

BIOLOGY 453: *Plants in their Environment*

MWF 1200-1250 ST 147

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An insect on the lip of a pitcher plant (*Sarracenia rubra*).
 Author: US Fish & Wildlife SE Region. Available from <https://upload.wikimedia.org/wikipedia/commons/2/29/>

Course Description

Like animals, plants have to obtain food, defend themselves from pathogens and predators, and find mates. But unlike animals, plants have to meet all of these challenges without being able to escape from unfavourable conditions or run away from predators. However, plants are not alone! Many plants enlist other organisms to help them grow, survive and reproduce under the highly variable conditions found in nature. We will focus on the partnerships and other interactions that play key roles in plant nutrition and defence. We will also discuss the importance of plant biotic interactions to humans: understanding these interactions has important implications for agriculture, reclamation, conservation and human health.

In addition to learning about these concepts, you will also have the opportunity to explore topics of interest to you and to strengthen your skills in teamwork, scientific communication and self-assessment, which are important for success in many careers; more information on what you'll learn is outlined on p. 2.

This course is different from other courses in a couple of ways:

- First, I use a grading approach called *specifications grading* in which your course grade is not based on the percentage score you earn on assignments but rather on how many and which assignments you successfully complete. There are no exams in this course, so there are relatively more assignments than in other courses; specifications grading gives you choices about which assignments you complete and provides several different ways for you to demonstrate your understanding of course concepts. More information on grading is on pp. 3-4.
- Second, you will be working with other students in a *permanent team* all term. This team-based learning (TBL) requires that you attend class regularly and come prepared to work with your teammates by completing assigned readings and/or videos before class. More information on TBL is on p. 5.

What's in this syllabus:

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Department Approval _____Original Signed_____ Date: 6 January 2020

Department Approval for no final exam _____Original Signed_____ Date: 6 January 2020

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

Support for learning & other course information

I welcome you to drop by during **office hours** (posted on D2L) or set an appointment to meet at a different time. In class, as your team works on assignments, there will be support from me and the **peer mentors**, who you will meet in the first class; their contact information is provided on D2L. The peer mentors can also provide advice on preparing for RATs and completing assignments. The course **TA**, Caroline Jasper, will help with marking of assignments.

Course D2L site: There is no textbook for this course. Instead, there will be assigned readings and videos for each unit; links to these and other resources will be provided via Desire 2 Learn (D2L); D2L course name: BIOL 453 L01 - (Winter 2020).

