

BIOL*4120 Evolutionary Ecology

Winter 2022 Section(s): 01

Department of Integrative Biology Credit Weight: 0.50 Version 1.00 - December 01, 2021

1 Course Details

1.1 Calendar Description

This course is an examination of common ecological circumstances faced by plants and animals and the morphological, behavioral and life history characteristics that have evolved in response. Particular emphasis will be placed on evolutionary processes and on adaptive aspects of thermoregulation, foraging strategies, spatial distribution, social and reproductive strategies. The course will emphasize both the theoretical basis and the empirical evidence for ecological adaptation.

Pre-Requisites: BIOL*2060, BIOL*2400

1.2 Course Description

- This course reviews the basic tools to study hypotheses about evolutionary adaptation. It will not be a broad survey of the field, but will instead focus on a few subject areas that we will discuss in detail using tools and approaches of evolutionary ecology.
- A basic understanding of Ecology and Evolution is assumed in the course and will not be taught. Students are also expected to have some basic experience in statistics in order to complete quantitative assignments and understand some methods.
- Note on Prerequisites: BIOL*2060 (Ecology) or BIOL*3110 (Population ecology discontinued) or other Ecology course with instructor consent), BIOL*2400 (Evolution) or BIOL*3400 or ZOO*3300 (Evolution discontinued).

1.3 Timetable

- Blended Format: Lectures Online and weekly Tutorial/Seminars In person
- · Lectures: 11:30 AM 12:20 PM, Monday, Wednesday and Friday,
 - Location: Online meeting
- Labs
 - Tutorial Section 1: 12:30 1:30 PM, Fridays, SSC 1306 (Jan-Feb)
 - Tutorial Section 2: 1:30 2:30 PM, Fridays, SSC 1306 (Jan-Feb)
 - Tutorial Section 3: 2:30 3:30 PM, Fridays, SSC 1306 (Jan-Feb)
 - Tutorial Section 4: 3:30 4:30 PM, Fridays, SSC 1306 (Jan-Feb)

1.4 Final Exam

There is no final exam.

2 Instructional Support

2.1 Instructional Support Team

Instructor:

Beren Robinson Ph.D.

berenrob@uoguelph.ca

Office: SSC1464

Office Hours: Office hours are replaced in this course by a synchronously

scheduled online class time, MWF (11:30 - 12:20pm) called 'Ask & Answer' sessions. Here, you ask me questions about any material related to content or working assignments.

Attendance is not required, but sessions will be recorded and made available through courselink. Students with personal

issues should contact Dr. Robinson directly by email.

2.2 Teaching Assistants

Teaching Assistant (GTA): TBA TBA
Office Hours: TBA

Teaching Assistant (GTA): TBA TBA
Office Hours: TBA

3 Learning Resources

This will be a blended course format:

Lectures will be taped and asynchronously available through CourseLink.

I will hold a synchronous <u>Online Ask & Answer</u> meeting 3 days a week during the scheduled lecture time: MWF 11:30am - 12:20 pm where I will address student questions - but otherwise not lecture. The goal here is operate this like a large office hours, and so the content will be driven by student concerns.

Tutorials are held In class on fridays of every week of the term. You must participate in the time associated with your official registered section.

- Lecture material will be drawn from the primary literature and supplied on the course website (via CourseLink).
- Various good evolution textbooks will help you with terms and basic evolutionary concepts (see first 3 below for example)
- For more detailed treatments of evolutionary ecology, the final 3 references below are recommended.

3.1 Recommended Resources

Evolution: Making sense of Life (any edition) (Textbook)

Douglas Emlen and Carl Zimmer 3rd edition Aug 1 2019 is the current textbook being used in BIOL*2400 "Evolution" Pearson (ISBN13: 9781319079864).

Evolution (Textbook)

Douglas J. Futuyma and Mark Kirkpatrick Publication Date - 4th Edition April 2017 Sinauer Associates, Inc. (ISBN: 9781605356051)

Evolutionary Analysis (Textbook)

Jon C. Herron and Scott Freeman 5th Edition Aug 12 2013 Pearson (ISBN-13: 978-0321616678)

Evolutionary Ecology: Concepts and Case Studies (Readings)

Fox, C.W., D.A. Roff and D.J. Fairbairn (eds). 2001. Oxford University Press, Oxford, UK. (ISBN-13: 978-0195131550)

Eco-Evolutionary Dynamics (Textbook)

Andrew P. Hendry 2017. Princeton University Press, Princeton, NJ (ISBN-13: 978-0691145433)

A Primer in Ecological Genetics (Textbook)

Jeffrey K. Conner and Daniel L. Hartl. 2004. Sinauer Assoc. Inc., MA (ISBN-13: 978-0878932023).

