BOT*3310 ~Plant Growth and Development~
Winter 2016

Course Description:

This course explores the basic foundations of plant growth and development. Emphasis is on unique aspects of plants, ranging from molecular genetic mechanisms to the whole organism, and integration of events at the cellular level with plant physiology and 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*.

Instructors:

Dr. Joseph Colasanti
Molecular and Cellular Biology
Science Complex, Rm. 4467
email: jcolasan@uoguelph.ca

Dr. Reynald Tremblay
Molecular and Cellular Biology
Science Complex, Rm. 4443
email: reynaldt@uoguelph.ca

Laboratory Coordinator:

Dr. Chris Meyer
Molecular and Cellular Biology
Science Complex, Rm. 3507
email: cmeyer02@uoguelph.ca

Teaching Assistants:

Kiah Barton
Mark Minow

Recommended Reading Sources:

The assigned textbook for this course, "**Plant Physiology and Development**, **6th edition (2015) by L. Taiz, E. Zeiger, I.M. Møller and A. Murphy** is available in the bookstore. 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*. A basic understanding of Genetics and Molecular Biology is required in order to understand important aspects of this course. A recommended textbook is "Principle of Genetics", by Snustad and Simmons (any edition).

Lectures and Laboratories:

Lectures: 12:30-1:20 Monday - Wednesday - Friday in **Animal Science ANNU 156**
Laboratories: 2:30-5:20 Monday or Tuesday, **SCIE 3303**

Note: Labs begin on **Jan. 18** or **Jan. 19**, depending on your section.

Course Structure: The course will consist of lectures by instructors and evaluation of student performance in the labs, which includes poster presentations by groups of student, evaluations of each other's posters, and description of scientific procedures and experiments in a laboratory notebook. Evaluation will be based on the following:

	% of Final Mark
Midterm Exam: (in class)	25%
FINAL EXAM:	35%
Laboratory work:	40%

- Components for lab evaluation:
  - 1) Lab Notebook/Data recording 20%
  - 2) Poster Presentations 20%
    - (poster quality, defense 15%)
    - (peer evaluation: 5%)

LECTURE SCHEDULE (tentative)

Week 1: Jan. 11 - 15
Overview of course
- Unique and important features of plants, Plant structures and organs (shoot, root, flower)
- Embryogenesis and meristems, molecular mechanisms of organ formation

Week 2: Jan. 18 – 22
- Genetic feedback loops and organ specification, meristem function, SAM and RAM maintenance
- leaf initiation, patterning and phyllotaxy, position vs lineage, periclinal chimeras

Week 3: Jan. 25 - 29
- Auxin gradients and organ specificity
- Water and solute movement, vascular structure, carbon assimilation and transport
- Gene reporter constructs, methods of gene expression visualization

Week 4: Feb. 1 – 5
- Photoreceptors, light signalling and development, phototropism and gravitropism
- Molecular signal transduction and development
*** LAB LECTURE DAY 1 (Friday, Feb. 5)**

Week 5: Feb. 8 – 12
- Light perception and development
- Photoreceptors and developmental signalling

~~~~~~~~~~~~~~~~~~~W I N T E R B R E A K ~~~ February 15 – 19 ~~~~~~~~~~~~~~~

Week 6: Feb. 22 - 26
- Photosynthesis and carbon assimilation, sink/source relations
- Water movement and plant vasculature

MID-TERM EXAM: Friday, February 26, 2016 (TENTATIVE)

Week 7: Feb. 29 – Mar. 4
-Phytohormones and development:
- Auxin and polar growth, organ movement
*** LAB LECTURE DAY 2 (Friday, Mar. 4)**

Week 8: Mar. 7 - 11
- Phytohormones and development:
- Gibberellins and cell expansion, seed germination

Week 9: Mar. 14 – 18
- Phytohormones and development:
- Cytokinins and cell division

Week 10: Mar. 21 - 25
- Phytohormones and development:
- Ethylene, abscisic acid and stress response
- Newly discovered phytohormones
*** LAB LECTURE DAY 3 (Friday, Mar. 25)**

Week 11: Mar. 28 – April 1
- Photoperiod response and circadian rhythms
- How plants tell time

Week 12: April 4 – April 8
- Flowering and floral induction, florigen
- Plant response to environment

***** NOTE: The 3 **LAB LECTURES** will be in the **LAB** (SC 3303/3304)

Week 12: POSTER PRESENTATIONS – April 4 & 5, 2016

~~~~~~~~~~~ FINAL EXAM: April 20, 2016 ~~~~~~~~~~

Learning Outcomes

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

1. Understand structure and function of tissues 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.

Course and University Policies

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, and be prepared to provide supporting documentation. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the SAS website

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 submission.

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.

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> email account regularly: email is the official route of communication between the University and its

students. Also please note, email questions that can be easily answered by looking at the course outline information or material posted on CourseLink, will not be answered.

Drop Date
The last date to drop one-semester Winter 2015 courses, without academic penalty, is Friday March 6. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar.

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.

Recording of Materials
Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

CAMPUS RESOURCES

The Undergraduate Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:

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

Make an appointment with a Program Counsellor in your degree program.

If you are struggling to succeed academically:

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.

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.

Student Health Services is located on campus and is available to provide medical attention.

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.

If you have a documented disability or think you may have a disability:

The Student Accessibility Services (SAS) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability.