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.


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

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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.

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

Safety

Research Lab 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