



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

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

Lecture Sections: L01 MWF 12:00-12:50 ENG 224 WINTER 2019

Course Coordinator/
Instructor: Dr. H. Addy EEEL 235C 220-8963 addy@ucalgary.ca

Desire 2 Learn (D2L) course name: BIOL 453 L01 – (Winter 2019) – 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>)

BIOL 453 Learning Outcomes. After completion of this course, the successful student will be able to demonstrate the following skills, knowledge and abilities:

1. **Course content mastery**

- Describe the plant microbiome and explain its role in plant nutrition, defense and distribution; explain the implications of this microbiome for humans (e.g. human health)
- 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 (e.g. mycorrhizal fungi, nitrogen-fixing and other bacteria) influence the availability of nutrients in different pools to plants
- Analyze the costs and benefits of symbiosis with microorganisms to both partners
- Explain how plants use carnivory to obtain nutrients from additional sources of nutrients
- Identify strategies by which plants balance defense/carnivory strategies with strategies to attract pollinators
- Compare and contrast various plant defense mechanisms (constitutive, induced, direct and indirect responses)
- Explain how plants enlist other organisms in defense and the costs/benefits of doing so
- Compare and contrast vertical and horizontal of endophytes in terms of the nature of the interactions between endophytes and host plants
- Explain the benefit of fungal endophytes to host plants, particularly as related to herbivory, and explain the potential benefits of such endophytes to humans

2. **Collaborative learning skills**

- Work effectively as part of a team, as reflected in Peer Feedback Assessments of five key competencies identified as critical to team effectiveness:
 - *Commitment* - take on fair share of and demonstrate commitment to team's work; be prepared for team meetings; deliver complete, accurate work
 - *Communication* - communicate clearly and share information; ask for and act on feedback
 - *Knowledge, skills and abilities* - acquire new skills and/or knowledge to improve team's performance; learn about teammates' tasks and roles
 - *Uphold high standards for quality of team's work* (- encourage and motivate team; care about quality of team's work; express and support belief that team will achieve high standards
 - *Focus*- monitor conditions affecting the team and notice problems; give teammates specific, timely and constructive feedback; help team plan and organize work
- Contribute effectively to team products as reflected in scores for tRATs and team assignments
- Provide constructive feedback to team members via Peer Feedback Assessments

3. **Scientific communication skills**

- Independently find, assess and summarize sources of scientific information
- Interpret and explain primary journal articles or data from those articles to peers
- Communicate scientific concepts effectively to a lay audience using one or more formats (e.g. essay, opinion editorial, news release, briefing paper for government agency, poster/ infographic, teaching materials for a class)

4. Self-regulated learning skills

- Independently acquire, retain and retrieve new knowledge
- Plan, monitor and evaluate learning and thinking
- Accurately assess strengths and weaknesses of your work as well as yourself as a learner and understand what strategies work best for you to accomplish a given task

Assessment of Learning Outcomes

The following information indicates how each learning outcome will be assessed in BIOL 453:

1. Course content mastery

Assessed via *tests*, an *in-class assessment on Unit 5*, and for the A and B grades, completion of *Individual Assignments*:

- a) *individual Readiness Assurance Tests* (iRATs) occur at the start of each unit in the course. Each iRAT consists of ~10 multiple-choice questions based on the assigned readings. As described on p. 7 of the syllabus, iRATs are followed by *team* RATs (tRATs), in which your team re-takes the same test together. Thus, tRATs assess course content mastery but also team effectiveness and so are included under Collaborative Learning Skills below.
- b) *Two tests*, each of which consists of ~10 multiple choice questions and 2-3 written questions, usually involving summary and interpretation of a figure/table. Test #1 deals with Units 1 and 2; Test #2 deals with Units 3 & 4.
- c) the *in-class assessment* on Unit 5 will involve answering questions about Unit 5 material individually and then as a team
- d) most of the *Individual Assignments* involve explaining a challenging course concept to a fellow student; the first one involves assessment of sample summaries. For the A and B grades, you need to successfully complete 4 out of 5 assignments; for the C grade, you must complete the first assignment.