4 Learning Outcomes

By the end of this course, students should be able to address the following goals and perform the following skills.

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

- 1. Evolution: Apply evolutionary principles to new problems in biology and everyday life; use evolutionary principles to develop novel hypotheses based on observation; explain a study to document selection-driven evolutionary change in a population.
- 2. Selection: Measure directional and nonlinear (stabilizing/disruptive) selection differentials; Define and understand how to measure selection gradients; Think critically about genic, individual and group selection; have a general sense of the strength of selection in the wild.
- 3. Fitness: Explain what fitness is and the variety of ways in which it can be measured; Appreciate challenges of measuring fitness in nature.
- 4. Heritability: Understand concepts of repeatability, heritability and polygenic inheritance at a more conceptual level; Understand at a basic level genetic covariances, genetic constraints and correlated responses to selection; Appreciate patterns in heritability estimates among types of traits.
- 5. Phenotypic evolution: Understand how to assess whether observed phenotypic changes/differences are genetically based.
- 6. Comparative method: Appreciate why it is important to consider evolutionary history in comparisons among species (and higher taxa), and have a basic idea of how this can be done.
- 7. Consider various other features of organisms such as phenotypic plasticity and life history traits in an evolutionary context, and explain using examples such concepts as evolutionary conflict between species, individuals and genes.
- 8. Quantify phenotypic variation in a sample in collaboration with others and use basic statistical methods to evaluate selection acting on the population (skills goal).
- Practice effective critical thinking during written and oral communication in tutorial discussions focused on analysing primary scientific literature and creating a final research poster on applied evolution by natural selection (skills goal).

5 Teaching and Learning Activities

- This course has both <u>lecture</u> (asynchronous online) and <u>tutorial</u> (synchronous In class) components.
- Lecture content material will be delivered online as videos for asynchronous

- review by students, supported by synchronous Online (Zoom) class meetings (Mon., Wed. and Fri.) where questions, work sets, and case studies can be discussed.
- Friday <u>tutorial</u> sections are in class on the University of Guelph campus and will be used to apply concepts through practical exercises and the discussion, critique and presentations of the primary literature.

5.1 General Lecture and Tutorial Schedule

Monday	Wednesday	Friday	
Week 1 - Introduction	Week 1 - What is an adaptation?	Week 1 - Asking evolutionary questions.	
	, i	Hypotheses and predictions	
		Assignment 1: System background; develop hypotheses about anti-predator trait function and fitness.	
Week 2 - Fitness	Week 2 - Fitness	Week 2 - Discuss Practical Lab Hypotheses	
		Assignment 1: Predictions of Trait change	
		Deadline to sign up for Assignment 2 Dates	
Week 3 - Natural Selection	Week 3 - Natural Selection	Week 3- Natural Selection	
		Assignment 1: Analyze - Measure selection	
Week 4 - Natural Selection	Week 4 - Natural Selection	Week 4 - Quantitative genetics	
		Assignment 1: Due Feb. 4	
		Assignment 2.1: Dennenmoser and Christy (2013) Fiddler crab claw performance.	

Week 5 - Quantitative Genetics	Week 5 - Unit Test 1 Feb. 9	Week 5 - Response to predator-driven natural selection	
		Assignment 2.2: Lapiedra et al. (2018) Anolis lizards on islands	
		Introduction to Assignment 3: Final Research Poster	
Feb 21 - Winter Break (No classes)	Feb 23 - Winter Break (No classes)	Feb 25 - Winter Break (No classes)	
Week 6 - Genetic Correlations	Week 6 - Phenotypic plasticity	Week 6 - Maternal effects Assignment 2.3: Baier and Hoekstra 2019 Mainland vs. island deer mice - behavioural / morphology	
Week 7 - Prediction of response to selection Breeder's Equation	Week 7 - Single gene trait evolution	Week 7 - Assignment 2.4: RennisonSchluter (2019) Molecular genetics of stickleback adaptation to predators	
Week 8 - Animal model in field populations	Week 8 - Applied Evolution	Week 8 - Assignment 2.5: Pigeon et al. (2016) Trophy hunting and evolution of horn size. Assignment 3 Poster Draft Due - Sunday	
Week 9 - Life History Evolution	Week 9 - Predator-prey Coevolution	Mar. 13 Week 9 - Assignment 2.6: AuerReznick (2018) Life history and pace of life in guppies.	
		Assignment 3 Poster Peer Review Due -	

