



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 ICT 114 WINTER 2018

Course Coordinator/

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

Desire 2 Learn (D2L) course name: BIOL 453 L01 – (Winter 2018) – 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
- Categorize plant defense mechanisms into constitutive, induced, direct and indirect responses, evaluating the cost and benefits of each mechanism
- Identify strategies by which plants balance defense/carnivory strategies with strategies to attract pollinators 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 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)

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 *iRATs* and *tests*:

a) *individual Readiness Assurance Tests* (iRATs) occur at the start of each unit in the course (note that one unit has two RATs due to the nature of the content). 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 in-class tests (Feb 12 & March 26)*, each of which consists of ~10 multiple choice questions and 2-3 written questions, usually involving summary and interpretation of a figure/table, as in the team assignments.

2. Collaborative learning skills

Assessed via *tRATs* and *team assignments*; an *Early Team Assessment*, two *Peer Feedback and Team Dynamic Assessments*; and completion of a *Development Goals plan* after the mid-semester Peer Feedback Assessment.

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. 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.

b) *Early Team Assessment*: in the third week of the term, you will complete a brief *Team Assessment* to report on how well your team is working together and flag any issues/conflicts that have arisen.

c) *Peer Feedback and Team Dynamic Assessment*: before Reading Week 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.

d) *Development Goal Plan*: in addition, the Peer Feedback Assessments provide you with a report summarizing your teammates' anonymous feedback regarding these competencies, allowing you to gain a stronger sense of your strengths and areas for development. The report also provides a framework for identifying development goals for each competency. A *Development Goal Plan* is due by the end of February.

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 four summaries in total; you can choose how many of these you wish to complete, as described in the requirements for each letter grade on pp. 3-4. Each summary is a **500- to 600-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 *Course Goals and Background Assignment*, written *Reflections* and the *Capstone Assignment*.

a) The Course Goals and Background Assignment is due at the start of class on Weds. January 11. 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) There are nine *Reflections* in total, five that are based on the assigned readings for each unit of the course (i.e. the readings assigned for each RAT) and four that address how you learn course content or prepare for assignments and tests. As for the summaries, you can choose how many of these reflections you wish to complete, as described in the requirements for each letter grade on pp. 3-4. Each reflection is a **500- to 600-word typed** response that answers specific questions. Reflections are to be completed to the “Acceptable” standard as defined by the Reflections Rubric posted on D2L. Reflections that are assessed as “not yet” meeting requirements are eligible to be re-assessed using a “free pass” as described on p. 4 of this syllabus.

b) *Capstone Assignment* (**required for A and B grades**)

This assignment asks you to integrate what you have learned about the Course Content Learning Outcomes as well a reflection of what you have learned in terms of the other categories of learning outcomes. The format of the assignment is up to you: it can be an essay, a concept map or other graphic of some sort or some other format entirely! More information is provided in the Capstone Assignment Specifications on D2L. The assignment is due at the start of class on **Wed. April 11**.

3. **Grading:** The University policy on grading and related matters is described in sections [F.1](#) and [F.2](#) of the online University Calendar.

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.

For a D: The work required to earn this grade reflects minimal mastery of most of the course outcomes; it indicates that you have a basic understanding of course content, adequate teamwork skills and some experience in communication of scientific concepts. The specific requirements are:

Content Mastery: Earn a minimum average score of **60%** on iRATs (lowest iRAT score is dropped) and two in-class tests.

Collaborative Learning: Earn a final peer score of 0.70 or higher on the final peer feedback survey, and a minimum average score of 75% on tRATs.

Scientific Communication: Complete **1 out of 4 Summaries** to an acceptable level as defined by the Summary Rubric.

Self-Regulated Learning Skills: Complete and hand in the *Course Goals and Background* Assignment at the start of class on Weds. January 11.

For a C: The work required to earn this grade reflects satisfactory mastery 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 more practice in communication of scientific concepts. In addition, completion of reflections assignments will help you reflect on both the course material and how you learn it. The specific requirements are:

Content Mastery: Earn a minimum average score of **70%** on iRATs (lowest iRAT score is dropped) and two in-class tests.

Collaborative Learning:

1. Earn a final peer score of 0.80 or higher, and a minimum average score of 80% on tRATs.
2. Complete **2 out of 3** peer feedback surveys.
3. Complete *Development Goals* report from your mid-semester peer feedback survey.

