

BIOL 439
NATURAL SELECTION AND MICROEVOLUTION
Fall 2022

Instructor: Dr. Jannice Friedman
Phone: 613-533-6394
E-mail: jannice.friedman at queensu.ca

Teaching Assistant: Alyson van Natto
E-mail: 17avn2 at queensu.ca

Class Meeting Times:

Lectures: Mon 10:00AM - 11:30AM; Wed. 8:30AM - 10:00AM; in KINGST104
Tutorial: Tues 12:30PM - 2:30PM in BIOSCI3112 OR Tues 3:30PM - 5:30PM in BIOSCI3110

Prerequisite / Co-requisite:

Essential prerequisites/co-requisite: BIOL 302/3.0 or BIOL 303/3.0) and a minimum GPA of 2.0 in the Biological Foundations List (BIOL 102/3.0; BIOL 103/3.0; BIOL 201/3.0; BIOL 202/3.0; BIOL 205/3.0; BIOL 206/3.0; BIOL 302/3.0; BIOL 303/3.0; BIOL 330/3.0; BIOL 334/3.0; BIOL 339/3.0; BIOL 341/3.0)

Course Description & Objectives:

The mechanisms of evolutionary change - from genes to societies. How natural selection interacts with genetic and population processes to make organisms adapted to their environment and to create biological diversity.

This course focuses on the core processes and mechanisms involved in adaptation and natural selection, extending to evolutionary genetics and genomics. Topics include: genetic variation, mutation and neutral evolution, selection, drift and inbreeding, quantitative genetics, molecular evolution, selection in the wild, human evolution. It will address evidence for adaptation and natural selection at the phenotypic, genetic/genomic level and at the molecular level.

Texts:

THERE IS NO REQUIRED TEXTBOOK

OPTIONAL Textbooks:

Evolutionary Analysis by Jon C. Herron and Scott Freeman. Pearson Publishers.
Evolution: Making Sense of Life by Doug Emlen & Carl Zimmer. MacMillan Learning.

Other sources:

We will be reading selected articles from the primary literature, and other readings posted in OnQ.

Assessment (may be subject to minor changes):

Open-book tests (x2)	30%
Assignments (x3)	30%
Literature Discussion and Summary (x3)	10%
News Article	5%
Research Proposal	15%
Presentation	10%

Open-book tests (x2) – 30%

You will have a 24-hour window to take the test. Tests will consist of a mix of short answer and long answer questions. Emphasis will be on concepts and problem solving.

Assignments (x3) – 30%

We will use virtual experiments to help understand and explore various aspects of the course material. The assignments will involve handing in a worksheet that will be assessed. You can ask questions about the worksheets during the tutorial sessions.

Literature Discussion and Summary (x3) – 10%

We will discuss 3 papers from the primary literature during tutorials. The papers will be selected to roughly match the content of the lectures. For each paper you will hand in a brief summary of the paper and be expected to participate in discussion during tutorial. More detailed expectations will be provided.

News article – 5%

You will be responsible for finding a recent (<6 month old) news article about a current issue that involves evolution. You will hand in a 1-page summary of the article and give a short 5 minute presentation.

Research Proposal – 15%

You will choose an article from the primary literature to use as a focus study. You will briefly summarize the paper, and then design a follow up study and write a research proposal. More detailed expectations will be provided.

Presentation - 10%

You will be responsible for summarizing your research proposal (concepts and techniques) and creating a presentation for your peers. You will present during tutorial, and will submit one question based on 5 other presentations.

Due-dates, late, and missing assignments:

Tests have to be conducted during the window provided, unless you have an approved academic consideration. Note that principles of universal design have been built into these assignments so that extra-time considerations will only be provided in extenuating circumstances. For all other assignments, you will be penalized 10% for each day that an assignment is late. Missing assignments will be given a 0. Please contact me if you have any questions.

Grading Method

In this course, all components will be graded using numerical percentage marks. Your course average will then be converted to a final letter grade according to Queen's Official Grade Conversion Scale:

Grade	Numerical Course Average (Range)
A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	49 and below

Turnitin:

This course makes use of Turnitin, a third-party application that helps maintain standards of excellence in academic integrity. Students will be required to submit their course assignments to onQ through Turnitin. In doing so, students' work will be included as source documents in the Turnitin reference database, where they will be used solely for the purpose of detecting plagiarism.