		Sunday Mar. 20
Week 10 - Comparative Method	Week 10 -	Week 10 - Assignment 2.7: Yun et al. (2019) Sexual conflict in monogamous and polygamous <i>Drosophila</i> .
Week 11 - Conservation	Week 11 - Unit	Week 11 - Assignment 2.8: Brodie et al.
Biology	Test 2 Mar. 30	(2002) Mosaic coevolution predator-prey
Week 12 - Final	Week 12 - Final	Week 12 - Final Synthesis
Synthesis	Synthesis	Assignment 3 - Final Poster Due Apr. 8

5.2 Important Dates

- Jan 10: Classes start
- Jan 14: Assignment 1 Introduction
- Jan 21: Deadline to sign up for paper presentation schedule (Assignment 2)
- Feb 4: Assignment 1 report due; First oral presentation of paper (Assignment 2) *see note below
- Feb 9: Unit test 1 (Wednesday class online)
- Feb 11: Assignment 3 Introduction
- Feb 21-2: Winter break (No Classes)
- March 11: 40th day of classes
- March 13: Assignment 3 Poster Draft Due in PEAR
- March 20: Assignment 3 Poster Peer Reviews Due in PEAR
- March 30: Unit test 2 (Wednesday class online)
- April 8: Take Home Exam given
- April 19: Assignment 3 Final Poster Due in PEAR
- *Note: Assignment 2 (paper oral presentation <u>and</u> participatory questions) are always due on Fridays in class tutorial throughout February 4 - April 1.

6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Assignment 1: Practical Lab tadpoles	20
Assignment 2: Paper Oral Presentation & Discussion	20
3 Questions Per Discussion Paper	5
Unit Test 1	10
Unit Test 2	10
Assignment 3: Mean peer review your poster	5
Assignment 3: Review of your reviewing	5
Assignment 3: Final Poster	25
Total	100

6.2 Assessment Details

Assignment 1: Practical Lab (20%)

Due: Fri, Feb 4

Learning Outcome: 1, 2, 3, 5, 8, 9 Course Content: Lectures & Readings

Assignment 2: Paper Oral Presentation & Discussion (20%)

Date: Friday every week: Feb. 4 - Apr. 1, In class seminar

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 9 Course Content: Lectures & Readings

3 Questions Per Discussion Paper (5%)

Date: Friday of week: Feb. 4 - Apr. 1 **Learning Outcome:** 1, 2, 3, 4, 5, 6, 7, 9 Course Content: Lectures & Readings

Unit test 1 (10%)

Date: Wed, Feb 9, Online Scheduled Classtime

The online unit test will assess cover our review of basic material about selection, heritable variation and evolution presented in the first month of term.

Unit Test 2 (10%)

Date: Wed, Mar 30, Online

This online unit test will focus more on the case studies introduced to this point, but will necessarily draw on basic evolutionary principles as presented earlier.

Assignment 3 - Final Poster (25%)

Date: Fri, Feb 11 - Fri, Apr 8

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 9

Final poster evaluation.

Assignment 3 - Poster Draft Due for Peer Review (5%)

Due: Sun, Mar 13

Your poster is available for peer review from Mar. 13 - 20. This portion of your grade will be the average of the 3 peer reviews.

Assignment 3 - Review of Your Peer Reviews (5%)

Due: Sun, Mar 20

Instructors will evaluate your peer reviews of other student posters.

6.3 Assignments 1 - 3

There are three assignments. Additional details and resources will be presented in class and available on the courselink website. Assignments are to be performed and reported as your individual work.

Assignment 1: Practical lab (In class Friday labs in January)

• Quantifying phenotypic variation in a real population; estimating selection on traits; writing a summary report.

Assignment 2: Oral presentation and discussion of 1 research paper (in class Friday labs remainder of term)

- Sign into a student group to present an oral summary and lead a discussion of one of the eight primary research papers in your tutorial section over the term.
- Students will form groups of 2 and sign up for either the <u>summary</u> or <u>critique</u> part of the presentation. See materials for paper analysis and presentation on CourseLink.
- After oral presentation, student groups will split up and members from each presenting group will lead student discussion of the research paper (2 groups per session).
- Non-presenting students will provide 3 written questions each week about the
 presented research paper to the instructor at the start of each friday session, and
 come prepared to participate in class discussion. In addition to 5% of your grade,
 reading and understanding the papers will help you answer questions about the
 papers on the course Unit Tests.