Scientific Communication: Complete **2 out of 4 Summaries** to an acceptable level as defined by the Summary Rubric

Self-Regulated Learning Skills:

1. Complete and hand in the *Course Goals and Background* assignment at the start of class on Weds. January 11.
2. Complete **5 out of 9 Reflections** to an acceptable level as defined by the Reflection Rubric.

For a B: The work required to earn this grade reflects good mastery of the course outcomes: it builds upon the requirements for a C to ensure that you have a good understanding of course content and strong teamwork skills. In addition, completion of additional reflections will help ensure that you reflect on both the course material and the process of learning it, helping you leave the course with a good mastery of both the course material and how you best learn it, so you can pursue the subject matter effectively in the future. The specific requirements are:

Content Mastery: Earn a minimum average score of **75%** on iRATs (lowest iRAT score is dropped) and two in-class tests.

Collaborative Learning:

1. Earn a final peer score of 0.90 or higher, and a minimum average score of 85% on tRATs.
2. Complete the *Development Goals* plan from the mid-semester peer feedback survey.
3. Complete **3 out of 3** peer feedback surveys.

Science Communication: Complete **3 out of 4 Summaries** to an acceptable level as defined by the Summary Rubric.

Self-Regulated Learning:

1. Complete and hand in the *Course Goals and Background* assignment at the start of class on Weds. January 11.
2. Complete **7 out of 9 Reflections** to an acceptable level as defined by the Reflection Rubric
3. Complete the *Capstone Assignment* to an acceptable level as defined by the Capstone Rubric.

For an A: The work required to earn this grade builds upon the requirement for a B to help ensure that you have not only mastered the course material but also that you can apply it, research additional related material, synthesize it to address an authentic need, and reflect on the process you underwent to produce the product.

Content Mastery, Collaborative Learning and Science Communication: meet the requirements described for a B grade.

Self-Regulated Learning:

1. Complete and hand in the *Course Goals and Background* assignment at the start of class on Weds. January 11.
2. Complete **8 out of 9 Reflections** to an acceptable level as defined by the Reflection Rubric.
3. Complete the *Capstone Assignment* to an acceptable level as defined by the Capstone Assignment Rubric.

Additionally, for an A, you must complete a *Final Project* as described on p. 2 to the standards defined by the Project Rubric **and** complete the required reflections on the process of completing this project to an “acceptable” standard as defined by the Reflection rubric. More information is provided on D2L.

** 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 who completes 4 out of 4 summaries to an acceptable standard (rather than 3/4) *and* 9 out of 10 reflections to an acceptable standard (rather than 8/10) will earn a B+ letter grade.

**To earn an A+, students must exceed *all* expectations for the A grade description (i.e., earn more than an average of 80% on iRATs and tests, earn a peer score greater than 0.90, complete 4/4 summaries, 10/10 reflections, the *Capstone Assignment* and a final project).

** 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 “B” letter grade requirements, who only completes 2 out of 4 summaries to an acceptable standard (rather than 3/4) **or** 7 out of 10 Reflections to an acceptable standard (rather than 8/10) will earn a B- letter 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

** 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 *three ‘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 the student has revised their assignment in response to that feedback. Free passes are **not** transferable and will **not** be replaced if lost. **

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:** N/A. **REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.**
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:** Students should read the Calendar, [Section G](#), on Examinations.
8. **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.
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.

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: suypaca@ucalgary.ca SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
- (g) Student Ombuds Office: 403 220-6420 Email: 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). Your responses make a difference - please participate in USRI Surveys.

Department Approval _____ ORIGINAL SIGNED _____ Date _____

Approval Dean's Approval
For Alternative Final Exam Arrangements: _____ ORIGINAL SIGNED _____ Date _____
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COURSE PERSONNEL

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

Office Hours: TBA

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. Quizzes 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. The nature of team assignments is such that you can't do them individually, so you can't make them up. If you miss an in-class quiz, test or assignment for medical reasons, the only documentation that will be accepted in BIOL 453 is a completed Physician/Counsellor Statement form, which can be downloaded from:
http://www.ucalgary.ca/UofC/departments/UHS/PDFs/deferred_exam_form.pdf
You must provide the completed form, signed by your physician, to me within 48 hours from the date that you missed the class/quiz/test.

