



BOT*3310 Plant Growth and Development

Winter 2018

Sections(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 1.00 - January 02, 2018

1 Course Details

1.1 Calendar Description

In this course the unique function and structure of plants is explored in relation to their growth, survival and adaptation to the environment. The control of growth and development by environmental and hormonal signals is explained through lectures and "hands-on" laboratories.

Pre-Requisite(s): BIOL*1090, (BIOL*1070 or BIOL*1080)

1.2 Course Description

This course explores the basic foundations of plant growth and development. Emphasis will be on unique aspects of plants, ranging from the single cell to the whole organism, and integration of events at the cellular level with whole plant development. Topics include basic plant structure and morphology, growth regulators, hormones and signaling, photomorphogenesis, vegetative and reproductive development, flower formation, cellular and sub-cellular components and their connection to plant form, and plant/environment interactions. Molecular and genetic mechanisms underlying plant physiology will be a central theme of this course. The laboratory component offers students hands on experience in modern methods of plant analysis using the model plant *Arabidopsis thaliana*.

1.3 Timetable

Lectures and Laboratories:

- Lectures: 12:30-1:20 Monday, Wednesday, Friday in **MacKinnon, Rm. 121**
- Laboratories: 2:30-5:20 Monday or Tuesday, **SSC 3304**
- **Note:** Labs begin on **Jan. 15** or **Jan. 16**, depending on your section.

1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructor(s)

Annette Nassuth

Email: anassuth@uoguelph.ca

Telephone: +1-519-824-4120 x58787

Office: SSC 4459

Office Hours: Best is to contact me directly after a lecture or during labs. You can also e-mail me to schedule an appointment.

2.2 Instructional Support Team

Lab Co-ordinator: Chris Meyer

Email: cmeyer02@uoguelph.ca

Telephone: +1-519-824-4120 x53955

Office: SSC 3507

2.3 Teaching Assistant(s)

Teaching Assistant: Mark Minow

Email: mminow@uoguelph.ca

Teaching Assistant: Lilia Virta

Email: lvirta@uoguelph.ca

3 Learning Resources

A basic understanding of Genetics and Molecular Biology is required for understanding important aspects of this course. Students might also want to read basic information on Plant Physiology to more easily follow the lectures.

3.1 Required Resources(s)

Notes on lectures (Notes)

YOU ARE EXPECTED TO TAKE NOTES during lectures - the lecture notes posted in the course link are not complete!

Information supplied during lectures (Readings)

In addition to the text, sources of information and accessory information, usually scientific papers and web site URLs, will be provided in class and subsequently posted on *CourseLink*.

3.2 Recommended Resources(s)

Plant Physiology (text book) (Textbook)

The HIGHLY recommended textbook for this course, "**Plant Physiology, 6th edition (2015) by L. Taiz, E. Zeiger, I.M. Møller and A. Murphy**", is available in the bookstore and on reserve in the library.

Principle of Genetics (Textbook)

The book "Principle of Genetics", by Snustad and Simmons (any edition) can give you good background information in genetics.

Biology of Plants (Textbook)

"**Biology of Plants**" 8th edition (2013) by R.F. Evert and S.E. Eichhorn, is recommended for students who like to read a bit simpler text than Taiz et al to prepare themselves. This book is used, and therefore on reserve, for BOT2100.

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Understand structure and function of tissue and organs of higher plants.
 2. Demonstrate knowledge of phytohormones and their role in plant growth.
 3. Decipher molecular signal transduction pathways based on genetic makeup.
 4. Understand the role of environmental interactions in plant growth.
 5. Design experimental protocols to identify mutant phenotypes.
 6. Collaborate effectively with fellow students in performing lab experiments.
 7. Carry out lab experiments with minimal supervision.
 8. Interpret data and findings in the context of primary scientific literature.
 9. Design a scientific poster describing qualitative and quantitative data.
 10. Explain data on poster to colleagues and defend conclusions.
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5 Teaching and Learning Activities

5.1 Lab

Week Jan 15 - week Mar 26

Topic(s): Independent Research Project - Collecting Data

Week Mar 26

Topic(s): Independent Research Project - Poster Preparation

Week April 2

Topic(s): Independent Research project - Poster Presentation

5.2 Tentative Lecture Schedule

- Week 1: Jan. 8 - 12
 - Overview of course
 - Unique and important features of plants, plant structures and organs (shoot, root, flower)
 - Embryogenesis and meristems, position-dependent signaling
- Week 2: Jan. 15 -19
 - Genetic feedback loops and organ specification, meristem function, SAM and RAM
 - Gene reporter constructs and mutants
 - Meristem function and molecular mechanisms of organ formation
- Week 3: Jan. 22 - 26
 - Organ differentiation, patterning and phyllotaxy, RAM
 - Position vs lineage, periclinal chimeras
 - Leaf development
- Week 4: Jan. 29 – Feb. 2
 - Trichomes, root hairs and stomata

- Photoreceptors, red and blue light signaling
- Molecular signal transduction and development
- Week 5: Feb 5 - 9
 - Auxin gradients and organ specificity
 - Auxin and polar growth, organ movement
- Week 6: Feb. 12 - 16
 - NO LECTURE Monday February 12
 - Gibberellins and cell expansion, seed germination
 - **MIDTERM EXAM:** Friday February 16, 2018 (TENTATIVE)
- WINTER BREAK: February 19-23
- Week 7: Feb. 26 – Mar. 2
 - Cytokinins and cell division
 - Ethylene and senescence
- Week 8: Mar. 5 - 9
 - Abscisic acid and stress response
 - Abiotic stress signaling and development
 - Cold tolerance
- Week 9: Mar. 12 - 16
 - Jasmonic acid and plant defense
 - Comparison between signaling pathways
- Week 10: Mar. 19 - 23
 - Water movement and plant vasculature
 - Photosynthesis and carbon assimilation, sink/source relations and transport
- Week 11: Mar. 26 – 30
 - How plants tell time
 - Photoperiod response and circadian rhythms
- Week 12: Apr. 2 – April 6
 - Flowering and floral induction, vernalization and plant memor
 - REVIEW
- **FINAL EXAM:** April 13, 2018, 8:30-10:30 ROOM TBA

6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Midterm Exam (in class)	25.00
Lab Reports	20.00
Poster Presentations	20.00
Final Exam	35.00
Total	100.00

6.2 Assessment Details

Midterm Exam (in class) (25.00%)

Date: Fri, Feb 16, 12:30 AM - 1:20 AM

Lab Reports (20.00%)

Four independently written reports worth 20% in total. See Lab 1 supplementary for more information.

Poster Presentations (20.00%)

- Poster Quality, Defense: 15%
- Peer Evaluation: 5%

Final Exam (35.00%)

Date: Fri, Apr 13, 8:30 AM - 10:30 AM, TBA

7 Department of Molecular and Cellular Biology Statements

7.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

7.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist.
<http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

7.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance.
<https://www.uoguelph.ca/counselling/>
- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>

- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.uoguelph.ca/~ksomers/>
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8 University Statements

8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The regulations and procedures for [Academic Consideration](#) are detailed in the Undergraduate Calendar.

8.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

8.6 Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and

students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The [Academic Misconduct Policy](#) is detailed in the Undergraduate Calendar.

8.7 Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

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