



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

1. Course: BIOL 313, Principles of Ecology – Winter 2020

Lecture 01: **MWF** **13:00-13:50** **ST 148**

Lab Sections: **B01, 02, 03** **Tuesday at 9AM** **BI 156, 162, 175**
 B04, 05, 06 **Tuesday at 12:00 Noon** **BI 156, 162, 175**
 B07, 08, 09 **Tuesday at 3:00PM** **BI 156, 162, 175**
 B10, 11, 12 **Thursday at 9AM** **BI 156, 162, 175**
 B13, 14, 15 **Thursday at 12:00 Noon** **BI 156, 162, 175**
 B16, 17, 18 **Thursday at 3:00PM** **BI 156, 162, 175**

Lab/Course Coordinator: Dr. Kyla Flanagan BI 266 kmflanag@ucalgary.ca
Instructor: Dr. Ariane Cantin BI 583 acantin@ucalgary.ca
Lab Technician: Louise Hahn BI 264 lhahn@ucalgary.ca

Course Site: D2L: BIOL 313-(Winter 2020) – Principles of Ecology

Note: Students must use their U of C email account for all course correspondence.

Department of Biological Sciences 220-3140 BI 186 biosci@ucalgary.ca

2. Requisites:

See section [3.5.c](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s): Biology 241 and 243

3. Grading:

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course, the following weights will be used:

Component(s)	Weighting %	Date
Lab Component	Lab total 40%	
<i>Individual</i>	<i>Lab individual total 25%</i>	
Methods, Results and Figures for Fly lab	4%	Week of February 24 th
Learning Surveys (Beginning & End of Course) & Peer Evaluations (Mid & End of Semester)	2%	Jan. 20 th , Feb. 24 th & Apr. 15 th
Introduction to Research Project	5%	Week of March 9 th
Excel Skills Activity	1%	Week of March 2 nd
Peer Feedback on Graphical Abstract	1%	Week of April 6 th
Term Project	12%	April 15 th
<i>Team¹</i>	<i>Lab team total 15%</i>	
Team Research Proposal	2%	Week of February 3 rd
Team Contract	1%	Week of January 27 th
Figure Facts Assignment	1%	Week of February 10 th
Team Poster for Multispecies Interactions	4%	Week of March 23 rd
Team Graphical Abstract	5%	Week of April 6 th
Meta Data	2%	April 15 th

Lecture Component (<i>all individual</i>)	Lecture total 60%	
Midterm	25%	March 2 nd 6:30-8:30
Final	30%	TBA
Participation (TopHat & Case Studies)	5%	All semester

¹At the end of the term, each student will evaluate the contributions of the other members of his/her team (peer evaluation). All team members will get a “peer score” based on the final peer evaluation. The peer score for a student is the average rating of the student, divided by the overall average rating for all members of the team. This provides a way to evaluate the relative contributions of each team member to the team’s work. Each student’s total teamwork mark will be multiplied by his/her peer score to determine his/her final mark for the teamwork component of the course (15% of final grade).

Each piece of work submitted by the student in the categories outlined above will be assigned a percentage score. A student’s grade is determined by marks for both individual and teamwork components. The student’s average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade using the conversion scale provided below.

Students must achieve a passing grade on both the lecture portion and the laboratory portion of the course to qualify for a passing grade overall.

This course has a registrar scheduled Final Exam.

The conversion between a percentage grade and a letter grade is as follows.

Letter Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Min. Percent Required	95%	90%	85%	80%	75%	70%	65%	60%	57%	53%	50%

4. Missed Components Of Term Work:

In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see [Section M.1](#); for more information regarding the use of statutory declaration/medical notes, see [FAQ](#)). Absences must be reported within 48 hours.

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 the student’s responsibility to familiarize themselves with these regulations. See also Section E.3 of the University Calendar.

5. Scheduled Out-of-Class Activities:

Midterm Exam March 2nd, 2020 18:30-20:30 Location ST 140 and 148

6. Course Materials:

Required: Ecology: Concepts & Applications, Molles, Cahill & Laursen, McGraw-Hill Ryerson. 4th Can. Ed.

