



UNIVERSITY OF CALGARY  
FACULTY OF SCIENCE  
DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE

**1. Course: BIOLOGY 453 – PLANTS IN THEIR ENVIRONMENT**

Lecture Sections: L01 MWF 14:00-14:50 SA 129 WINTER 2017

Course Coordinator: Dr. L. Harder

Instructor(s): Dr. L. Harder BI 276A 220-6489 harder@ucalgary.ca  
Dr. H. Addy EEEL 235C 220-8963 addy@ucalgary.ca

Desire 2 Learn (D2L) course name: BIOL 453 L01 – (Winter 2017) – Plants in their Environment  
Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

**2. PREREQUISITE(S):** Biology 313 and either Botany 303, Biology 371 or PLBI 403

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 sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

<b>First half of the course</b>	<b>50%</b>	
Learning assessments	2%	
Quizzes (individual and group*)	8%	
In-class group assignments*	3%	
Paper	10%	
Midterm exam	27%	Thursday March 2, 6:30-8:30 pm ENC 70
<b>Second half of the course</b>	<b>50%</b>	
Quiz	8%	
Paper (individual and group*)	12%	
Final exam	30%	(Scheduled by the Registrar)

\*A component of the grades for group assessments will involve peer evaluation by other members of each student’s team.

**To pass the course as a whole, a student must obtain a passing grade (50%) on both the midterm and the final examinations.**

Each piece of work submitted by a student will be assigned a percentage score. A student’s average percentage score for the various components listed above will be weighted as indicated above to calculate the overall percentage for the course, which will be used to determine the course letter grade. The following grading scheme identifies the maximum thresholds for letter grades that will be applied in this course: thresholds may be lowered to establish the final grade distribution.

Threshold	Letter Grade
92%	A+
88 %	A
84 %	A-
80 %	B+
76 %	B
72 %	B-
68 %	C+
64 %	C
60 %	C-
56 %	D+
50 %	D
<50 %	F

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](#). It is a student's responsibility to familiarize herself/himself with these regulations. See also [Section E.6](#) of the University Calendar

5. **Scheduled out-of-class activities:** Dates and times of approved class activities held outside of class hours.

Midterm	Thursday, March 2	6:30-8:30 pm	Location ENC 70
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There will be a final examination scheduled by the Registrar

**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.

6. **Course Materials:** There is no textbook for this course, but books placed on reserve in the Taylor Family Digital Library (see list on last page) provide excellent reference material. In addition, for some topics, links to relevant and/or assigned readings will be provided on D2L.

**Online Course Components:** Some teamwork resources are provided by ITPMetrics, a University of Calgary-based system of secure web-based tools for forming teams and doing peer evaluations. These tools are free to all students and are not dependent on prior access.

7. **Examination Policy:** No calculators or electronic devices are permitted for quizzes and exams. Students should also read the Calendar, [Section G](#), on Examinations.

8. **Writing across the curriculum statement:** In this course, the quality of the student's writing on assigned papers will be a factor in the evaluation of those papers. See also [Section E.2](#) of the University Calendar.

9. **Human studies statement:** Students in the course are not expected to participate as subjects or researchers. See also [Section E.5](#) of the University Calendar. See also <http://www.ucalgary.ca/pubs/calendar/current/e-5.html>.

10. **Use of living and dead organisms:** Students will not be expected to handle organisms during this course.

#### 11. 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](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](mailto: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 (FOIPPA). 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: [suypaca@ucalgary.ca](mailto:suypaca@ucalgary.ca) SU Faculty Rep. Phone: 403 220-3913 Email: [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca) and [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca);

- (g) Student Ombuds Office: 403 220-6420 Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca); <http://ucalgary.ca/provost/students/ombuds> **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 during 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](http://www.ucalgary.ca/usri)). Your responses make a difference - please participate in USRI Surveys.

### **Biology 453 Learning Outcomes**

After completion of this course, successful students should be able to:

- Compare and contrast the various nutrient pools in terms of the availability of nutrients in that pool to plants. For pools containing unavailable nutrients, explain what processes must happen to make nutrients available to plants.
- Explain how plant symbioses with microorganisms (mycorrhizal fungi, nitrogen-fixing and other bacteria) influences the availability of nutrients in different pools to plants
- Analyze the costs and benefits of symbiosis with microorganisms to both partners
- Give examples of plant interactions with animals as prey, herbivores and pollinators; explain how these interactions influence plant growth and distribution
- Categorize plant defense mechanisms into structural, constitutive biochemical, and induced biochemical responses, evaluating the cost and benefits of each mechanism
- Provide and explain examples of how flowers and pollinators have evolved physiological compatibilities
- Identify strategies by which plants attract pollinators as well as strategies that allow plants to minimize pollen herbivory and maximize pollen transfer
- Write a concise and accurate summary or critique of articles from the primary literature

