

# BIOC31 H3

## Plant Development and Biotechnology

### Winter 2015

#### COURSE INSTRUCTOR AND CONTACTS

*Instructor:* Prof. Sonia Gazzarrini

*Time/room:* Wednesdays, 11am – 1pm; room BV 355

*Office hours:* Mondays, 11am - noon; room SY222 (New Science Research Building – SRB) or by appointment

*email:* [gazzarrini@utsc.utoronto.ca](mailto:gazzarrini@utsc.utoronto.ca)

**Note:** email only for important matters; questions involving detailed answers about lectures and lecture notes will be addressed during office hours or by appointment.

*TA:* Eliana Vonapartis

*email:* [eliana.vonapartis@mail.utoronto.ca](mailto:eliana.vonapartis@mail.utoronto.ca)

#### COURSE REQUIREMENTS

**Course prerequisites:** BIOC10H (Cell Biology); BIOC11H (Molecular Aspects of Cellular & Genetic Processes)

#### COURSE DESIGN AND OBJECTIVES

The central question of developmental biology is how does a single cell become a complex organism. What are the “factors” that control the behavior of cells? Plants and animals evolved multicellularity independently. Surprisingly, the mechanisms that generate patterns of cells, tissues and organs are similar! However, different genes are used by plants and animals to generate these patterns. This course will discuss molecular mechanisms that control developmental processes in plants, such as embryo, root, shoot and flower development.

## READING MATERIAL AND LECTURE NOTES

This course is based solely on examination of current and past literature.  
No textbook is assigned.

- Required reading material for the course will be available as URL on Blackboard.
  - *NB: You will be expected to have completed all readings by the indicated lecture dates.*
- Lecture notes will be posted on Blackboard as PDF files before lectures.

## REFERENCE BOOKS

*Selected chapters from:*

1. *Mechanisms in Plant Development.* Leyser O. and Day S.
2. *Molecular Genetics of Plant Development.* Howell S. H.
3. *The Arabidopsis Book (online):* <http://www.bioone.org/loi/arbo.j>

## Grade Breakdown

10% Quiz 1 (~ week 3 or 4, in class)  
35% Midterm test (week 8; Feb 25 in class)  
15% Quiz 2 (~ week 11, in class)  
40% Final exam (TBA)

Format for quizzes, tests and final exam: multiple-choice questions and short answers.

**Missing tests or Midterm exam:** a UTSC medical certificate filled in by a Medical Doctor will be required.

## **LECTURE TOPICS**

### **Introduction: molecular genetics of plant development**

- Molecular analysis of plant development: tools to study gene and protein expression patterns
- Gene transfer into plants: generation of transgenic plants
- Genetic analysis of plant development: generation of mutants by forward and reverse genetics

### **Embryo development: pattern formation from a single cell**

- Cell fate and positional information
- Auxin signaling, polar auxin transport and apical-basal polarity
- Root meristem (RM) and the role of auxin
- Radial polarity and intercellular communication

### **Vegetative development**

- Shoot apical meristem (SAM): initiation, maintenance and extracellular signaling
- Stem cells
- Development of organ polarity

### **Reproductive development**

- Inflorescence (IM) and floral (FM) meristems
- Development of floral organ identities: the ABCD model and homeotic mutations

### **Hormone signaling pathways and hormone cross-talk**

### **Comparative study of plant and animal development**

### **Plant Biotechnology**

(NB: Lecture topics and dates may change)

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### **ACCESSABILITY STATEMENT**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in S302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca).

### **ACADEMIC INTEGRITY STATEMENT**

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behavior on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

IN PAPERS AND ASSIGNMENTS: Using someone else's ideas or words without appropriate acknowledgement. Submitting your own work in more than one course without the permission of the instructor. Making up sources or facts. Obtaining or providing unauthorized assistance on any assignment.

ON TESTS AND EXAMS: Using or possessing unauthorized aids. Looking at someone else's answers during an exam or test. Misrepresenting your identity.

IN ACADEMIC WORK: Falsifying institutional documents or grades. Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes. All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behavior on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behavior or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see <http://www.utoronto.ca/academicintegrity/resourcesforstudents.html>).