2. Collaborative learning skills

Assessed via *tRATs*, *team assignments* and two *Peer Feedback and Team Dynamic Assessments*:

- a) *team Readiness Assurance Tests* (tRATs): as indicated above, your team will complete a tRAT at the start of each unit in the course, immediately after you complete the iRAT individually.
- b) Your team will also work on *team assignments* in class, which provide opportunities to work on sample test questions and also help you develop science communication skills. If your team earns more than 75% overall on the team assignments, and if your final peer score is more than 80%, you will earn one bonus point on an iRAT.
- c) *Peer Feedback and Team Dynamic Assessment*: at mid-semester and again at the end of term, you will complete a *Peer Feedback and Team Dynamic Assessment* via ITP Metrics, which allows team members to gain insight regarding their teamwork competencies. You receive a peer score, which indicates your average score on five competencies divided by the average score for your teammates, as well as written feedback from each teammate. Your final peer score is the multiplier for your tRAT and team assignment marks.

3. Scientific communication skills

Assessed via *Summaries* and, for an A grade, a *Final Project*. These assignments will focus on communication of science to a layperson (general public) audience. Recent studies have shown that the ability of students to understand primary scientific articles and to communicate scientific concepts clearly is greatly strengthened by writing summaries of research articles for a public audience.

- a) *Summaries*: there are three summaries in total; you can choose how many of these you wish to complete, as indicated in the table on p.4. Each summary is a **~800-word typed** summary of an **assigned** paper, written for a non-expert audience; summaries are to be completed to the “Acceptable” standard as defined by the Summary Rubric posted on D2L. Summaries that are assessed as “not yet” meeting requirements are eligible to be re-assessed using a “free pass” as described on p. 4.
- b) *Final Project (for A grade only)*: this project gives you the opportunity to explore how you might use the knowledge and skills developed in this course after graduation. For the project, you will identify a *specific topic* related to the course content that you are interested in and want to learn more about. For this specific topic, you will *produce materials* to explain this topic to a lay audience. Examples of approaches you might take are: producing materials/activities for teaching the topic to elementary/junior-high classes; posters or other materials for teaching the public at a museum or a park; a briefing note to a politician regarding proposed legislation; an opinion editorial to a newspaper. You are encouraged to **think creatively** about the format for this project by reflecting on how you learn best, your career goals and what format will allow you to best demonstrate your understanding. There are several stages for this project, each with a **firm** due date; you will also complete reflections about the process of doing this project. More information is provided on D2L.

4. Self-regulated learning skills

Assessed via the three *Course Goals Reflections*. The rubric that will be used to assess these reflections is posted on D2L.

a) The *Course Goals and Background Assignment* is due at the start of class on Mon. January 14. In this assignment, you outline your goals for this course and also provide me with information about your background that is useful to me in developing course material. Credit for this assignment is awarded if it demonstrates sound academic effort, as measured by completeness and professional writing.

b) The *Mid-Semester Reflection* will involve a reflection on Test 1 as well as on your mid-semester feedback from your teammates.

b) *Capstone Reflection*. This reflection asks you to integrate what you have learned course content what you have learned in terms of the other categories of learning outcomes.

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 this course, your work will be evaluated in one of three ways, depending on the type of work:

- tests, RATs and quizzes will be marked using points
- peer surveys are marked for completion
- Individual Assignments, Summaries, Reflections, and all components of the Final Project are marked using “pass/fail” rubrics. For each of these assignments, work that does not earn credit on a first try can be re-submitted **once** using a free pass as described on p. 4, thus I use the terms “**Acceptable**” and “**Not Yet Acceptable**” rather than Pass-Fail. Rubrics and lists of expectations for each of these assignments is posted on D2L.

Students will earn grades based on **the requirements they choose to complete (note that you do not have to do all of the requirements!)**. To earn a given letter grade, students must complete **all** the requirements listed for that letter grade. The table on the next page and the checklist posted on D2L will help you keep track of the requirements for each letter grade.

For a D: The work required to earn this grade reflects basic command of most of the course outcomes; it indicates that you have a basic understanding of course content and adequate teamwork skills. The specific requirements are indicated in the table on the next page.

For a C: The work required to earn this grade reflects satisfactory command of the course outcomes: it builds upon the requirements for a D to help ensure that you have a solid understanding of course content, satisfactory teamwork skills and have gained practice in communication of scientific concepts. In addition, completion of self-regulated learning assignments will help you reflect on both the course material and how you learn it. The specific requirements are outlined in the table on the next page.

For a B: The work required to earn this grade reflects good command of the course outcomes. In addition to the requirements for a C, you will successfully complete individual assignments in which you gain practice in communicating course concepts. As well, you will complete additional summaries of primary journal articles and demonstrate strong teamwork skills. Completion of additional reflections that involve thinking about both the course material and the process of learning it will help you understand both content and how you best learn it, so you can pursue the subject matter effectively in the future. The specific requirements are outlined in the table on the next page.