Online Course Components: Students will use **Top Hat** (TH; <https://tophat.com/>) in class to enhance learning in the classroom. If a student completes 75% or more of the in-class participation activities (TH and Case Studies), they will receive the full 5% participation mark. **If the student completes less than 75% of the in-class participation activities, they will receive 0% for the participation mark.** It is the student’s responsibility to ensure that their participation is being recorded by the TH system, and any discrepancies must be brought to the attention of the Instructor by 16:00 on April 15, 2020 at the latest (but we encourage doing so at the earliest opportunity), as we will be unable to modify participation grades after this time. If a student is unable/unwilling to use the TH system, they must contact the Instructor within the first two weeks of class to make alternate arrangements. Some teamwork resources are provided by **ITP Metrics**, a system of secure web-based tools for forming teams and conducting Peer Evaluations and assigning a student to teams at the University of Calgary. This tool is free for all students. Students will be invited by email to create an ITP Metrics account in the first week of the course.

7. **Examination Policy:**

Non-programmable calculators will be allowed for the midterm and the final exam. Students should also read the Calendar, Section G, on Examinations.

8. **Approved Mandatory And Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing Across the Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation, etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

10. **Human & Living Organism Studies Statements:**

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

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 the 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 fieldwork requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conform 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 concerns 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.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business 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 submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [L.1](#) and [L.2](#) of the University Calendar
- b. **Final Exams:** 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 resources available throughout

the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 30, 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 was 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 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. 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: ombuds@ucalgary.ca.
- 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: ombuds@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: _____

Associate Dean's Approval for
Out of regular class-time activity: ORIGINAL SIGNED Date: _____
B313 co W20; 2019-12-03 2:08:17 PM

OVERVIEW OF THE COURSE:

In this course, you will explore questions such as:

1. How do environmental factors dictate the distribution of organisms?
2. How do individuals make decisions in choosing mates and acquiring resources?
3. What controls the size of a population?
4. How do anthropogenic factors —such as habitat fragmentation—impact populations?
5. How do we make decisions in managing populations? How do we control invasive species? How do we conserve declining species?

In the labs, you will develop some fundamental skills that apply to any discipline in biology, including how to design an experiment, write a scientific paper, and perform some fundamental statistical analyses, all while exploring current issues in Ecology. We are excited this semester to be utilizing Team-Based Learning to the labs! You will be working in teams to conduct your own term research project on a question you develop (with lots of support from TAs and us).

The course is divided into 5 big 'themes' each with a series of topics:

Theme 1 (week 1): Introduction to Ecology

- *Ecology in the context of evolution*

Theme 2 (weeks 2-4): Ecology of Individuals

- *How do organisms deal with environmental variability? How does this influence the distribution of a species?*
- *How do organisms deal with limited resources/nutrients/energy?*
- *How do organisms choose mates?*
- *Life histories and Trade-offs*

Theme 3 (weeks 4-6): Ecology of Populations

- *How do vital rates and intraspecific interactions of populations influence the rate of change of a population?*
- *Population structure, age, stage & sex*
- *Spatial population dynamics (meta-populations) & applications*

The midterm covers Themes 1-3

Theme 4 (weeks 7-10): Ecology of Species Interactions

- *Competition*
- *Predation & herbivory*
- *Parasitism*
- *Mutualism*

Theme 5 (weeks 10-13): Ecology of Communities and Ecosystems

- *Species diversity*
- *Community assembly & ecosystem function*
- *Landscape ecology & macroecology*

The final exam is cumulative, in that you need to be able to apply what you learned in Themes 1-3 to Themes 4 & 5.

TEACHING ASSISTANTS: Contact information for TAs will be updated on D2L in the first week of classes.

INSTRUCTOR OFFICE HOURS: Wednesday 2-4PM & Friday 2-3PM in BI 583 (in John Post's Laboratory)

Individual assistance is always available **by appointment**. I look forward to seeing you during office hours. Stop in! (office hours are really, really boring with no students).

