
Teaching Team

Professors: See Academic Timetable.

Instructor: Allison Schmidt LSC-4015 494-1638 *Allison.Schmidt@dal.ca*

Lectures & Labs

Lecture times: M W F 10:35-11:25, Room: See Academic Timetable

Labs/Tutorials: Room 4009 or 4016 - LSC (4th floor, Biology)

Sessions: See Academic Timetable

Labs/Tutorials: Room 4009 - LSC (4th floor, Biology)

Note: Regular weekly lab sessions begin second week of January.

Course Description and Prerequisites

Ecology examines interactions of plants and animals, including humans, with each other and with their non-living world. Topics include population growth, competition, predation, food webs, metapopulation dynamics, biodiversity and ecosystem function. The course has a quantitative approach providing a foundation for further work in ecology, marine biology and environmental science.

A grade of C+ or higher in BIOL 1011.03, BIOL 1021.03, BIOA 1003.03, ENVS 1000.06, BIOL 1030.03, or (SCIE 1505.18) AND A grade of D or higher in MATH/STAT 1060.03 or MATH/STAT 2080.03.

Assumed Knowledge and Skills before taking BIOL 2060

Before starting the course you should be able to:

- **Recall** 1) exponential and logistic models describe unlimited and resource-limited population growth; 2) evolutionary trade-off underlie differences in life history strategies; and 3) basic chemistry concepts (balancing equations, molecules)
- **Distinguish** among biological interactions (predation, competition, mutualism, symbiosis, parasitism)
- **Describe** human impacts on the nitrogen cycle
- **Interpret** 1) the results of a simple field or laboratory experiment and 2) simple graphs (e.g., histograms, x versus y plots) of ecological data
- **Know** how to calculate summary statistics (mean, sample size, variance, standard deviation)
- **Familiarity** with regression, t-tests and ANOVA

If you are unsure about any of these, you should review them in your first year biology, chemistry and statistics textbooks before the class begins.

Textbooks (A copy of each is also “on reserve” at the Killam library)

Molles MC, Cahill JF, Laursen A. 2017. Ecology: concepts and applications. 4th Canadian Edition. Toronto: McGraw-Hill. 654p.

Knisely K. 2017. A student handbook for writing in biology. 5th ed. Sunderland: Sinauer Associates. 288p.

Evaluation

To get a passing final grade in BIOL 2060 you **MUST** get **50% or better** on your Final Lab Grade (20 out of 40 points) **AND** your Midterm and Final Exam marks (30 out of 60 points).

| Assessment Component: | % |
|---|-----|
| Midterm Exam (in class) – see schedule for date. | 15 |
| Final Exam (scheduled by Registrar) | 45 |
| Labs (worth a total of 40%) | |
| Competition Experiment (A5=3%, A7 = 12%, A8 = 3%) | 18 |
| Assignments (A2, A3, A4 and A6 @ 3% each) | 12 |
| Forest Ecology and Succession Report (A10) | 10 |
| Total | 100 |

A bonus mark worth 1% of your final grade will be awarded for participating in the 2 Help Sessions (Location LSC 4009, no part marks):

Session 1 (A7): Fri Mar 15 13:30-15:30 **or** Mon Mar 18 16:00-18:00 (Writing Centre, Library & TAs)

Session 2 (A10): Fri Mar 29 13:30-15:30 **or** Mon Apr 01 16:00-18:00 (Writing Centre, Library & TAs)

Grade Scale:

| | | | | | |
|------------|----------|----------|----------|---------|----------|
| A+: 90-100 | A: 85-89 | A-:80-84 | B+:77-79 | B:73-76 | B-:70-72 |
| C+: 65-69 | C: 60-64 | C-:55-59 | D: 50-54 | F: <50 | |

NOTE: If you require a specific final grade for a scholarship, honours degree, job, graduate or professional school or other purpose, you should ensure that you put in the work needed to earn that grade. You have many opportunities in the lecture and lab to get feedback and help, earn bonus points and showcase your understanding on exams and assignments so we do not offer extra assignments to “boost” your grade. If you receive a final grade lower than what you are required for an academic program, job, or other it is not the fault of the teaching team. Please do not come at the end of the term requesting a higher grade, it is unfair to other students in the class and affects the high academic standard of the university. However, if you have any questions about your grade, marking or feedback, we encourage you to come and discuss this with us as the term is progressing.