For an A: The work required to earn this grade builds upon the requirement for a B to help ensure that you not only have confident mastery of the course material but also that you demonstrate excellent skills in teamwork, scientific communication and self-regulated learning. You are able to research scientific information independently, integrate this with course material to create an authentic product and reflect on the process you underwent to produce the product. You will demonstrate your abilities to meet these additional learning outcomes by successfully completing all components of a ***Final Project*** as described on the previous page to an “Acceptable” standard as defined by the rubrics posted on D2L. The specific requirements are outlined in the table on the next page.

** Students who *exceed all* expectations ***for a given*** letter grade, will earn the “+” letter designation. For example, a student aiming to complete the “B+” letter grade requirements must complete 3 out of 3 summaries to an acceptable standard (rather than 2/3), 4 out of 4 individual assignments to an acceptable standard (rather than 3/4), and earn more than 75% overall on tests and quizzes in addition to meeting all of the other requirements for a B grade.

To earn an A+, students must exceed *all*** expectations for the A grade description, including a minimum average on iRATs, tests and the quiz of 90% on iRATs and tests.

** Students who do not successfully complete **one (and only one)** of the requirements for a letter grade will earn the “-” letter

designation. For example, a student aiming to complete the “A” letter grade requirements submits all components of the project, including the final version but does not earn an “Acceptable” rating on the final version would earn an A- grade, if they had successfully completed all other requirements of an A grade. Students not successfully completing **more than one** of the requirements for a letter grade will be assessed as **not having met the requirements for that grade** and will drop to the next lower letter grade. For example, a student aiming to complete the “A” letter grade who did not earn an “Acceptable” rating on the Project Proposal would not be able to complete the other components of the project and thus would earn at most a B+ grade.

** Note that a of grade of F will result if students do not successfully meet **all** of the requirements for a D grade.

** Students will be given *five ‘free passes’* that can be used to re-submit any written assignments (Reflection or Summary Assignment) to get the work to an “acceptable” standard. The free pass and re-submitted assignment must be submitted **within one week (7 days) of the graded assignment being returned or mark being posted**. There is only one re-submission per free pass and the free pass must be completed and attached to the re-submitted assignment. Re-submitted material must also be accompanied by the original graded assignment and a brief reflection (approximately one paragraph) describing how you have revised the assignment in response to that feedback. **

Summary table of requirements for each learning outcome for each letter grade					
Outcome	Assessed by:	Requirements for each letter grade			
		D	C	B	A
Content Mastery	Minimum average score on iRATs, two tests and final quiz (average score = total iRAT score/10 + Test 1 score/15 + Test 2 score /15 + Unit 5 in-class assessment/2 for a total score/42, which is then converted to %)	60%	70%	75%	82% (A ⁺ = 90%)
	Individual Assignments	X	Indiv. Assign #1	4/5	4/5
Collaborative learning	Minimum average score on tRATs (Note that your tRAT score is modified by your peer score on the final Peer Feedback Survey. Your peer score, which is your average score on five competencies divided by the average score for your teammates, is used as the multiplier to determine your final tRAT score).	80%	85%	90%	90%
	In-class Team Assignments (Team Capstone Assignment must be successfully completed to earn completion for this component)	✓	✓	✓	✓
	Peer Feedback Surveys: completion of two surveys via ITP Metrics (at mid-semester and end of term).	✓	✓	✓	✓
		Final peer score ≥ 0.80	Final peer score ≥ 0.85	Final peer score ≥ 0.90	Final peer score ≥ 0.95
Scientific Communication	Summaries	X	1/3	2/3	2/3
	Final Project Proposal (includes outline and annotated bibliography of two papers)	X	X	X	✓
	Draft of Final Project	X	X	X	✓
	Self-Assessment Reflection on Draft	X	X	X	✓
	Final Project	X	X	X	✓
Self-regulated learning	Course Goals Reflections (at beginning, mid-semester and end of course)	X	2/3	3/3	3/3

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 /themselves with these regulations. See also [Section E.3](#) of the University Calendar.

5. Scheduled out-of-class activities: REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.

Test 1: Tuesday Feb. 26, 6-7:30 pm, EDC 179.

Test 2: Thursday March 28, 6-7:30 pm, EDC 179.