Department Approval  ORIGINAL SIGNED  Date \_\_\_\_\_

Associate Dean's Approval for  
out of regular class-time activity:  ORIGINAL SIGNED  Date: \_\_\_\_\_  
B453co W17;11/17/2016 3:03 PM

**Welcome to Plants in Their Environment!** The sessile nature of plants poses significant challenges for their interactions with abiotic and biotic components of their environments. During this course, we will investigate the mechanisms and processes that direct plant development and allow them to grow, survive and reproduce under the highly variable conditions found in nature. You will learn about the integrated and coordinated physiological processes that enable plants to grow and maintain themselves and the interactions with other organisms that affect their survival and reproduction. This course will focus on broad areas of plant physiological and ecological research and antagonistic and mutualistic interactions with microorganisms and animals. We will investigate some of these issues through class discussions and other activities.

There is no textbook for this class, but books placed on reserve in the Taylor Family Digital Library (see list on the last page of this document) provide excellent reference material. In addition, the instructors will provide relevant readings on D2L to help you understand concepts more completely.

The overarching course objectives are to:

- convey and foster an understanding of the major principles and concepts of how plants interact with their environment;
- sharpen the ability to reason logically and evaluate information critically; and
- promote understanding of the logic involved in the design, analysis, and interpretation of scientific experiments.

OVERVIEW OF LECTURE SCHEDULE*		
DATE (APPROXIMATE)	TOPIC	INSTRUCTOR
Jan. 9	Introduction to the course	H. Addy
Jan. 11 – Feb. 17	Plant nutrient acquisition: How do biotic interactions help plants obtain nutrients?	
<b>Feb. 19 – 26</b>	<b>Reading Days; no classes</b>	
Feb. 27	In-class review	
March 2	<b>Midterm Exam (6:30-8:30 pm; ENC 70)</b>	
Mar. 1 – Mar. 13	Herbivory and plant defence	L. Harder
Mar. 15 – Apr. 12	Reproduction: environmental influences on pollination, seed production and success, mating and sexual systems	

**\*Consult the detailed class schedule provided on D2L**

**Lecture exams:** Exams will be based primarily on information presented in class, but may also include information from course readings. Each instructor will inform you what lecture information will be available on D2L. The final exam will emphasize material presented during the second part of the course (see lecture outline), but may also include questions that draw on information presented during the first part.

**Papers:** There are two papers in this class. These assignments are designed to help you develop your skills to: summarize key information from scientific papers effectively, to analyze results critically and build understanding from multiple research papers. You will complete the final lecture assignment in a small group. More information about these assignments and their evaluation will be provided in class and on D2L.

**Policy on Late Assignments:** Lecture Assignments are due at the start of class, unless announced otherwise. Late assignments will not be accepted and will be graded as a zero unless you provide documentation supporting a valid reason for handing in an assignment late within 48 hours of the assignment deadline (see the University Calendar). Valid reasons (and required documentation) are:

- personal illness (doctor's note on official stationery);
- death of family member or person close to you (documentation from funeral home);
- family emergency (doctor's note or Counselling Centre report, on official stationery);
- sports team absence (coach's letter).

We strive to create a comfortable, interesting learning environment for everyone, and we welcome feedback at any time. This class will require active participation in all class sessions for you to benefit fully from class activities. For our part, we will strive to provide you with a positive learning experience. Specifically, we will:

- Be respectful of all persons in the class and create an environment in which all opinions and comments are heard and valued.
- Be available outside of class time to discuss course work or other course concerns (or just to chat!).
- Encourage you to investigate fully and think critically about course content.
- Encourage you to develop written communication skills.
- Provide you with instructional material through lectures and on-line material that will help you to excel in this course.
- Develop activities that allow you to construct meaning about physiological and ecological processes.
- Assess all assignments fairly and provide suggestions and comments for improvement.

RESERVE READING LIST – Taylor Family Digital Library

	<b>AUTHOR</b>	<b>TITLE</b>	<b>PUBLISHER</b>	<b>CALL NUMBER</b>
1.	Fitter A.	Environmental physiology of plants	Academic Press	QK711.2 F58 2001
2.	Gregory, P. J.	Plant roots: growth, activity, and interaction with soils	Blackwell Publishing	QK644 .G74 2006
3.	Herrera, C. M., Pellmyr, O.	Plant-animal interactions: an evolutionary approach	Blackwell Science	QH549.5 INTERNET
4.	Karban, R. Baldwin, I. T.	Induced responses to herbivory	University of Chicago Press	QK923 INTERNET
5.	Larcher W.	Physiological plant ecology	Springer	QK905 L3713 2003
6.	Waisel, Y.	Plant roots: the hidden half	Marcel Dekker	QK644 .P53 1996
7.	Wilmer, P	Pollination and floral ecology	Princeton University Press	ISBN 9780691128610