Course and University Policies: It is your responsibility to read the course and university policies outlined in the following pages during the 1st week of class.

To avoid misunderstandings and confusion during the semester and the fair and equal treatment of all students, the following rules and policies will be enforced by all members of the teaching team.

1. Expected Knowledge and Skills after taking BIOL 2060
2. Lab Sessions – expectations
3. Lab Assignments
4. Lab Marking Framework
5. Missing Course Requirements
6. Student Collaboration, Communication and Computing in 2060
7. University Policy on Academic Integrity
8. University Policies on Accessibility, Diversity and Inclusion – includes important information on multitasking in class

Extenuating circumstances can arise and when they do you are encouraged to get in touch with Dr. Schmidt as

soon as possible in an attempt work out reasonable accommodation.

Expected Knowledge and Skills after taking BIOL 2060

Once you have completed the class you should be able to:

- **Describe** 1) major drivers of and differences among terrestrial, marine and freshwater biomes; 2) how abiotic factors influence the distribution and abundance of organisms; 3) the mechanisms that drive primary and secondary succession; and 4) the effects of disturbance on species diversity
- **Understand** the fundamentals of disease dynamics and transmission
- **Interpret** 1) the evolution of animal behaviour and life history in light of natural selection and inclusive fitness and 2) food-web diagrams in terms of indirect interactions including trophic cascades
- **Explain** 1) the concept of a fundamental and realized ecological niche; 2) top-down and bottom-up control of primary productivity and 3) the major gradients of species diversity in terrestrial and marine ecosystems.
- **Use** the BIDE (births, deaths, immigration, emigration), exponential and logistic population growth models to make predictions
- **Manipulate and interpret** results of the Lotka-Volterra competition and predator-prey models
- **Design** a laboratory or field study using appropriate experimental design principles
- **Predict** the impacts of human activities (e.g. climate change, nutrient loading) using knowledge of the major biogeochemical cycles on the planet (e.g. water, carbon, nitrogen, phosphorus)
- **Generate** appropriate tables and graphs to represent ecological data
- **Read and interpret** a scientific paper describing a straightforward experimental or observational study
- **Conduct** statistical analyses (regression, t-test, ANOVA) on ecological data
- **Communicate** research results in the style of a scientific paper and in a conference style presentation

Lab Sessions (40% of your final grade)

Labs sessions are weekly, attendance is MANDATORY and you must attend the section in which you are registered.

Labs have been designed for you to practice the skills you need in science and beyond:

- Critical thinking
- Initiative, self-motivation and self-assessment
- Planning, organizing and time management
- Data collection and analysis
- Data presentation, interpretation and synthesis
- Scientific research and writing
- Collaboration – working in groups
- Oral communication – through collaboration and presentation

You will be given guidelines for the figures, tables and formatting that must be meticulously followed because this is a requirement in science. Otherwise, you will not be given a recipe to follow. It will often be left up to you to make judgments about what to include or how to approach a question, this is the critical thinking aspect of the assignments and providing a detailed rubric robs you of this practice.

You will be provided with the rationale and examples in the lab to help you understand the requirements and guide your thinking. You will also have small and large group discussions to gain a broader and deeper understanding of ideas and concepts. The instructor and TAs will never give you the answers to assignment questions but instead direct and push your thinking toward the answers you are looking for.

Lab Assignments

Assignment 1a: Is a pre-lab assignment that is **due at the start of your first lab**. You will submit an electronic copy ONLINE under the link in the LAB 1 folder on the class website AND bring a paper copy to your first lab. **Assignment 1a will not be accepted late.** A late or incomplete Assignment 1a will result in a deduction of 5% off your overall grade for Assignment 1.