- 6. Course Materials:** There is no required textbook for this course; links to relevant and/or assigned readings will be provided on D2L.
Online Course Components: Some teamwork resources are provided by ITP Metrics, 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 aids are allowed on tests or examinations. Students should read the Calendar, [Section G](#), on Examinations.
- 8. Approves Mandatory and Optional Course Supplemental Fees:** There are no supplemental fees for this course.
- 9. Writing across the curriculum statement:** In this course, the quality of the student's writing on assignments will be a factor in the evaluation of those papers. See also [Section E.2](#) of the University Calendar.
- 10. Human & living organisms studies statements:** 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>.

STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS. Students taking laboratory- and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

Students are expected to be familiar with Section SC.4.1 of the University Calendar.

11. Reappraisal of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

Term Work: The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within 15 days of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections I.1 and I.2 of the University Calendar

Final Exam: The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

12. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- a) **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).
- b) **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call 403-210-9355.
- c) **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we

encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at 403-220-2208.

- d) **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. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**
- e) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.
- f) **Academic Accommodation Policy:** 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 procedure-for-accommodations-for-students-with-disabilities.pdf.

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy, by email addy@ucalgary.ca or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See Section E.4 of the University Calendar.

- g) **Safewalk:** Campus Security will escort individuals day or night (See the Campus Safewalk website). Call 403- 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). 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 Legal Services website.
- i) **Student Union Information:** VP Academic, Phone: 403-220-3911 Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: 403-220-3913 Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: suvpaca@ucalgary.ca.
- j) **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k) **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- l) **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or non-academic misconduct, in addition to any other remedies available at law.

Department Approval ORIGINAL SIGNED Date

Department Approval for
NO FINAL EXAM ORIGINAL SIGNED Date

Associate Dean's Approval
for out-of-class activity ORIGINAL SIGNED Date

B453co W19;1/11/2019 9:54 AM

COURSE PERSONNEL

INSTRUCTOR: Dr. Heather Addy EEEL 235C 403-220-8963 addy@ucalgary.ca

Office Hours: TBA

There are also peer mentors and markers in this course; names and contact information will be provided on D2L.

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 focus on investigate the mechanisms and processes that allow plants 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 microorganisms, animals and other plants that affect their survival, nutrition, defense and reproduction. We will also discuss the implications of some of these interactions for humans. The structure of the course will give you opportunities to explore topics of interest to you.

Responsibilities and Expectations:

My philosophy of teaching is that it is my responsibility to create and maintain the conditions that allow students to learn. Feedback from students is very important to me so that I will know whether such conditions exist, how well the course is going and where problems are arising. In addition to a midterm and end-of-term course evaluation, I will also be meeting weekly with class representatives, students who volunteer to discuss all aspects of the course with me and raise any concerns communicated to them by other students. I use a team-based learning approach in this class to provide students the opportunity to obtain and strengthen skills in working as part of a team. This approach has also been demonstrated to promote learning by giving students numerous opportunities to discuss course concepts with other students and the instructor, and to practice applying course concepts to answer questions and solve problems. As another source of support, we will also have peer mentors in this course. The peer mentors are students who have taken this course previously and done well in it; they will attend classes and provide guidance and help as your team works on assignments. You will meet the peer mentors in our first class.

To make our time together as effective as possible, it is important that the lecture learning environment is one of mutual respect. I will do whatever I can to create and maintain that environment; my expectations of student conduct are outlined below:

- **Everyone has the right to learn as well as the responsibility to not deprive others of their right to learn.** Actions such as talking during instruction/lecturing, or using laptops and other electronic devices for non-class activities can be very distracting and affect others' learning. Please monitor your own behaviour during classes and restrict your use of laptops and other electronic devices to only those activities directly related to class to ensure that you do not distract others.
- **Please arrive at class on time.** Late arrivals and early departures can be disruptive and can result in you missing important information. I understand that there are special circumstances when you may have to arrive late or leave early; please make your arrival/departure as unobtrusive as possible and be sure to let your teammates know about your situation in advance of class.
- Please let me know right away if you are dealing with a problem or situation that is preventing you from performing at the level you want to be at in this class.
- Please treat your classmates, peer mentors and me with respect. There may be times when you are frustrated with something that is going on in the course and find it difficult to be patient. However, to maintain a respectful and constructive environment in this class, I ask that you are respectful of others in your words and actions.

What you can expect from me:

- I will treat all students with respect and do my best to make my expectations about how to succeed in this class clear.
- I will do my best to help your learning by designing clear assignments and assessments that provide you with timely feedback.
- I will start and end classes on time.
- I will be available outside of class time through office hours, appointments or email should you want to review concepts that are not clear, discuss study strategies, learn more about any topic or discuss concerns about any aspect of the course. Please note that I will aim to reply to emails within 24h, except on weekends.

