



UNIVERSITY OF  
CALGARY

DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE

1. **Course:** **BIOLOGY 313 – Principles of Ecology**

Lecture Section(s) L01 MWF 13:00-13:50 ST 140 WINTER 2019

<b>Lab Section(s)</b>	<b>B01, 02, 03</b>	<b>Tuesday at 9:00 AM</b>	<b>BI 232, 234, 234A</b>
	<b>B04, 05, 06</b>	<b>Tuesday at 12:00 Noon</b>	<b>BI 232, 234, 234A</b>
	<b>B07, 08, 09</b>	<b>Tuesday at 3:00 PM</b>	<b>BI 232, 234, 234A</b>
	<b>B10, 11, 12</b>	<b>Thursday at 9:00 AM</b>	<b>BI 232, 234, 234A</b>
	<b>B13, 14, 15</b>	<b>Thursday at 12:00 Noon</b>	<b>BI 232, 234, 234A</b>
	<b>B16, 17, 18</b>	<b>Thursday at 3:00 PM</b>	<b>BI 232, 234, 234A</b>

**Course Coordinator** Dr. Heather Addy EEEL 235C [addy@ucalgary.ca](mailto:addy@ucalgary.ca)

**Instructors:** Dr. Robert Barclay BI 330 [barclay@ucalgary.ca](mailto:barclay@ucalgary.ca)

Dr. Ariane Cantin BI 587Z [acantin@ucalgary.ca](mailto:acantin@ucalgary.ca)

**Lab Technician:** Ms. Louise Hahn BI 264 [lhahn@ucalgary.ca](mailto:lhahn@ucalgary.ca)

D2L course name: BIOL 313 L01 - (WINTER 2019) – PRINCIPLES OF ECOLOGY (W2019BIOL313L01)

Biological Sciences Department BI 186 403-220-3140 [biosci@ucalgary.ca](mailto:biosci@ucalgary.ca)

2. **Prerequisites: Completion of at least 24 units (4.0 full-course equivalents), including Biology 233 or any two of Biology 231, 241 and 243**

See section 3.5.C in the Faculty of Science section of the online Calendar  
[www.ucalgary.ca/pubs/calendar/current/sc-3.5.html](http://www.ucalgary.ca/pubs/calendar/current/sc-3.5.html)

3. **Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course, the following weights will be used:

**Lab Component**

**Individual Work (27% course grade)**

Assignment 1	5% (3% assignment, 2% peer-review)
Assignment 3	6%
Assignment 4	1%
Term Project	13%
Peer Evaluations	2%

**Team Work<sup>1</sup> (15% course grade)**

Assignment 2	1%
Assignment 5	5%
Quiz #1	2%
Quiz #2	2%
Quiz #3	2%
Term Project Metadata	3%

**Lecture Component (58% course grade)**

Participation (Top Hat)	3%		
Midterm Exam	25%	<b>Monday March 4 6:30-8:30PM</b>	<b>ST 140 / 148</b>
Final Examination <sup>2</sup>	30%		

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



Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

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

#### 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 **15 days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a reassessment of the work if, and only if, the student has sufficient academic grounds. See sections I.1 and I.2 of the University Calendar
- b. **Final Exam:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

#### 11. Other Important Information For Students:

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).
- b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see [www.ucalgary.ca/wellnesscentre](http://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](mailto:svsa@ucalgary.ca)) or phone at 403-220-2208 .
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero-tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. **These are only examples.**
- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.
- f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#). Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy, by email [addy@ucalgary.ca](mailto: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 (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.
- i. **Student Union Information:** VP Academic, Phone: 403-220-3911 Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca).

SU Faculty Rep., Phone: 403-220-3913 Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca).  
Student Ombudsman, Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca).

j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.

k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

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

Associate Dean's Approval for  
out of regular class-time activity: \_\_\_\_\_ ORIGINAL SIGNED \_\_\_\_\_ Date: \_\_\_\_\_  
B313 W19; 1/9/2019 11:37 AM

## 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 basic 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.*

## 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 very important 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.

### Our expectations of you:

- treat others in class with respect. This means:
  - no talking when we are teaching
  - turn off cell phones in class (unless we are doing Top Hat)
  - restrict your use of laptops and other electronic devices to only those activities directly related to class. If you violate this policy or disturb other students, you may be asked to leave the classroom
  - be on time & come prepared; participate actively in class and lab activities

### What you can expect from us:

- treat all students with respect
- start and end classes on time
- available outside of class time to discuss course content or any other course concerns
- prepare reading guides and organize review sessions for exams
- post materials for lecture and labs on D2L in a timely manner
- 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 favors individuals whose behaviors 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.