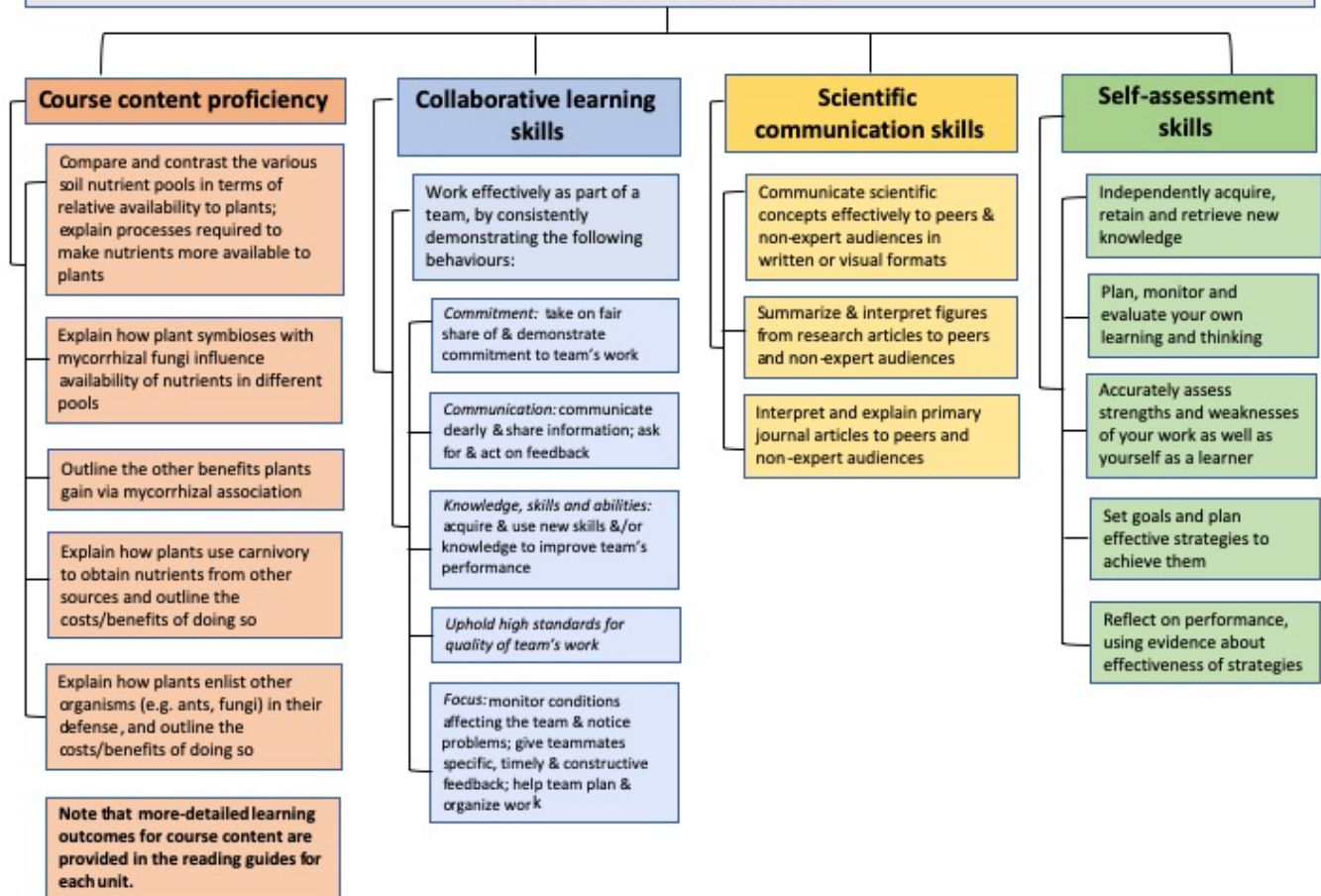
Prerequisites: Biology 313 and either Biology 371 or PLBI 403. A student may not register in a course unless they have a grade of at least C- in each prerequisite course. See section 3.5.C in the Faculty of Science section of the online Calendar (<http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html>)

There are **no out-of-class activities** for this course. **Regularly scheduled classes have precedence over any out-of-class-time activity.**

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.

What will you learn in this course?

After successfully completing this course, you will be able to demonstrate the following skills, knowledge and abilities:



Specifications Grading

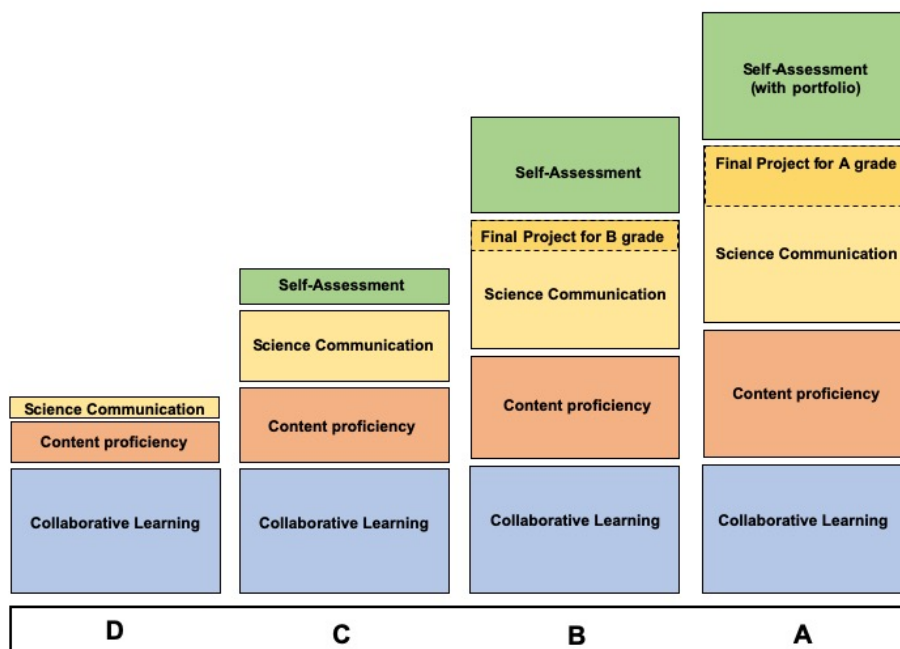
Your course grade is based on which course requirements you successfully complete. This figure shows you the requirements for the four categories of learning outcomes for each letter grade. To earn a given letter grade, you must complete **all** the requirements listed for that letter grade.