Academic Integrity:

Each student in this course is expected to abide by the University of Calgary Code of Academic Conduct. You are encouraged to study together and to discuss information and concepts covered in class and assigned readings with other students, but **all** individual work that you submit in this course for academic credit must be your own work. In the case of team assignments, all members of the team are responsible for the honesty and integrity of the document.

Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. All work submitted for this class (whether as a draft or for final grading) is held to the strictest standards for intellectual honesty. A single offence may lead to a grade of zero for the assignment involved, disciplinary probation, suspension or expulsion. The Faculty of Science follows a zero-tolerance policy regarding dishonesty. In addition to reading the sections of the University Calendar under "Student Misconduct", I will assume that you have read and understand the information posted on the Dept. of Biological Sciences' webpage dealing with academic honesty: <http://www.bio.ucalgary.ca/undergrad/academichonesty.html>. In particular, be sure that you understand what constitutes plagiarism—test yourself by taking the on-line quiz.

Team-Based Learning:

In this class, we will be using a Team-Based Learning (TBL) approach. In this process, you will spend many classes working in teams applying what you've learned from the assigned readings. Teams in TBL are different than the kind of group work you may have done in other classes: the instructor forms the teams (as described below) which work together throughout the term to complete course assignments and quizzes; team members also evaluate each other's contributions to the group throughout the term. Before your team tackles an assignment, TBL uses short tests to make sure you've got the basics from the required readings. They're not ordinary tests, though: you take the tests both individually and as a team, and you get immediate feedback, so the tests function as learning tools. I will do some lecturing but a lot of our class time will be spent on applying what we've learned. Here are the basics:

1. Prior to the first class, I will send you a link to a web-based tool (ITP Metrics) that we will use to form the teams and to do peer assessments during the term. It is important that the teams as diverse as possible, so you will be asked to answer some survey questions about your background, your major/year, problem-solving styles and other factors that will help us form successful teams. You will meet your teammates in the first class.
2. For each major unit in the course, you will be assigned some readings and/or videos; I prepare a reading guide for all assigned readings/videos to help you focus on the most important points in the assigned readings. At the beginning of the unit, you will individually take a short (~10-15 questions) multiple-choice test called an "Individual Readiness Assessment Test" (iRAT) to see how well you've understood the concepts in the assigned reading. I will drop your lowest iRAT score for the term. iRATs missed without a valid excuse (medical or family emergency) will be awarded a mark of zero. Missed quizzes may not be written at a later time.
3. Right after taking the iRAT, you will take the same test with your team. This is called a "Team Readiness Assessment Test" (tRAT). For the group test, you'll use a special "scratch-off" answer sheet that immediately tells you whether you have the correct answer for full marks. If your team doesn't choose the correct answer on the first try, you make a second choice for partial credit. If it takes you three tries to get the correct answer, you again earn partial credit for the item. As for the iRATs, quizzes missed without a valid excuse will be awarded a mark of zero; missed quizzes may not be written at a later time.
4. When you've finished the tRAT, your team provides written feedback as to which concepts are still unclear or for which you would like more information.
5. I'll use the individual and team scores as well as the written feedback to determine what material needs to be discussed and clarified, which is what will happen in the next class meeting. I'll also incorporate any supplemental information that you'll need to complete the in-class team assignments that involve application of what you learned in the readings.
6. The final aspect of a module will be the Team Application Activities. These application activities are the most critical part of the course because they will involve real problems and applications of the material that I expect you to be able to do by the end of the module/course. During these activities, you will work with your teammates to bring all you've learned in the module together to solve a problem. One of my goals for you in this course is that you should be able to do something with the material you learn. These activities should help you achieve this and also allow you to see how I will examine your ability to apply the material on the tests, as these assignments are often sample test questions. All the teams will be working on the same problem and I will likely be asking teams to defend their answers in a class discussion.
7. At least three times during the semester, you will complete confidential assessments of how well your team is working together, so that any issues can be dealt with promptly. If you are having issues in your team, please don't hesitate to talk to me or the Peer Mentors. Little problems can turn into big problems if not addressed. We are happy to facilitate a discussion with your team to help resolve issues.
8. The team nature of this class requires you to be in class and to do your part as a member of your Team. RATs missed without a valid excuse (medical or family emergency) will be awarded a mark of zero. The nature of RATs and team assignments is such that you can't do them individually, so missed RATs and tests cannot be written or submitted for grading at a later date.