EMAIL COMMUNICATION: I will be working hard to answer your emails within 24 hours Monday-Friday, all emails received during the weekend or on holidays will be answered by 5PM the following workday.

Teaching Team Responsibilities and Expectations

Our philosophy is that it is our responsibility to set the stage for learning. It is our job to ensure that the classroom environment, support materials, and assessment tools all support the conditions that allow you to learn. Feedback from students is essential so that we will know how well the course is going and where problems are arising. In addition to a mid-semester and an end-of-semester course evaluation, we will also have **Class Representatives**, who will provide feedback about how the course is going based on what they are hearing from you or observing in class. Please feel free to contact the class representatives and/or us about the course at any time. It is also our goal that, as much as possible, students will spend class time actively working with course material and applying what has been learned from the readings and lectures. This means coming to class prepared and willing to participate. To make our time together as effective as possible, it is crucial that the lecture learning environment is one of mutual respect. We will do whatever we can to create and maintain that environment; my expectations of student conduct are outlined below:

Our expectations of you:

- **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. We understand that there are exceptional 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 the class.
- Please let us 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 and us with respect. There may be times when you are frustrated with something that is going on in the course and find it challenging to be patient. However, to maintain a respectful and constructive environment in this class, we ask that you are respectful of others in your words and actions.

What you can expect from us:

- We will treat all students with respect and do our best to make our expectations about how to succeed in this class clear.
- We will start and end classes on time.
- We will be available outside of class time to discuss course content or any other course concerns.
- We will prepare reading guides and organize review sessions for exams.
- We will post materials for lectures and labs on D2L on time.
- We will reply to emails within 24 h (except weekends).

Course Outcomes: After completion of this course, a successful student will be able to:

- Demonstrate that ecological interactions happen at different scales and discuss why/how we examine those interactions to explain the distribution and abundance of organisms
- Explain the importance of ecology for other disciplines in biology and discuss its relevance to our everyday lives, conservation, etc.
- Explain how/why ecological interactions need to be considered in an evolutionary context
- Explain the process of optimization, and how natural selection favours individuals whose behaviours lead to an increase in fitness
- Explain the fitness consequences for mate choice and the differences that exist between males and females
- Link individual rates of survival and fecundity and life-history strategies to population growth rates
- Explain why exponential/geometric growth results from density-independent per capita rates and how logistic growth results from density-dependent per capita rates
- Explain how ecological processes and interactions can promote and maintain biological diversity
- Describe and predict human impacts on ecology systems, making links to the global carbon cycle, climate change, and global scale ecological process
- Design, conduct and analyze an authentic ecological experiment. Report the results of this experiment in the format of a scientific paper.

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," we will assume that you have read and understood the information posted on the Dept. of Biological Sciences' webpage dealing with academic honesty: https://bio.ucalgary.ca/undergraduate/current_students/academic_honesty. In particular, be sure that you know what constitutes plagiarism—test yourself by taking the on-line quiz.

Teamwork in Lab:

We will be forming teams in the first week of class. Research shows that *diverse* teams function the best and produce the best outcomes. So, it's our job to make the teams as diverse as possible. To help with this, we will be using **ITP Metrics** to divide you into teams based on previous courses you've taken, your major/year, work experience, and other factors that will help us form successful teams. These may feel like big teams at first, but research shows that teams of 4-7 individuals work best. As the term progresses, I am sure you will appreciate having the diversity of ideas and perspectives that come with a team of this size.

Additionally, we will be putting measures in place (Team Contract, Peer Evaluation) to ensure there is individual accountability to the team. If you are having issues with your team, please don't hesitate to come and talk to your TAs or us. Little problems can turn into big problems if not addressed. We are happy to facilitate a discussion with your team to help resolve issues.