Specifications Grading

As you noted from reading the first part of this syllabus, assignments in this course are grading using a pass/fail scheme (i.e. there is no partial credit for assignments). The rationale for this approach to grading comes from research into adult learning: adults learn best when they have a flexible but challenging learning environment and when they have some choice in their learning experience. In this course, we will create a positive and challenging learning environment, in which we will uphold high expectations for work, with opportunities to revise work that does not yet meet expectations along with feedback and support from me, your teammates and the Peer Mentors to achieve your best work. The specifications or requirements for a pass on each assignment are clearly stated in the rubrics for each assignment and you will have examples of work that does and does not meet the specifications.

This course provides you choice in your learning experience both in terms of the topics for some of the assignments as well as which assignments to complete. While there are some tests in the course, there are no traditional midterms or final exams; instead, there are a variety of assignments from which you can choose how much to do in order to meet the requirements for the grade you plan to earn. We will talk more about specifications grading in the first two classes of the term, and you will have the chance to ask any questions or discuss any concerns then.

Lecture and Assignment schedule BIOL 453 Winter 2018

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 | M Jan 8 | Introduction to course and to team-based learning | |
| | W Jan 10 | Introductory RAT (on syllabus & <i>Building Effective Teams</i> document) | <i>Course Goals & Background</i> Assignment |
| Unit 1. Plant nutrient uptake from soil | F Jan 12 | RAT 1 (see Unit 1 Reading Guide) | <i>Reflection Assignment #1</i> |
| | M Jan 15 | Nutrient pools in soils & mini-team activity | |
| | W Jan 17 | Plant uptake of nutrients & mini-team activity | |
| | F Jan 19 | Plant adaptations to increase nutrient uptake: team activity | |
| | M Jan 22 | Plant adaptations continued | |
| Unit 2. The role of mycorrhizas in plant nutrition | W Jan 24 | RAT 2 | <i>Reflection Assignment #2</i> |
| | F Jan 26 | Clarification lecture—mycorrhizas | |
| | M Jan 29 | Arbuscular mycorrhizas & plant nutrition: team activity | <i>Summary Assignment #1; Reflection Assignment #3</i> |
| | W Jan 31 | AM team activity continued | <i>Early Team Assessment (done in class)</i> |
| | F Feb 2 | Ectomycorrhizas and orchid mycorrhizas & mini-team activity | |
| | M Feb 5 | Mixotrophy: team activity | |
| | W Feb 7 | Mixotrophy continued | |
| | F Feb 9 | In-class review | <i>Reflection Assignment #4</i> |
| | M Feb. 12 | Test #1 | |
| | W Feb 14 | Post-test activity | |
| | F Feb 16 | RAT 3 | <i>Reflection Assignment #5</i> |
| | Feb. 19-23 | Reading Week — No classes | Mid-semester peer evaluation survey opens Feb 16; closes Feb. 25 |
| Unit 3. The role of carnivory in plant nutrition | M Feb 26 | Traits of carnivorous plants & mini-team activity | |
| | W Feb 28 | Carnivory case study: team activity | |
| | F March 2 | Costs & benefits of carnivory: team activity | <i>Reflection Assignment #6</i> |
| | M March 5 | Costs & benefits of carnivory continued | <i>Summary Assignment #2</i> |
| Unit 4. Herbivory and plant defense | W March 7 | RAT 4 | <i>Reflection Assignment #7</i> |
| | F March 9 | Direct & indirect defenses & mini-team activity | |
| | M March 12 | Induced defenses & Mini-team activity | |
| | W March 14 | Priming: team activity | <i>Summary Assignment #3</i> |
| | F March 16 | Indirect defenses & mini-team activity | |
| | M March 19 | Volatile signals: team activity | |
| | W March 21 | Volatile signals continued | <i>Reflection Assignment #8</i> |
| | F March 23 | In-class review for test | <i>Summary Assignment #4</i> |
| M March 26 | Test #2 (Units 3 & 4) | | |

| Unit | Date | Topic | Assignments due* |
|--|-------------|--|--|
| | W March 28 | Post-test activity | |
| | F March 30 | Good Friday — No classes | |
| Unit 5. Plant pollinator attraction & tradeoffs with plant defense | M April 2 | RAT 5 | <i>Reflection Assignment #9</i> |
| | W April 4 | Endophytes & mini-team activity | |
| | F April 6 | Implications of plant biotic interactions for humans | |
| | M April 9 | Implications of plant biotic interactions for humans | <i>Final Project & Project Reflections</i> |
| | W April 11 | Wrap up of course & final team activity | |
| | F April 13 | No class | <i>Capstone Assignment (via Dropbox)</i> |