BIOL 453 Schedule Winter 2019

Note that the RAT dates may be moved back (i.e. to a later date), if we need additional time at the end of the previous unit to clarify any concepts. Any changes to RAT dates or assignment due dates will be announced in class and posted as an announcement on D2L.

*Assignments are described earlier in the syllabus; further information and rubrics provided on D2L.

Unit	Date	Topic	Assignments due*
Introduction to course: Challenges faced by plants as sessile organisms	F Jan 11	Introduction to course and to team-based learning	
	M Jan 14	Introductory RAT (on syllabus, <i>Building Effective Teams</i> document & <i>Introduction Reading Guide</i>)	<i>Course Goals & Background</i>
	W Jan 16	Clarification lecture & team activities– exchange/absorption reactions	
Challenge 1: Obtaining nutrients. Unit 1–How do plants themselves obtain nutrients from soil?	F Jan 18	RAT Unit 1	
	M Jan 21	Clarification lecture & team activities– nutrient cycles	
	W Jan 23	Clarification lecture & team activities–depletion zones	
	F Jan 25	Clarification lecture & team activities–root adaptations	<i>Individual Assignment #1 on sample summaries due at start of class</i>
	M Jan 28	Summary of Unit 1	
Challenge 1: Obtaining nutrients. How do plants enlist other organisms to obtain more nutrients? Unit 2–Mycorrhizas	W Jan 30	RAT Unit 2	
	F Feb 1	Clarification lecture & team activities – mycorrhizal structure; quantitative/qualitative effects	<i>Individual Assignment #2 on most unclear concept in Unit 1 (due 11:59 pm)</i>
	M Feb 4	Clarification lecture & team activities – quantitative/qualitative effects continued	<i>Project Proposal due (11:59 pm)</i>
	W Feb 6	Clarification lecture & team activities – common mycorrhizal networks	
	F Feb 8	Clarification lecture & team activities – common mycorrhizal networks	
	M Feb 11	Summary Unit 2	<i>Summary #1 due (11:59 pm)</i>
Challenge 1: Obtaining nutrients. How do plants enlist other organisms to obtain more nutrients? Unit 3–Carnivory	W Feb 13	RAT Unit 3	
	F Feb 15	Case study: nutrient-impooverished soils	
	Feb 18-22	Reading Week: no classes	
	M Feb. 25	In-Class Review for Test # 1 (Units 1 & 2)	<i>Individual Assignment #3 on most unclear concept in Unit 2 due at start of class</i>
	T Feb. 26	Test 1: 6–7:30 pm EDC 179	
	W Feb 27	Unit 3 Clarification lecture & team activities – defining features of carnivorous plants	
	F March 1	Clarification lecture & team activities – cost/benefits of carnivory	
	M March 4	Clarification lecture & team activities – cost/benefits continued	<i>Summary #2 due (11:59 pm)</i>
	W March 6	Clarification lecture & team activities – carnivory/pollinator conflicts	
	F March 8	Summary Unit 3	<i>Mid-Semester Reflection due</i>
Challenge 2: Defending against herbivores. How do plants enlist other organisms to defend them against herbivores?	M March 11	RAT Unit 4	
	W March 13	Clarification lecture & team activities – direct vs indirect defenses	
	F March 15	Clarification lecture & team activities – volatile signals	<i>Individual Assignment #4 on most unclear concept in Unit 3 (due 11:59 pm)</i>
	M March 18	Clarification lecture & team activities–volatile signals	<i>Project Draft and Reflection due (11:59 pm)</i>
	W March 20	Clarification lecture & team activities – defense mutualisms	
	F March 22	Clarification lecture & team activities – defense mutualisms continued	
	M March 25	Summary of Unit 4	<i>Summary #3 due (11:59 pm)</i>
	W March 27	In-class review for Test #2	<i>Individual Assignment #5 on most unclear concept in Unit 4 (due at start of class)</i>
Unit 5. Plant Microbiome	R March 28	Test #2 (Units 3 & 4) 6–7:30 pm EDC 179	
	F March 29	In-class preparation for Unit 5	
	M April 1	RAT Unit 5	

Unit	Date	Topic	Assignments due*
	W April 3	Teamwork on case study	
	F April 5	Teamwork on case study	
	M April 8	In-class assessment on Unit 5 (individual/team components)	
	W April 10	Wrap up of course & final team activity	<i>Capstone Reflection due (11:59 pm)</i>
	F April 12	No class	<i>Final Project due (11:59 pm)</i>