DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus Fall 2021 (revised June 2021)

Department of *Biology*

BIOL 4220

Plant Cell Biology

Fall 2021

Instructor(s): Arunika Gunawardena e-mail arunika.gunawardena@dal.ca 494 1594

Office hours: Mondays and Wednesday from 1 to 2 pm. If not send an email and make an appointment

Office LSC 6076

Lectures: Mondays and Wednesdays 11.35 am to 12.55 pm, LSC 216

Laboratories: Lecture-based course but two labs will be conducted on advanced microscopy and tissue culture techniques

Tutorials: No

Course delivery: In-person (lectures will not be recorded, but all lecture slides and supporting documents will be uploaded on the class website prior to the lecture).

Course Description

This course covers the structure, function, and dynamic properties of plant cellular components including constituent organelles, cytoskeleton, and the cell wall. Current areas of research such as programmed cell death, cell signalling and cellular trafficking are discussed in depth. The course consists of lectures, discussions and student seminars.

Course Prerequisites

BIOL 2020.03 (or BIOA 2001.03) and BIOL 2004.03 or permission of the instructor

Course Exclusion

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Learning Objectives

After taking this course, a student will be able to:

• Describe the structure and dynamics of plant specific organelles such as the vacuole, chloroplasts and cell wall

• Obtain in-depth knowledge of advanced microscopic techniques such as confocal laser scanning microscopy and its uses in plant cell biology

• Describe in detail the process of photosynthesis and its various forms (C3, C4 and CAM) in different plant species

•Compare and contrast plant and animal programmed cell death

•Describe in detail different examples of programmed cell death in plant development

•Learn about current research on plant programmed cell death and their global applications

•Describe the cell signalling pathways involved in plant programmed cell death

•Design experiments to detect programmed cell death

•Develop better group discussions and oral presentation skills

Course Materials

The following chapters of these two textbooks are recommended for this course and they are available in the library on a short-term loan (2 hrs):

- For photosynthesis: Chapter 7 from 'Biology of Plants by Raven, Evert and Eichhorn' or Chapter 8 from 'Introduction to Botany' by Murray Nabors.
- For plant cell: Chapter 3 from 'Biology of Plants by Raven, Evert and Eichhorn' or Chapter 2 from 'Introduction to Botany' by Murray Nabors

For plant cell and programmed cell death: A selection of articles will be employed throughout the course. These articles will be selected from the online resources available at Dalhousie University or posted on the class website. In addition, students are responsible for finding literature for their seminars. Required journals can be accessed online through Dalhousie libraries website.

Suggested Journals: The Plant Cell, Annual Review of Plant Biology, Journal of Experimental Botany, Journal of Plant Physiology, Planta, Plant and Cell Physiology, Plant Cell and Environment, Plant Cell Reports, Plant Cell, Tissue and Organ Culture, Plant Molecular Biology, Plant Physiology, Trends in Plant Science, Plant Physiology and Biochemistry, The Plant Journal: for Cell and Molecular Biology, American Journal of Botany, Botany, PLoS One, BMC plant biology, Journal of experimental botany

Course website: BIOL4220 & BIOL5220 - Plant Cell Biology
All lecture slides and supporting documents will be uploaded on the class website prior to the lecture. Updates and announcements will also be posted regularly on the class website.

Course Assessment

This class will be composed of in-class examinations, class discussions, quizzes, and seminars during the scheduled class time.

Assessment	**Weight (% of final grade)**	**Date**	**Length of exam**
Quiz 1 and 2	15 %	Sep 22 and Nov 01 (tentatively)	15 mins each
Mid-term exam (in class)	35 %	Oct 13	75 mins
Seminar	25%	Starts from Nov 15	25 mins
(Seminar presentation due date)		Nov 14	
Attendance and participation in class discussions	5 %		
Final exam (in class)	20 %	Dec 07	60 mins

Other course requirements

- Class participation and 90 % attendance are required to pass the course.

Conversion of numerical grades to Final Letter Grades follows the <u>Dalhousie Common Grade Scale</u>

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)	

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Course Policies on Missed or Late Academic Requirements

The student must notify (in writing) the professor prior to the academic requirement deadline and must submit a completed Student Declaration of Absence (SDA) form. No more than two (2) separate SDA forms may be used.

Quizzes

• If quiz #1 is missed due to a valid reason, those marks will be re-distributed to quiz #2

• If quiz #2 is missed due to a valid reason, those marks will be re-distributed to the final exam

• If both quizzes are missed, only one will be re-distributed to the final exam

Seminar

• A seminar topic related to programmed cell death will be assigned to each student (15 mins long PowerPoint presentation followed by 10 mins questions).

15 %: Submitted on time, content, and organization

10 %: Delivery and answers to questions (includes evaluation by students too (see evaluation of class presentation form)

A seminar topic and the presentation date will be announced on the 20th of October. All the students should submit their seminar presentations by 6 pm on the 14th of November (penalty for late submission: 5 % reduction per day). Presentations and discussions are scheduled from 15 November to 01 December. Students are highly advised to stick to the assigned dates. If a student is unable to present on the given date due to a valid reason, the student should inform the professor ASAP.

• If a student misses more than two seminar presentations, the student will not have enough materials to prepare for the final exam. Therefore, participation in students' presentations is mandatory.

Exams

One makeup exam will be scheduled for any student(s) provided the examination was missed due to a valid reason

No plagiarism software will be used; however, students will be well informed that this course is governed by the academic rules and regulations outlined in the University Calendar by Senate.

Course Content

TOPIC-BY-TOPIC CLASS OUTLINE

08 September	Introduction
13 September	Photosynthesis 1
15 September	Photosynthesis II
20 September	Photosynthesis III
22 September	Quiz 1 and Plant Cell I
27 September	Plant cell II
29 September	Plant cell III
04 October	Advanced microscopy lab
06 October	Programmed cell death (PCD) I
11 October	Thanksgiving holiday
13 October	Mid-term exam
18 October	Programmed cell death (PCD) II
20 October	Programmed cell death (PCD) III

25 October	PCD in leaf morphogenesis
27 October	Guest lecture
01 November	Quiz 02 and PCD examples and presentation guidelines
03 November	Tissue culture lab
8-12 November	Study week
15 November	Xylem differentiation (Student seminar presentations followed by discussions starts from 15 Nov until 01 December)
17 November	Leaf senescence
22 November	Aerenchyma formation (cortical and vascular)
24 November	Hypersensitive cell death (virus) and (bacteria) and (fungus)
29 November	UV induced PCD, Salt induced PCD, and heat induced PCD
01 December	Shedding of root cap cells and Self-incompatibility induced PCD
06 December	Review
07 December	Final exam

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Faculty of Science Course Syllabus (Section B)

Fall 2021

Plant cell biology BIOL 4220

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

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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/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

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