Assignments and Submission: There are 2 types of assignments: 1) the semester long competition experiment that has dedicated lab sessions as well as specific due dates for the different components; 2) other weekly lab assignments that will have dedicated time in lab to work on them. All assignments will require time outside of the lab to complete. An electronic copy of each assignment MUST be submitted online by the deadline except where indicated in the specific section of the lab manual where a paper copy must be printed or handwritten in ink. **ALWAYS your submission to make sure it is the latest version of your completed work. Late marks will apply if you need to resubmit a complete version after the due date.**

Late Assignments: All assignments will be considered late if EITHER the paper or online copy are submitted after the deadline. **A 10% penalty per day (30% for weekends) is levied on late assignments.** Late assignments will **NOT** be accepted after graded papers have been handed back.

Assignment Back-ups: It is the student's responsibility to keep backup copies of all submitted class work. Computers meltdown often, back up your work in the cloud or email it to yourself. NEVER leave a copy on the desktop of a DAL computer, **it will be deleted once you log off!**

Lab Marking Framework (continued on the next page)

Not all assignments are graded but all need to be completed to get a full understanding of the concepts. Assignments that are not graded but that are submitted late or incomplete or not submitted will result in a 5% penalty on a future graded assignment. Feedback on assignments that are not graded will be part of the associated in-class activity. For graded assignments, you will get general feedback about each item that is graded. In addition, you will be asked a series of reflective questions about your work. Your reflections will not be marked but this is where we will provide more detailed feedback to help you hone your ability to assess and improve the quality of your work.

Evidence shows that when you assess the quality of your own work you are developing the ability to critique how you did something and learn from your mistakes (Weimer 2014). This is a crucial step in your learning and will greatly help you to understand the material and improve your work. Critically assessing your work and improving it based on your assessment are essential skills in all professions. Mastering any skill takes practice, so continually using them is vital in developing your assessment skills and preparing you for the work force (Weimer 2014).

Therefore, the onus is on you to take the feedback you get and go back to the guidelines and assignment details to identify where you may have gone wrong and come up with specific questions for clarification to bring to the TA or Dr. Schmidt if needed.

For all assignments, you will be assessed on:

1. your ability to follow guidelines where they are specified,
2. the quality of your work,
3. your understanding of the concepts, and
4. your ability to convey that understanding.

NOTE: Time and effort are not on the list because they cannot be objectively assessed, so please do not come and request a higher grade with these as a rationale. **Carefully read all your feedback, look at the marking framework and come with specific questions.** This will enhance your understanding and grow your ability to self-assess.

Lab Marking Framework Continued

Your work will be assessed using the following framework. I have indicated what is inadequate (F) and excellent (A) and it is a sliding scale. The generality of the framework allows you to think critically about what is needed and gives you the flexibility to be creative while still being rigorous and building your scientific thinking and communication skills. This framework parallels the Dalhousie University Grade Scale and Expectations: http://www.dal.ca/campus_life/student_services/academic-support/grades-and-student-records/grade-scale-and-definitions.html

Inadequate:

- a. inappropriate presentation and analysis of the data
- b. followed few to none of the guidelines for the layout of figures and tables and their associated captions
- c. incorrect interpretation of the data and analyses
- d. demonstrated a limited understanding of the necessary background or context
- e. included only the minimum level, unnecessary or excessive amount of detail in the explanation
- f. demonstrated a limited ability to draw scientific conclusions based on data, integrate results with scientific literature and discuss the importance of results to science and society
- g. information poorly conveyed (not succinct, illogical, unfocused, redundant or lacking clarity)

Excellent:

- a. best and complete way to present and analyze the data
- b. used a thoughtful design for the layout of figures and tables (e.g. concise tables, multi-panel figures, etc.) and their associated captions in addition to following all of the guidelines
- c. correct and complete interpretation of the data and analysis
- d. demonstrated an exceptional understanding of the necessary background or context
- e. included an appropriate amount of detail in the explanation
- f. drew insightful conclusions based on data, demonstrated an exceptional ability to integrate results with literature and displayed critical thought in discussing the importance of results to and their implications for science and society
- g. clearly and thoughtfully conveyed information with a logical structure clearly linking ideas

Missed Course Requirements (continued on the next page)

Students are responsible for all material covered in the class. However, Dalhousie University recognizes that you may experience short-term (3 consecutive days or less) physical or mental health conditions, or other extenuating circumstances (such as caregiving duties; immediate family illness, injury or death; involvement in an accident; legal proceedings or being a victim of a crime, domestic or intimate partner violence) that may affect your ability to attend required classes, tests, exams or submit other coursework.

