

UNIVERSITY OF CALGARY
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. Course: PLANT BIOLOGY 543 - PLANT CELL AND DEVELOPMENTAL BIOLOGY

Lecture Section: L01 TR 12:30-13:45 ST 125 Winter 2017

Lab Section: B01 T 09:00-11:50

Course Coordinator/

Instructor(s): Dr. M. Samuel BI 392 210-6459 msamuel@ucalgary.ca

Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

D2L course name: BOTA 543 Plant Cell and Developmental Biology

2. **PREREQUISITES:** Biology 331, and one of Botany 303 or 321 or Plant Biology 403 or 421.

NOTE: Students may not register in a course unless they have a grade of at least C⁻ in each prerequisite course.

See section 3.5.C in the Faculty of Science section of the online Calendar

(<http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html>)

3. **GRADING:** The University policy on grading and related matters is described in “Academic Regulations, sections F.1 and F.2” of the online University Calendar (<http://www.ucalgary.ca/pubs/calendar/current/f-1.html> and <http://www.ucalgary.ca/pubs/calendar/current/f-2.html>) In determining the overall grade in the course the following weights will be used:

| | | |
|----------------------------------|-----|-----------------|
| Mid-Term examination | 30% | Feb 28 (In lab) |
| Research Paper and Presentations | 15% | |
| Class Participation | 5% | |
| Final written examination | 30% | |
| Lab Evaluation and report | 20% | |

(There will be a final examination scheduled by the Registrar.)

A passing grade is not essential in each component of the course, although participation in each component is mandatory to pass the course.

Each piece of work (presentation, class participation, laboratory report, midterm test or final examination) submitted by the student will be assigned a percentage score. The student’s average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade

4. **Missed Components of Term Work.** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in section 3.6: <http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html>. It is the student's responsibility to familiarize himself/herself with these regulations. See also <http://www.ucalgary.ca/pubs/calendar/current/e-3.html>.

5. Dates and times of class exercises held outside of class hours

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

Midterm Exam Tuesday, Feb. 28, 09:00-11:00 In Lab

6. **EXAMINATION POLICY:** No electronic or written aids (eg. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper. Students should also read the Calendar, Section G, on Examinations: <http://www.ucalgary.ca/pubs/calendar/current/g.html>.

7. Course Materials: TEXT: Recommended: Mechanisms of Plant Development. Leyser, O. And Day, S. Blackwell Publishing, 2003. Plant Biology: Alison M. Smith, George Coupland et al., Published by Garland Science, 2010
8. In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also <http://www.ucalgary.ca/pubs/calendar/current/e-2.html>.
9. **STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS.** See also <http://www.ucalgary.ca/pubs/calendar/current/e-5.html>.

10. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) Misconduct: Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties.
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf.

Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email addy@ucalgary.ca or phone 403 220-3140.
- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: suvpaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

Department Approval _____ ORIGINAL SIGNED _____ Date _____
PLBI 543 co; 24/10/2016 13:37

BOTANY 543 – WINTER 2017
LECTURE TOPICS AND SCHEDULE

| Date | Topic | Lecturer | # of Lectures |
|------------------------|---------------------------------------------------------------------|-----------------|----------------------|
| Jan. 10 | Introduction to Plant Development | M. A. Samuel | 1 |
| Jan. 12, 17, 19 | Embryogenesis and the Emergence of the Basic Body Plan | M. A. Samuel | 3 |
| Jan. 24, 26 | Cell biology of development | M. A. Samuel | 2 |
| Jan 31, Feb 2, 7 | Molecular Basis of embryogenesis and meristem development | M. A. Samuel | 3 |
| Feb. 9, 14, 16 | Flower Development | M. A. Samuel | 3 |
| Tuesday, Feb 28 | MIDTERM EXAMINATION (during lab) | | |
| Mar 2, 7, 9 | Cell-cell signaling during pollen-pistil interactions | M. A. Samuel | 3 |
| Mar 14, 16, 21, 23 | Molecular mechanisms of hormonal signaling during plant development | M. A. Samuel | 4 |
| Mar 28, 30, Apr 4 | Senescence and Programmed Cell Death | M. A. Samuel | 3 |
| Apr 6, 11 | Student presentations | M. A. Samuel | 2 |

LABORATORY SCHEDULE

- Jan. 24 1) Identification of Developmental Mutants of Arabidopsis
- Jan 31, Feb. 7 2) Isolation of T-DNA insertion lines through PCR
- Mar 7 3) Study of pollen-pistil interactions using fluorescence staining and microscopy
- Mar 14, 21 4) ABA sensitivity assays to isolate Arabidopsis ABA mutants
- Mar 28, Apr 4 5) Identification of senescence mutants - Use of DEX-inducible vector

Grading scale:

| | |
|------|----|
| 95 | A+ |
| 90 | A |
| 85 | A- |
| 80 | B+ |
| 75 | B |
| 70 | B- |
| 65 | C+ |
| 61 | C |
| 57 | C- |
| 54 | D+ |
| 50 | D |
| <50% | F |

PLBI 543 (M Samuel)

1. Understand the big picture of plant evolution through independent lineage and the presence of progressive development.
2. Understand plant embryonic development and how a seedling serves as a reference for an adult plant
3. Understand functional redundancy and how genome duplication events have led to extreme functional redundancy using the auxin transporters and their role in embryo development
4. Understand the importance of shoot apical meristem and stem cell niche in progressive development of shoots. Students should be able to clearly delineate differences between cell division and cell differentiation that is required to balance stem cell and organ growth.
5. Understand the root apical meristem and how the root architecture develops from the root meristem. Through this students learn about cell-cell communication and cell signaling
6. Understand the role of the antagonistic interaction between Auxin and Cytokinin in regulating shoot and root development
7. Learn and apply concepts of homeotic genes and homeotic mutations using the ABC model for flower development
8. Understand plant reproduction and the role of self-incompatibility in promoting hybrid vigor. Learn about the active rejection pathway of self-incompatibility. Student learn about vesicle trafficking and post-translational modifications through this topic
9. Learn about various hormonal signaling pathways that influence plant development. Learn the most recent advances in Auxin and ABA signaling
10. Learn plant senescence process and how it helps to mobilize resources to the developing seed. The various molecular and sub-cellular processes involved during plant senescence are also introduced.