Tentative Course Schedule

Date	Lecture	Reading p.# 4ed. (3ed.)	Labs	Assessment
Jan	13 1: Introduction to Ecology	Ch 1 & Handout	Lab 1: Introduction to Research	NO ASSIGNMENT
	15 2: Evolution: why we need to understand evolution to understand ecology Part I	81-88 (89-95)		
	17 3: Ecological Interactions & Evolution Part II	89-104 (96-110)		
	20 4: Physiological Ecology: Limiting factors, performance curves and distributions of organisms	Ch 5 (115-144)	Lab 2: Developing a Team Research Project	1: Team Research Proposal (2%) (Due: Lab 4)
	22 5: Physiological Ecology: Limiting factors, temperature, distribution limits and climate change	Ch 5 (115-144)		
	24 6: Behavioural Ecology: How do individuals deal with limited resources/energy?	187-191 (191-196)		
	27 7: Behavioural Ecology: How do individuals find prey?	185-186 (190-191)	Lab 3: Ecological Sampling & Experimental	2: Team Contract (1%) (Due: end of lab)
	29 8: Behavioural Ecology: How do individuals choose mates?	212-222 (216-226)		
	31 9: Behavioural Ecology: How & why do the life history strategies of organisms vary?	228-238 (231-241)		
Feb	3 10: Behavioural Ecology: How & why do the life history strategies of organisms vary?	242-246 (244-250)	Lab 4: Fruit Fly Foraging	3: Methods, Results and Figures for Fly lab (4%) (Due: Lab 7)
	5 11: Case Study: Using GAME THEORY to understand behaviour*	222-224 (226-228)		
	7 12: Population Ecology: How do the vital rates of individuals influence populations?	309-310 & 318-321 (311-312 & 319-322)		
	10 13: Population Ecology: How do intraspecific interactions affect populations?	321-328 (323-328)	Lab 5: Describing and reporting methods	4: Figure Facts Assignment (1%) (Due: end of lab)
	12 14: Population Ecology: How do differences among individuals affect populations?	290-302 & 314-317 (293-305 & 316-319)		
	14 15: Population Ecology: What are the consequences of examining populations spatially?	270-277 & 571-582 (272-280 & 558-567)		
	17	n/a	NO LAB	NO ASSIGNMENT
	19	n/a		
	21	n/a		
	24 16: Case Study: Zombie Attack!*	Handout	Lab 6: Mid Semester Research Progress	5: Introduction (5%) (Due: Lab 8)
	26 17: Review Lecture & Top Hat practice*	n/a		
	28 18: Introduction to the second half and Q & A	n/a		
Mar	2 19: Competition (1) - MIDTERM EXAM 18:30-20:30	336-343 (335-343)	Lab 7: Data Management and Excel Wizardry	6: Excel Skills Activity (1%) (Due: end of lab)
	4 20: Competition (2)	344-350 (343-348)		
	6 21: Competition (3)	351-363 (349-360)		
	9 22: Predation (1)	374-381 (370-375)	Lab 8: Multispecies Interactions	7: Team Poster for Multispecies Interactions (4%) (Due: Lab 10)
	11 23: Predation (2)	381-382 & 389-390 (378-379 & 385-387)		
	13 24: Case Study: Caribou Conservation Controversy*	Handout		
	16 25: Herbivory	365-374 (361-370)	Lab 9: Writing and Graphical Abstracts	8: Team Graphical Abstract (5%) (Due: Lab 12)
	18 26: Parasitism & Disease (1)	396-403 (392-399)		
	20 27: Parasitism & Disease (2)	396-403 (392-399)		
	23 28: Mutualism	408-423 (404-417)	Lab 10: Team Project	NO ASSIGNMENT
	25 29: Species Abundance & Diversity (1)	424-436 (420-433)		
	27 30: Species Abundance & Diversity (2)	437-450 (433-445)		
Apr	30 31: Communities	Ch 17	Lab 11: Team Project	NO ASSIGNMENT
	1 32: Communities (2)	Ch 17		
	3 33: Nutrients and energy flow	Ch 20		
	6 34: Landscape Ecology	Ch 21	Lab 12: Team Graphical Abstract Showcase	9: Peer Feedback on Graphical Abstract (1%) (Due: end of lab)
	8 35: Macroecology	Ch 22		
	10	No lecture		
	13	No lecture		Term Project (12%) & Meta-data (2%) (Due: Apr 15)
	15	38: Review*	NO LAB	