Assignment 3: Scientific Poster presentation (final version due last day of classes)

- Review, summarize and communicated from the primary scientific literature your analysis of any potential example of human-induced evolution in any natural system of your choice:
 - Demonstrate structured selectionist thinking in order to assess evidence of adaptive evolution in your chosen study system
 - Demonstrate critical thinking that assesses and distinguishes what we know from what we don't know about adaptive evolution in the system
 - Effectively communicate your analysis through a Scientific poster
- Find and evaluate research to test the general hypothesis that humans are a source of selection (intentionally or unintentionally) that may/may not drive the evolution of specified traits (targets of selection) in a natural population of your choice. Focus on evaluating the evidence for answering these questions:
 - Is human activity a source of selection? How strong is the selection?
 - What organism traits are targets of the selection? How do these traits function to affect performance (fitness?) and so link the target and source of selection?
 - Has evolutionary change occurred in the population? Is there evidence of trait change over generation; that trait variation is heritable; that trait change may be due to some other mechanism?
 - Strive to express what we know vs. what we don't know about evolution by natural selection in your study system. Identify and discuss key uncertainties about the evidence for/against/absent with respect to these (and other relevant) questions. What should future studies focus on next to evaluate these identified uncertainties.
 - Use of a minimum of 6 peer reviewed primary scientific papers in your analysis. Note that in most cases, not everything will be known about whether and how evolution occurs. In this case, relevant information may be known about a similar system. You can use that information to suggest that some mechanism/condition may also apply in your study system.
- Poster design has two elements: Structure and Content. The importance of both
 of these to effective communication with a poster will be discussed in lecture and
 through supporting materials on CourseLink.
- Assignment 3 has an additional graded pre-submission peer-review process of a first draft composed of two time-sensitive elements:
 - Submit a first draft to be evaluated by three of your peers. 5% of your grade will be based on the mean of these peer reviews.

- Evaluate and provide feedback on randomly assigned draft versions of posters from three other students. Your review of these posters will be evaluated for an additional 5% by an instructor (ie., we will evaluate your reviews).
- The pre-submission peer-review process provides two benefits: To give and get feedback that improves your final poster, and to see different ways to design poster structure and content.
 - First draft and final poster will be submitted through PEAR, and the final poster version will be evaluated by instructors.

7 Course Statements

7.1 Class Atmosphere

- Success in a remote delivery course strongly depends on your organizational and time-management skills.
- Learning strategy 1: Strive for general knowledge rather than detailed knowledge
 in this course. All examples are given to demonstrate a big idea. Try to first
 capture the big idea and then consider how the examples inform that idea. Make
 sure that you can sketch write that idea out. By sketch, I mean using diagrams
 that describe the major components of the idea with words and arrows that
 express causality.
- Learning strategy 2: Psychological research demonstrates that motor activity always enhances learning. So, always write out or diagram out my notes as a general matter of habit. Being able to do so is a good test of your knowledge.
- Learning strategy 3: stay on top of the material every day. Instead of spending all
 of one day on one class, try to always have an hour or so of time with each of
 your courses. This has many benefits that include breaks and changes in topics
 which keeps the brain fresher.
- The success of this course depends on mutual respect among students and instructors. It also depends on the participation of the instructors and students. Everyone is more stressed than usual - so please choose your words carefully and always strive to be respectful in your communications. But we also encourage levity during the discussions! We all gotta laugh sometimes... so,

- please bring your enthusiasm to class!
- We wish to support all students whether or not registered through Student Accessibility Services (SAS).
- If you are a SAS registered student that requires accommodation PLEASE contact me so that we can discuss how I can help you succeed.
- Academic misconduct or personal harassment will not be tolerated and will be subject to University disciplinary procedures.

7.2 Grading

 All assignments are due by the end of the indicated day (11:59PM) unless consideration is agreed to in advance of the deadline by the instructor. Late penalty is 20% per each additional 24 hr period starting at 12:01 AM, including weekends.

7.3 When You Cannot Meet a Course Requirement

Consideration may be granted at the instructor's discretion for medical, compassionate or university-related conflicts may require additional discussion with your program counsellor.

Consideration is more likely when the student proactively advises the instructor of issues well in advance of deadlines.

We wish to support all students whether or not registered through Student Accessibility Services (SAS). Please be aware that the SAS does NOT contact faculty about your presence in any course. Please reach out to your instructors in order for us to help you succeed.

8 Department of Integrative Biology Statements

8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

Make an appointment with a program counsellor in your degree program. <u>B.Sc.</u>
 <u>Academic Advising or Program Counsellors</u>

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. http://www.learningcommons.uoguelph.ca/
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: http://www.lib.uoguelph.ca/getassistance/studying/chemistry-physics-help and http://www.lib.uoguelph.ca/getassistance/studying/math-stats-help

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. https://www.uoguelph.ca/counselling/
- Student Health Services is located on campus and is available to provide medical attention. https://www.uoguelph.ca/studenthealthservices/clinic
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. http://www.selfregulationskills.ca/

8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/index.html. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar. (https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml)

8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course

format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be

asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website https://www.ridgetownc.com/services/accessibilityservices.cfm

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars https://www.uoguelph.ca/academics/calendars

9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

9.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
- https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.