All grades have similar requirements for collaborative learning because the teams rely on all members being prepared.

The specific assignments and other requirements that need to be completed for each letter grade are shown in the table on p.4.

Specifications grading can sound daunting, but **don't panic!!** This course has lots of **support** to help you understand specifications grading and succeed. And most students find that specs grading works very well for them, once they get used to it, as indicated in these comments from previous students:

- *“The specs grading may be confusing or intimidating at first, but it really is structured in a way to put the importance back on learning and less on the grade you receive.”*
- *“The grading style was weird at first but once I got the hang of it, I really liked it. It helps students get a better idea about the level of work required for certain letter grades. Students could take control of their own learning and strive for their own goals.”*



Why use specifications grading? Research into adult learning tells us that adults learn best when they have a flexible but challenging learning environment and when they have some choice in their learning experience. Specifications grading helps create this learning environment: you have some choice as to which assignments you complete as well as choice in format for some assignments, and assignments are marked using “pass/fail” rubrics. For most assignments, you can revise and re-submit (once) work that does not yet meet expectations using a free pass as outline below, so I use the terms “**Acceptable**” and “**Not Yet Acceptable**” rather than pass/fail. You will receive lots of feedback and support from me, your teammates, the TA and the Peer Mentors to support your revisions and achieve your best work.

A key feature of specifications grading is that your work does **not** have to be perfect to earn an “Acceptable” grade: this grade means that your work has demonstrated understanding of the concept, has met the expectations for the assignment, and it is complete and well-communicated. See the rubrics provided on D2L for more information.

What are free passes and how do they work?

- each student gets **4 ‘free passes’** that can be used to re-submit assignments that did not earn an “Acceptable” score. The completed free pass and revised 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.
- A free pass can also be used to submit **some** assignments within **7** days of the due date; the information on D2L indicates which assignments are eligible for this extension.
- Free passes are **not** transferable to other students.

| Summary table of requirements for each component of the course for each letter grade (details and rubrics for assignments provided on D2L) | | | | | |
|---|--|------------------------------------|--------------------------|--------------------------|--------------------------|
| Component | Assessed by | Requirements for each letter grade | | | |
| | | D | C | B | A |
| Course Content Proficiency | Min. avg. score iRATs* (lowest score dropped) | 60% | 70% | 75% | 85% (A+ = 90%) |
| | Individual contribution to final course summary | X | ✓ | ✓ | ✓ |
| | Individual in-class assignments (I will periodically collect individual versions of team assignments and 'warm-up questions'; these will be graded for completion, as per the rubric on D2L) | Acceptable scores on 60% | Acceptable scores on 60% | Acceptable scores on 70% | Acceptable scores on 80% |
| Collaborative Learning | Min. avg. score tRATs** | 75% | 80% | 85% | 90% |
| | Team Assignments*** (includes successful completion of Unit Summaries, Scientific Article Summaries & Course Summary Assignment) | ✓ | ✓ | ✓ | ✓ |
| | Peer Feedback Surveys (mid-semester and end-of-term) | ✓ | ✓ | ✓ | ✓ |
| | Final Peer Score on end-of-term survey | ≥ 0.80 | ≥ 0.85 | ≥ 0.90 | ≥ 0.95 |
| Scientific Communication | Explanation & Analogy Assignments | X | 1/3 | 2/3 | 2/3 |
| | Pre-class assignments (answers to questions) on scientific articles | ✓ | ✓ | ✓ | ✓ |
| | Final Project (includes draft completed for in-class workshop as well as final version. Requirements differ for A and B versions; see details on D2L) | X | X | ✓ | ✓ |
| Self-Assessment | Self-assessments (at beginning, middle, and end of course) | X | 3/3 | 3/3 | 3/3 (with portfolio) |

***iRATs & tRATs:** each module of the course starts with a multiple-choice “Readiness Assurance Test (RAT)” based on assigned readings and videos to prepare you for the team assignments that follow. You do this quiz first individually (iRAT) and then as a team (tRAT); the information on team-based learning on p. 6 explains further.