Holiday travel and heavy course load are not exceptional circumstances and will not be accommodated

You will be allowed to use the Student Declaration of Absence (SDA) form **ONCE** in BIOL 2060 and there are exceptions for when you can use them (see next page). **If you are going to absent from Lab or Exams you MUST notify Dr. Schmidt PRIOR to your absence for any accommodation to be considered.** Your SDA MUST include the reason for your absence and be submitted **within 3 days of your absence to be eligible for any accommodation** (see next page for submission details). If you experience a subsequent short-term absence you will need to provide written documentation within 3 days of your absence. **Notes from a health professional must be dated on or before (and include) the day of your absence, not after.**

SDAs are not a free pass, they replace a sick note which means that you are still responsible for completing missed course requirements. If you knowingly provide false or fraudulent medical or other documentation (including the SDA form) for your absence, you will have committed an academic offense and are subject to University discipline (per Section 7 of Dalhousie's Code of Student Conduct).

Missed Course Requirements Continued

You cannot use the SDA for the following:

- **Formal Lab report (Assignment 7):** You have many weeks to complete your formal lab report, only long-term absences (see definition below) are acceptable grounds for an extension. In that case, PRIOR arrangements must be made with appropriate written documentation.
- **Final Exam:** Requests for alternate arrangements for missed University-scheduled **FINAL** exams are handled under a separate University regulation: [Requests for an Alternative Final Examination Time](#)

You do not need an SDA if: you already have an accommodation plan in place that allows for coursework deferrals or deadline extensions. You do need to contact Dr. Schmidt in advance to initiate your plan

“Long-term absence” refers to absences of more than three (3) consecutive days due to major or chronic physical or mental health conditions, or other extenuating circumstances such as caregiving duties; immediate family illness, injury or death; involvement in an accident; legal proceedings; being a victim of a crime, domestic or intimate partner violence. If this applies to you, get in touch with Dr. Schmidt as soon as possible to help determine the best way to move forward.

Submitting your SDA: You must submit your form using the dropbox in Brightspace.

Make sure to completely fill in the form PRIOR to submission. If it is blank or missing information, you may not be accommodated.

Student Collaboration, Communication and Computing

Collaboration: You will be strongly encouraged to collaborate with your classmates on all assignments since this is how you will get different perspectives and insights. However, there are only 2 group submissions, all other submissions are individual. This means you must ensure that even though you collaborate that your assignment is your individual piece of work. Discussing ideas with your classmates, then putting down your ideas from these discussions after you have had time to think independently about it will ensure maximum benefit with minimum chances of plagiarism. If you have any questions or concerns about this talk with your TA or Dr. Schmidt.

Email: Check your Dalhousie email daily! This is the main route for communication between the teaching team and students.

Computing: You will be using Microsoft Excel for graphing and R for the statistics you will use in this course. You will need to have MS Excel or equivalent and R installed on your computer or you will need to use student computers.

If you use a DAL computer make sure to save your work to an external drive or OneDrive or the cloud. Do not save it on the desktop, it will not be there after you log-off!

Brightspace: This site is a vitaly important class resource where you will submit all your assignments. In addition, important announcements will be posted here. **Check it regularly!**

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Students' Responsibility: It is a responsibility of ALL students to be familiar with behaviours and practices associated with academic integrity – ignorance is no excuse for plagiarism, cheating or any other academic offence.

TIPS TO AVOID PLAGIARISM:

- NEVER lend your completed or partially completed report
- DO NOT borrow a classmate's report
- DO NOT use old reports from previous terms
- NEVER simply print out and submit 2 identical copies of tables and graphs that you and a classmate have been collaborating on.
- You must MAKE THE REPORT YOUR OWN, INDEPENDENT PIECE OF WORK in all respects; otherwise you will have “copied”, thereby committing an academic offence.
- If you are unsure about anything, read through the following section for additional information and resources. If still in doubt talk to your instructor or lab assistant.

