

Faculty of Science Course Syllabus
Department of Biology
Plant cell biology BIOL 4220
Fall 2019

Instructor(s): Arunika Gunawardena arunika.gunawardena@dal.ca LSC 6076 494 1594

Lectures: Tuesdays and Thursdays 11.35 to 12.55 pm LSC 244

Laboratories: Lecture-based course but 1 lab will be conducted on advanced microscopy

Tutorials: ----

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

Prerequisite knowledge/skills

Know the basic structure of a cell
Recall basic plant processes
Describe the differences between plant and animal cells
Know the basic principles of light microscopy

Course objectives/Learning Outcomes

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

COURSE TEXT

The following text books are recommended for this course and they are available in the library:

Biology of plants by Raven et al
 Introduction to Botany by Murray Nabors
 Plant programmed cell death by Arunika Gunawardena and Paul McCabe

Additional reading: Plant cell biology, Plant cell culture, Plant cells and tissues

A selection of articles will be employed throughout the course. These will be selected from online resources available at Dalhousie University or they will be posted on the class website. In addition, students are responsible for finding literature for their seminar. Required journals can be accessed through Dalhousie online services.

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 lectures will be uploaded onto the class website prior to the class.

Course Assessment

This class will be composed of in-class examinations, class discussions and a seminar

Component	Weight (% of final grade)	Date
Quiz 1 and 2	10%	Sep 12 and Nov 07 (tentatively)
Mid-term exam (in class)	40 %	Oct 08
Seminar*	20%	From Oct 17
Attendance and participation in class discussions	5 %	
Final exam (in class)	25 %	Nov 28

* A topic related to PCD will be assigned to each student (15 mins long power point presentation followed by 10 mins questions)

Seminar presentation:

- 10 %: submitted on time, content, delivery and organization
- 5%: answers to questions
- 5%: evaluation by students (see evaluation of class presentation form)

Other course requirements

Students should submit their presentations to the professor **24 hrs prior** to the actual presentation date/time.

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

Class participation and 90 % attendance is required to pass the course. Attendance will be taken and without a valid reason* supplemental exams will not be offered.

*A 'valid reason' includes a medical reason (doctor's note dated on the day that was missed), a serious family emergency (documented proof will be required), or an important appointment/ meeting that cannot be moved (proof will be required).

Course Content

TOPIC-BY-TOPIC CLASS OUTLINE

03 September	Introduction + Photosynthesis I
05 September	Photosynthesis II
10 September	Photosynthesis III
12 September	Quiz 1 and Plant Cell I
17 September	Plant Cell II
19 September	Plant cell III
24 September	Confocal/Transmission electron microscopy/Plant tissue culture lab
26 September	Programmed cell death (PCD) I
01 October	Programmed cell death (PCD) II
03 October	Programmed cell death (PCD) III
08 October	Mid-term exam
10 October	PCD in leaf morphogenesis I
15 October	PCD in leaf morphogenesis II
17 October	Xylem differentiation
22 October	Leaf senescence
24 October	Aerenchyma formation (cortical and vascular)
29 October	Hypersensitive cell death (virus) and (bacteria) and (fungus)
31 October	UV induced PCD and Salt induced PCD and heat induced PCD
05 November	Deletion of endosperm, deletion of embryonic suspensor and deletion of aleurone layer
07 November	Quiz 2 and compare and contrast developmentally regulated plant PCD with environmentally induced plant PCD
11-15 November	Study week
19 November	Shedding of root cap cells
21 November	Self-incompatibility induced PCD and Lateral and adventitious root emergence
26 November	Role of chloroplast in plant PCD, Role of vacuole in plant PCD, Role of reactive oxygen species (ROS) in plant PCD
28 November	Final exam
03 December	Monday classes will be held

Faculty of Science Course Syllabus (Section B)
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 the office (Rm 3037, McCain Building), e-mail (elders@dal.ca) or leave message (902-494-6803).

Information: https://www.dal.ca/campus_life/communities/native.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

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>

Aboriginal Student Centre: https://www.dal.ca/campus_life/communities/native.html

Black 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 Services: https://www.dal.ca/campus_life/health-and-wellness/health-services/services.html

Counselling: https://www.dal.ca/campus_life/health-and-wellness/counselling.html

Student Advocacy: <https://www.dsu.ca/services/community-student-services/student-advocacy-service>

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

Safety

Research Lab Safety

https://www.dal.ca/content/dam/dalhousie/pdf/dept/safety/lab_policy_manual_2007.pdf

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>