Tentative Course Schedule for Biol 313 – Winter 2019

Day	Date	Lecture	Readings in 4 <sup>th</sup> ed. textbook (3 <sup>rd</sup> ed.)	Labs	Assessment	
F	Jan	11	1 - Introduction to Ecology	<b>Ch 1 &amp; handout</b>		
M		14	2 - Evolution: why we need to understand evolution to understand ecology	<b>pp. 81-88</b> (89-95)	<b>No assignment</b>	
W		16	3 - Evolution: ecological interactions & evolution	<b>89-104</b> (96-110)		
F		18	4 - Physiological Ecology: limiting factors, performance curves, and organism distribution	<b>Ch 5</b> (115-144)		
M		21	5 - Physiological Ecology: limiting factors, temperature, distribution limits, and climate change	<b>Ch 5</b> (115-144)	Lab 2: Scientific Writing & Term Project	Introduction to Term Project assigned (3%) Due Lab 4
W		23	6 - Behavioural Ecology: how do individuals deal with limited resources/energy?	<b>187-191</b> (191-196)		
F		25	7 - Behavioural Ecology: how do individuals find prey?	<b>185-186</b> (190-191)		
M		28	8 - Behavioural Ecology: how do individuals choose mates?	<b>212-222</b> (216-226)	Lab 3: Ecological Sampling & Experimental Design	Experimental Design for Term Project assigned (1%) Due Lab 4
W		30	9 - Behavioural Ecology: how & why do life history strategies vary? Part I	<b>228-238</b> (231-241)		
F	Feb	1	10 - Behavioural Ecology: how & why do life history strategies vary? Part II	<b>242-246</b> (244-250)		
M		4	11 - Case Study: using Game Theory to understand behaviour *	<b>222-224</b> (226-228)	Lab 4: Fruit Fly Foraging	Methods, Results & Figures for Fly Lab Experiment assigned (6%) Due Lab 6
W		6	12 - Population Ecology: how do the vital rates of individuals influence populations?	<b>309-310 &amp; 318-321</b> (311-312 & 319-322)		
F		8	13 - Population Ecology: how do intraspecific interactions affect populations?	<b>321-328</b> (323-328)		
M		11	14 - Population Ecology: how do differences among individuals affect populations?	<b>290-302, 314-317</b> (293-305 & 316-319)	Lab 5: Data Management & Analysis	Team Quiz #1 (2%)
W		13	15 - Population Ecology: what are the consequences of examining populations spatially?	<b>270-277 &amp; 571-582</b> (270-280 & 558-567)		
F		15	16 - Case Study: Zombie Attack!*	<b>Handout</b>		
<b>M-F</b>		<b>18-22</b>	<b>Reading week: no lecture</b>		<b>NO LABS</b>	<b>No assignment</b>
M		25	17 - Review & Top Hat practice*		Lab 6: Creating figures	Creating figures & describing trends in plotted data (in class) (1%)
W		27	18 - Introduction to the second half of BIOL 313, Q & A			
F	Mar	1	19 - Competition Part I	<b>336-343</b> (335-343)		
M		4	20 - Competition Part II	<b>344-350</b> (343-348)	Lab 7: SIMBIO Isle Royale & Term Projects	Team Quiz #2 (2%)
W		6	21 - Competition Part III	<b>351-363</b> (349-360)		
F		8	22 - Predation Part I	<b>374-378</b> (370-375)		
M		11	23 - Predation Part II	<b>378-381</b> (375-378)	Lab 8: Multispecies Interactions	Poster for Multispecies Interactions Experiment assigned (5%) Due Lab 10
W		13	24 - Case Study: caribou conservation controversy*	<b>Handout</b>		
F		15	25 - Herbivory	<b>365-378</b> (362-370)		
M		18	26 - Parasitism & disease Part I	<b>396-403</b> (392-399)	Lab 9: SIMBIO Keystone Predators & Term Project	Team Quiz #3 (2%)
W		20	27 - Parasitism & disease Part II	<b>396-403</b> (392-399)		
F		22	28 - Mutualism	<b>408-423</b> (404-417)		

M		25	29 - Species abundance & diversity Part I	<b>424-441</b> (420-436)	Lab 10: Peer Review & Term Project	Peer review Assn. 1 (in class) 2%
W		27	30 - Species abundance & diversity Part II	<b>424-441</b> (420-436)		
F		29	31 - Communities Part I	<b>424-441 &amp; Ch 17</b> (420-436 & Ch. 17))		
M	Apr	1	32 - Communities Part II	<b>Ch. 17</b> (Ch 17)	Lab 11: Term Project	No assignment
W		3	33 - Nutrients & energy flow	<b>Ch 29</b> (Ch 20)		
F		5	34 - Landscape ecology	<b>Ch 21</b> (Ch 21)		
M		8	35 - Macroecology	<b>Ch 22</b> (Ch 22)	Lab 12: Term Project Wrap Up	Term Project (13%) & Team Metadata (3%) (Due Apr 12)
W		10	36 - Case Study: global carbon cycle & ocean productivity	<b>593 &amp; 597-610</b> (578 & 582- 595)		
F		12	No class			