****** Your RAT score will be multiplied by your final Peer Score on the end-of-term survey. Your peer score is your average score on five competencies (listed in the learning outcomes for collaborative learning on p.2) divided by the average score for your teammates.

******* If your team earns Acceptable scores on ≥ 75% of these assignments, you will earn 1 bonus mark on your second-lowest iRAT, provided your final peer score meets the cutoff for your letter grade goal. Your team must successfully complete the Unit Summaries, Scientific Article Summaries and the final Course Summary Assignment to earn this bonus mark.

How are + and – grades determined?

- Students who exceed all expectations for a given letter grade will earn the “+”-letter grade. Students who do not successfully complete one (and only one) of the specifications required for a given letter grade will earn the “-”-letter designation. This excludes: the Peer Surveys, Pre-Class Assignments on scientific papers and Team Assignments, which must all be completed
- 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. Students who do not successfully meet all of the requirements for a D grade will earn an F grade

Team-Based Learning (TBL)

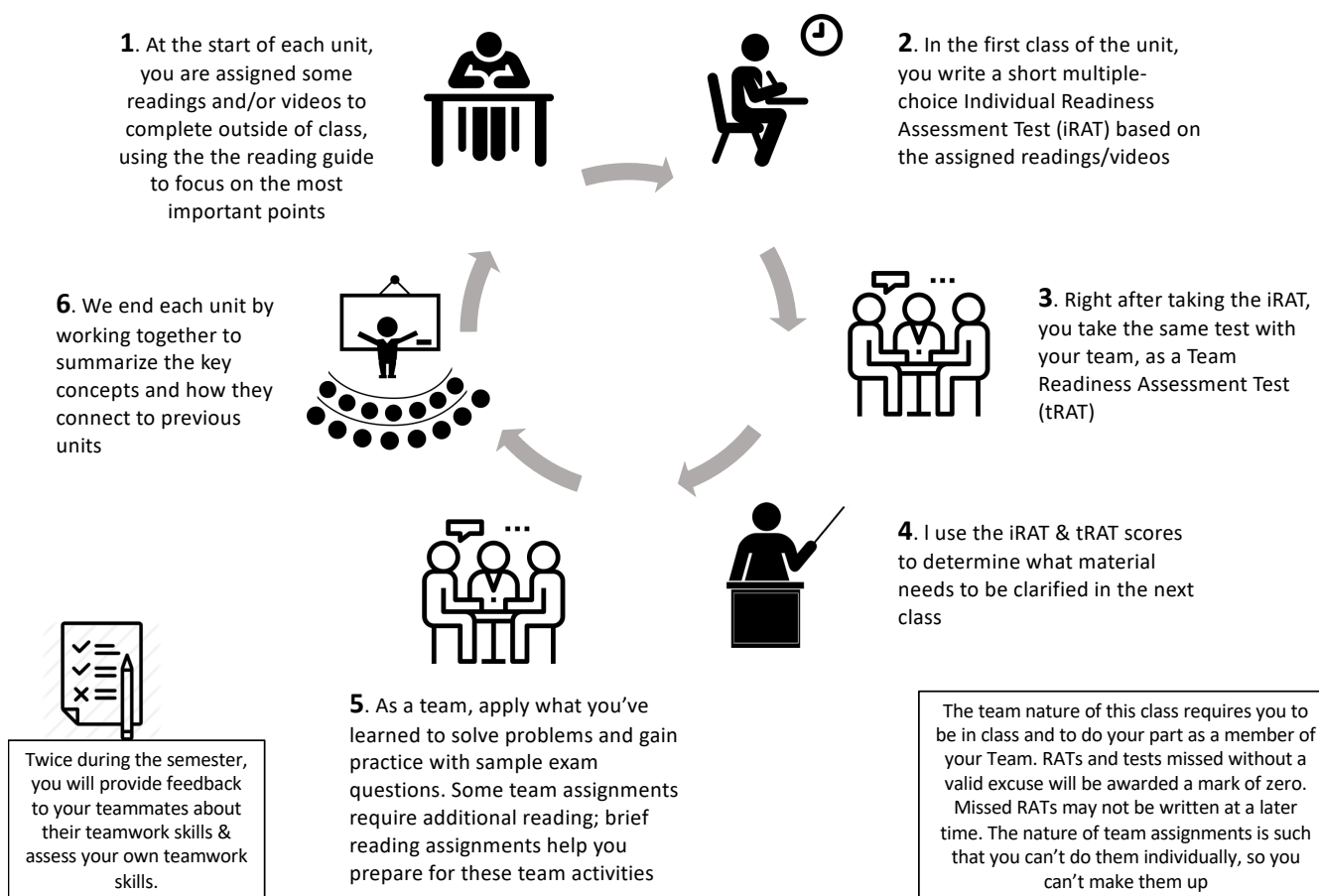
In this course, you will work in a team, applying what you've learned from the assigned reading/videos. Teams in TBL are different than the kind of group work you may have done in other classes: I form the teams using information you provide about your background, previous courses and other factors that will help us form diverse teams. TBL also builds in accountability for all students in a team.