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: <http://www.dal.ca/cultureofrespect.html>

Students are expected to follow the Code of Student Conduct. Students who don't follow this community expectation could face disciplinary action if they are in violations of the code.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

One of the biggest issues associated with BIOL 2060 is **multitasking** on your computer and phone in lecture or lab. **Research by Fried (2008) and Sana et al. (2013) has shown that students multitasking on their laptop in class did not understand the material as well as those who did not multitask! Both studies also found that the performance of the students sitting around the multitasker was also negatively affected because the multitasking was distracting!** So avoid looking at anything other than class material on your computer in lecture or lab so that you and your neighbours can focus on learning! **When you multitask you are in direct violation** of section C.2. Disruption of the code of conduct.

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office (Rm 3037, McCain Building), e-mail (elders@dal.ca) or leave message (902-494-6803).

Information: https://www.dal.ca/campus_life/communities/native.html

Student Resources and Support

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

Aboriginal Student Centre: https://www.dal.ca/campus_life/communities/native.html

Black Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health Services: https://www.dal.ca/campus_life/health-and-wellness/health-services/services.html

Counselling: https://www.dal.ca/campus_life/health-and-wellness/counselling.html

Student Advocacy: <https://www.dsu.ca/services/community-student-services/student-advocacy-service>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

References

Fried CB. 2008. In-class laptop use and its effects on student learning. *Comp. Edu.* 50:906-914

Sana F, Weston T, Cepeda NJ. 2013. Laptop multitasking hinders classroom learning for both users and nearby peers. *Comp. Edu.* 62:24-31

Lecture and Lab Outline: dates of actual holidays will vary from year to year. Travel is NOT an acceptable excuse to miss examinations and will not be tolerated so be sure to use the current year's outline when making travel arrangements.

| Week and Lecture # | Lecture Topic | Lab Topic |
|---------------------------|---|--|
| Week 1 | 1 Introduction (<i>Molles and Cahill: Chapter 1</i>) <u>Individuals</u> 2 Environmental Conditions (5) 3 Resources (6,7) | Labs start Week 2 |
| Week 2 | 4 The Niche (5-7) 5 Distribution & Abundance (10) <u>Populations</u> 6 Population Growth Models: Exponential (11) | Lab 1: Competition Experiment: Design and Set up |
| Week 3 | 7 Age Structure & Life Histories (9) 8 Intraspecific Competition 9 Logistic Growth (12) | Lab 2: Nature of Data |
| Week 4 | 10 Density Independence <u>Interactions</u> 11 Interspecific Competition (13) 12 MUNRO DAY – Holiday | Lab 3: Population Dynamics |
| Week 5 | 13 Interspecific Competition (13) 14 Predation (14) Disease (15) | Lab 4: Modeling Competition |
| Week 6 | 15 <u>Adaptation</u> Adaptation (4) 16 Adaptation (4) 17 Life on Land (2) | Lab 5: Competition Experiment: Data and Details |
| Week 7 | Reading Week No Classes or Labs | |
| Week 8 | 18 Life in Water (3) 19 MID-TERM EXAM <u>Communities:</u> 20 Metapopulations & Island Biogeography (10,22) | Lab 6: Species-Area Relationships |
| Week 9 | 21 Diversity (16) 22 Disturbance (18) 23 Succession (18) | Lab 7: Competition Experiment: Final Data Collection |
| Week 10 | 24 Succession & Patch Dynamics (18) 25 Community Assembly (17) 26 Food Chains (17) | Lab 8: Biannual Conference on Plant Competition |
| Week 11 | 27 Food-Webs (17) 28 Stability (18) 29 Landscapes (20) | Lab 9: Forest Ecology: Field Trips |
| Week 12 | <u>Ecosystem & Global Ecology</u> 30 Energy Flow (19) 31 Nutrient Cycles I (20) 32 Nutrient Cycles II (20) | Lab 10: Forest Ecology: Data analysis + creating your poster |
| Week 13 | 33 Diversity Gradients & Hotspots (22) 34 Global Changes (23) 35 Catch-up & Review | NO LABS |
| Week 14 | 36 Catch-up & Review | NO LABS |