link is posted on the course Brightspace site.

On Reserve at the Killam Library:

Lim W, Mayer B, and Pawson T, Cell Signaling Principles and Mechanisms, 1st Ed., ©2015, Garland Science, 400p. ISBN 9780815342441

All other materials will be available on the course Brightspace site

Course Assessment

	Weight (% of Final)	Date
LECTURE COMPONENT		
Final Exam	35	TBD by Registrar
ARTICLE/VIDEO COMPONENT		
Team presentations	35	On Thursdays
Video debate project	15	Due on Apr 2
Attendance/participation/peer evaluations	15	see "Evaluation" section
TOTAL	100	

There is NO midterm exam

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 and Evaluation

Communication

Email to your @dal.ca account will be used to relay important course-related information. Documents, links, and announcements will be posted on Brightspace. It is your responsibility to check the BIOL 4020 Brightspace site and you email account often.

EVALUATION

Evaluation of student performance will be based on four components: 1) Article presentation and discussion, 2) Class attendance, participation and peer evaluation, 3) Video debate project, and 4) Final exam.

Article Presentation and Discussion

We will be reviewing one article that is relevant to the weekly topic at hand. The papers will be important papers in the field of cell signalling. Teams of 4 or 5 participants will have one week to review the article and will be asked one the Thursday lecture to describe a figure or table from the paper.

Class attendance, participation and peer evaluation

It is essential in an interactive class such as Advanced Cell Biology that you be present in class. Attendance will be taken on presentation days and an absence with no valid reason* will cost you 2 points (out of a maximum of 4 points – arriving more than 20 minutes after the start of class will be considered an absence). Being physically present, however, is only part of the requirement and 3 points are allocated for attentiveness during presentations and respectful participation in discussions. This class is meant to be very interactive and is heavily team-centered. It is therefore essential that everyone contribute to all aspects of the team activities including article preparation in your regular teams and within 'jigsaw' groups. To encourage everyone's participation, your peers will have the opportunity to grade your participation, just as *you* will have the opportunity to grade your peers *and yourself*. A 'peer evaluation form' will be provided and you will be required to provide a mark out of '2' for each member of your regular team and for the members of the jigsaw group that you interacted with. This form will be turned in **on Sept 26th, Oct 31st, and Nov 28th** (all Thursdays). Failure to turn in the form will impact on your participation mark.

Attendance:	4
Participation:	3
Peer Evaluation (Regular Team component):	4
Peer Evaluation ('Jigsaw' component):	4
TOTAL:	15

*A 'valid reason' includes reasons that would be acceptable for missing an exam such as a medical reason, a wedding/death in the family, or another reasonable excuse such as an important appointment or important meeting that cannot be moved (in this case it is essential that you let me know in advance).

One (1) Student Declaration of Absence may be used during the semester (SEE THE LINK TO THE UNIVERSITY POLICY ON MISSED OR LATE ACADEMIC REQUIREMENTS DUE TO STUDENT ABSENCE AT THE END OF THE SYLLABUS) otherwise a doctor's note dated on the day that was missed or other dated document justifying the absence is required.

Feedback

In addition to providing a basic understanding of cell signalling, the ultimate goal of this course is to give participants the necessary tools to understand cell biology articles, to critically assess the findings reported in these papers and to communicate your interpretation of these findings. Timely and constructive feedback is essential in order for one to improve his/her abilities in this regard and you will benefit from two types of feedback.

1) Presentation feedback from instructor

At the end of the class on Thursdays (presentation day), I will provide a brief comment to the presenter (in private) on the quality of the presentation and will provide tips on how the presentation could be improved.

2) Peer feedback

The peer evaluation form provides space for you to write a brief comment (less than 30 words) regarding your colleague's performance. It is not required that you write something unless you have given the person a mark of '0'. Positive comments are encouraged. Comments must be *respectful and helpful*, ie. it is essential that the comments be *constructive* and provide your peer with the information necessary to improve. Peer feedback will be anonymous: comments will be typed, compiled and sent by email 3 times during the term (mid September, October and November). I reserve the right to edit or delete comments if I find anything abusive or inappropriate.

Video debate project

Hardly a week goes by without hearing about a discovery or accomplishment in the biological sciences that could potentially have significant impact on health, society or the environment. The potential ramifications of the advances are often unsettling to various degrees. Each team will make a 15 to 20-minute video episode that defends one side of a debate topic. The target audience for the video is fellow undergraduate students with a basic knowledge of biology. We will listen to all podcasts during class time at the end of the semester. Before a topic is raised, each student will record their opinion before and after hearing the two sides. This is in the style of an Oxford debate. The goal is to change as many minds as possible. Along with a 15-20 minute video file, each group will submit a "*production document*" explaining the role each student played in the preparation of the video and providing detailed reference list for the content used to create your video.

Details on marking criteria and links to open source video editing tools will be provided on Brightspace.

Important dates:

Thursday October 3rd: Submit detailed outline (storyboard)

Thursday November 28th: Video debate day (last day of class)

Final Exam (Date TBA by Registrar)

Material subject to examination:

1. The entire content of the lectures is subject to examination unless otherwise indicated. Slides that are meant as additional material and not subject to examination will be marked "FYI".
2. Only the lecture material is subject to exam. NOT the articles or video.

Course Content

The content of Advanced Cell Biology course consists in Lectures (usually 1 hr / wk) and article preparation (20 min / wk) and presentation (80 min / wk).

Typical weekly schedule:

An original research article will have been posted on Brightspace the preceding week and the students will have had time to read it entirely and to analyze in depth their assigned section.

On Tuesday: 1 hour lecture and 20 minute *jigsaw*. *Jigsaw groups* consist in groups formed with students from the four teams – see EVALUATION section above – that have analyzed in depth a section of the article assemble to explain the section to each other. For example, one student from each team may have analyzed the introduction of a paper

Between Tuesday and Thursday: Teams assemble to thoroughly explain their section of the paper to the other members of the team and to prepare their presentation.

On Thursday: PRESENTATION DAY. For each component of the article, the teams that will be presenting on this day will be announced by the instructor at the beginning of the class. The presenting students will then have 10 minutes to finalize their presentations before the presentations begin.

Lecture Content

The lecture content includes the study of pathways and molecular interactions that are relevant to the capture, transmission and interpretation of signals. In studying these pathways and interactions we will constantly go back to how they are involved in four key processes in higher vertebrates namely,

- Glucose homeostasis
- Phototransduction
- The cell cycle
- Synaptic transmission and cellular excitation

And if time permits

- The adaptive immune system

In most cases the topic of the article of the week will be aligned with the lecture. Please note however that the final exam will be on the lecture content only.

Faculty of Science Course Syllabus (Section B)
BIOL 4020.03 Advanced Cell Biology

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://www.dal.ca/academics/important_dates.html

University Grading Practices

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

Missed or Late Academic Requirements due to Student Absence (policy)

https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html

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/academic-advising.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/services-support/student-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>