The teams work together throughout the term to complete course assignments and quizzes. Before your team tackles an assignment, you take a short test 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. The tests are also one way that TBL builds in accountability for all members of a team. I will do some lecturing but a lot of our class time will be spent on applying what we've learned.

I use TBL because research shows that **students working in groups** have **higher academic achievement**. You learn and retain more when you **discuss** what you read, **teach** a concept to someone else, and **practice applying** concepts and ideas. All of these activities strengthen **high-level reasoning skills**.

The figure below shows how TBL works in this course:

How does team-based learning work?



Responsibilities & Expectations

My philosophy of teaching is that it is my responsibility to create and maintain the conditions that support your learning. 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. I meet 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.

To make our time together as effective as possible, it is important that the classroom 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 not to 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, TA, 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: we will do this section together in our first class!

Other Important Policies & Regulations:

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.

Examination Policy: No aids are allowed on tests or examinations. Students should read the Calendar, [Section G](#), on Examinations.

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.

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 Associate Head, Undergraduate of the Department. Students are expected to be familiar with Section SC.4.1 of the University Calendar.

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. 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.**

Other Important Information for Students

- **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.
- **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.
- **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.
- **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.
- **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). 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.
- **Student Union Information:** VP Academic, Phone: 403-220-3911 Email: suypaca@ucalgary.ca. SU Faculty Rep., Phone: 403-220-3913 Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: suypaca@ucalgary.ca.
- **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.
- **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.
- **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.

Help & Resources

If you are feeling lost or overwhelmed...

1. **Talk with me.** Please email me or drop by my office. Many questions and issues can be easily resolved this way.
2. Explore the **supports and resources** available throughout the university community:
 - the SU Wellness Centre (MacEwan Student Centre 370) provides physical and mental health and wellness support via counselling, self-help resources and peer support
 - the Campus Mental Health Strategy website (<https://www.ucalgary.ca/mentalhealth/>) 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.
 - the Student Success Centre (<https://www.ucalgary.ca/student-services/student-success>) offers advising, learning and writing support