Academic Integrity and Queen's Code of Conduct

Queen's students, faculty, administrators and staff all have responsibilities for upholding the fundamental values of academic integrity; honesty, trust, fairness, respect, responsibility and courage (see www.academicintegrity.org). These values are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University (see the Senate Report on Principles and Priorities <http://www.queensu.ca/secretariat/policies/senate/report-principles-and-priorities>).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and their behaviour conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar, on the Arts and Science website (<https://www.queensu.ca/artsci/students-at-queens/academic-integrity>), and from the instructor. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

Accommodation Policy, Exam Conflicts, and Other Conflicts

Students who feel they need accommodations for disabilities or extenuating circumstances, or have a conflict between exams or other commitments can find the Faculty of Arts and Science protocol and the

portal where a request can be submitted at: <http://www.queensu.ca/artsci/accommodations>. The earlier an Instructor is apprised of an extenuating circumstance, the more likely an accommodation can be made. Students are encouraged to be proactive in anticipating difficulties, when possible.

Copyright

This material is designed for use as part of BIOL 439 at Queen's University and is the property of the instructor unless otherwise stated. It is a departure from academic integrity to distribute, publicly post, sell or otherwise disseminate an instructor's course materials or to provide an instructor's course materials to anyone else for distribution, posting, sale or other means of dissemination, without the instructor's *express consent*. A student who engages in such conduct may be subject to penalty for a departure from academic integrity and may also face adverse legal consequences for infringement of intellectual property rights. Third party copyrighted materials (such as book chapters and articles) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright

Notice of Recording

Synchronous (live) tutorials will be delivered in this course through a video conferencing platform supported by the University [Zoom]. Steps have been taken by the University to configure these platforms in a secure manner. At least one tutorial a week will be recorded with video and audio and will be made available to students in the course for the duration of the term. The recordings may capture your name, image or voice through the video and audio recordings. By attending these live classes, you are consenting to the collection of this information for the purposes of administering the class and associated coursework. If you are concerned about the collection of your name and other personal information in the class, please contact the course instructor to identify possible alternatives. To learn more about how your personal information is collected, used and disclosed by Queen's University, please see the general [Notice of Collection, Use and Disclosure of Personal Information](#).

Accommodation of Disabilities

Queen's University is committed to achieving full accessibility for people with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. The Senate Policy for Accommodations for Students with Disabilities was approved at Senate in November 2016 (see <https://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslclwww/files/files/policies/senateandtrustees/ACADACCOMMPOLICY2016.pdf>). If you are a student with a disability and think you may need academic accommodations, you are strongly encouraged to contact the Queen's Student Accessibility Services (QSAS) and register as early as possible. For more information, including important deadlines, please visit the QSAS website at: <http://www.queensu.ca/studentwellness/accessibility-services/>

SCHEDULE (May be subject to changes)

Week	Date	Topic	Notes/Assignments
1	Sept 5 – 9	Introduction and review	
		Tutorial: None	
2	Sept 12 – 16	Selection in natural populations	
		Tutorial: Q&A	
3	Sept 19 - 23	Phenotypic selection	
		Tutorial: Q&A	Due: Assignment 1
4	Sept 26 - 30	Genomic approaches to selection	
		Tutorial: Literature Discussion	Literature Discussion
5	Oct 3 -7	Local adaptation	
		Tutorial: Q&A	Due: Assignment 2
	Oct 10 -14	MID-TERM BREAK: NO CLASS	
6	Oct 17 -21	Testing for adaptation	
		Tutorial: Q&A	Take-home TEST 1
7	Oct 24- 28	Genetic correlation & trade-offs	
		Tutorial: Literature Discussion	Literature Discussion
8	Oct 31 – Nov 4	Rapid and novel evolution	
		Tutorial: Q&A	Due: Assignment 3
9	Nov 7 - 11	Rapid and novel evolution (invasive)	
		Tutorial: Q&A	Literature Discussion
10	Nov 14 - 18	Rapid and novel evolution (human)	
		Tutorial: Q&A	Research Proposal Outline
11	Nov 21 - 25	Presentations	
		Tutorial: Literature Discussion	
12	Nov 28 – Dec 2	Presentations	
		Tutorial: None	Research Proposal Due
13	Dec 5		Take-home TEST 2