| Tentative Class Schedule Winter 2020 (changes to dates for RATs or Assignment posted on D2L) | | | |
|--|------------------|--|---|
| | Date | Topic (note that most classes will involve teams working on assignments) | Assignments Due |
| Introduction to Course | M Jan 13 | Introduction to course, specifications grading & team-based learning. First team assignment. | |
| | W Jan 15 | Introductory RAT on syllabus, Building Effective Teams W20, and Introductory Reading Guide | |
| | F Jan 17 | Clarification lecture on soil; more information on specs grading | Self-Assessment 1: Course Goals & Background Assignment due by 11:59 pm on D2L |
| | M Jan 20 | Where are nutrients in soil and how do these become available to plants? | |
| Unit 1: How do plants themselves obtain nutrients? | W Jan 22 | Unit 1 RAT | |
| | F Jan 24 | N & P cycles and environmental implications | |
| | M Jan 27 | Depletion zones: influence of soil moisture level and clay content | |
| | W Jan 29 | Root adaptations for nutrient uptake: root branching, root hairs and rhizosphere chemistry | |
| | F Jan. 31 | Case Study/Paper #1—Plant adaptations to old, impoverished soils | Individual assignment on Paper 1 due by 9 am on D2L (free pass cannot be used) |
| | M Feb 3 | In-class workshop on Explanation & Analogy Assignments (involves self- and peer-assessment components) | Bring draft of E&A #1 to class |
| | W Feb 5 | Summary of Unit 1 | |
| How do plants make use of biotic interactions to increase nutrient acquisition? Unit 2: Mycorrhizas | F Feb 7 | Unit 2 RAT | |
| | M Feb 10 | Mycorrhizal diversity | Explanation & Analogy Assign. 1 due by 11:59 pm on D2L (free pass can be used) |
| | W Feb 12 | How do mycorrhizal associations increase nutrient availability to plants? | Mid-semester Peer Feedback Survey via ITP Metrics open. |
| | F Feb 14 | Common mycorrhizal networks: resource sharing among plants? | |
| | Feb 17–21 | Winter Break—no classes | |
| | M Feb 24 | Case Study/Paper #2 — common mycorrhizal networks and parasitism | Individual assignment on Paper 2 due by 9 am on D2L (free pass cannot be used). Mid-semester Peer Feedback Survey closes |
| | W Feb 26 | Common mycorrhizal networks continued | |
| | F Feb 28 | Common mycorrhizal networks continued | |

| | | | |
|---|--------------------------------------|--|---|
| | M March 2 | Summary of Unit 2 | Explanation & Analogy Assign. #2 due by 11:59 pm on D2L (Free pass can be used) |
| How do plants make use of biotic interactions to increase nutrient acquisition? Unit 3: Canivory | W March 4 | Unit 3 RAT | |
| | F March 6 | What traits must a plant have to be considered carnivorous? | |
| | M March 9 | Costs/benefits of carnivore | Self-Assessment 2 due by 11:59 pm on D2L |
| | W March 11 | Why is carnivory rare? | |
| | F March 13 | Case Study/Paper #3—Do all carnivorous plants consume animals? | Individual assignment on Paper 3 due by 9 am on D2L (free pass cannot be used) |
| | M March 16 | Summary of Unit 3 | |
| Unit 4: Plant defense. How do plants defend themselves? How do they enlist other organisms in their defence? | W March 18 | Unit 4 RAT | |
| | F March 20 | How do plants defend themselves against herbivores? How can they reduce the costs of defense? | |
| | M March 23 | Direct vx. indirect defense | Explanation & Analogy Assign. #3 due by 11:59 pm on D2L (free pass can be used) |
| | W March 25 | Enlisting animals in defense: volatile signals | |
| | F March 27 | Case study/Paper #4 Defense mutualisms: ants | Individual assignment on Paper #4 Summary due by 9 am on D2L (free pass cannot be used) |
| | M March 30 | In-class workshop on project (involves self- and peer-assessment components) | Upload draft of project by 9 am; bring draft of project to class |
| | W April 1 | Defense mutualisms: endophytes | |
| | F April 3 | Defense mutualisms: endophytes | |
| | M April 6 | Unit 4 Summary | |
| W April 8 | Course Summary—final team assignment | Individual contribution to course summary due by 9 am on D2L. Final Peer Feedback Survey via ITP Metrics opens (closes on April 17). | |
| | F April 10 | Good Friday—no class | |
| | M April 13 | Easter Monday—no class | |
| | W April 15 | No class but I will have office hours (see posting on D2L) | Project due by 11:59 pm on D2L (free pass can be used). Final Self-Assessment due at 11:59 pm on Friday April 17 (free pass can be used) |