

BIOL 206

Evolutionary Genetics

Winter Term (2023)

CALENDAR DESCRIPTION

An introduction to the genetic mechanisms of population differentiation and evolutionary change - from molecules to species. The genetical theory of evolution is also applied to problems involving conservation, biotechnology and the evolution of disease.

NOTE: Priority to BIOL concentrators will be given during course selection.

RECOMMENDATION: BIOL 201/3.0 and BIOL 202/3.0.

PREREQUISITE: A minimum grade of C- in BIOL 205/3.0.

Instructor	Dr. V. Friesen
Instructor Contact	vlf@queensu.ca Phone: 533-6156, Rm. 4443A Bioscience Post questions in OnQ
Office Hours	By chance or appointment
Tutorial Instructor	Dr. H. Teresinski
Tutorial Instructor Contact	hjt@queensu.ca Bioscience Complex Room 2308A Post questions in OnQ
Teaching assistants	See course OnQ page

Overview

The goals of Biology 206 are to provide students with a broad overview of modern evolutionary biology and how and why scientists study evolution. The course integrates the two major organizing principles of biological systems: genetics and evolution. Genes encode information for generating the phenotype from biochemistry to behavior, while evolutionary forces shape the sequence of genes and how they are expressed. We will discuss how the genetic machinery produces and stores genetic variation as the raw material for evolution. We will introduce the major mechanisms of evolutionary change: natural selection, random evolutionary processes and gene flow, and how these processes work together to create biodiversity. In each case, we'll explore concepts through experimental and comparative case studies. We will teach you as much about how research is done as what has been discovered. And we will show you that evolutionary biology as a field is the most profound and significant in all of science. No other discipline comes close to addressing as many essential and exciting philosophical and empirical topics. Topics covered will include Introduction to evolution theory, The Hardy-Weinberg principle and its assumptions, Random evolutionary processes and gene flow, Population subdivision, Types of natural selection, Causes and consequences of linkage disequilibrium, Evolution of complex (quantitative) traits, Adaptation, The evolution of sex, Sexual selection & mate choice, Social evolution, Speciation, Species Interactions, Human evolution, and Rapid evolution.

Course Materials

There is a required textbook for this course. You can purchase a hard-copy or digital (e-book) version from the Campus Bookstore.

Herron & Freeman 2014. Evolutionary Analysis, 5th Edition. Pearson. Specific readings will be posted with each lecture.

Additional course materials will be provided online via OnQ

Suggested Time Commitment

Students can expect to spend approximately 10 hours a week in study/practice and online activity for this course.

Topics

- Introduction to evolution theory
- The Hardy-Weinberg Principle and its assumptions
- Random evolutionary processes and gene flow
- Types of natural selection
- Causes and consequences of linkage disequilibrium, including the evolution of sex
- Evolution of complex (quantitative) traits
- Adaptation
- Sexual selection & mate choice
- Social evolution
- Speciation & the evolution of biodiversity
- Biogeography
- Human evolution
- Conservation genetics

Assessments

Online Quizzes (3 x 4% each)	12%
Tutorials / Assignments (7 x 4% each)	28%
Midterm 1	15%
Midterm 2	15%
Final exam	30%

Assessments and Activities Description :

Midterms – Two, each worth 15%. Tests will be conducted in class. Tests are designed to take 30 minutes, but you will have 50 minutes to complete them. Tests will comprise multiple choice and possibly a short-answer question. Test 1 will cover the first unit (approx. weeks 1-4), Test 2 will cover the second unit (approx. weeks 5-8).

Final Exam – 30%. The final exam will be scheduled by FAS, during the exam period (mid April, 2023). The exam will be multiple choice with a few short answer questions. The final exam will be cumulative, with emphasis on the third unit (approx. weeks 9-12).

Quizzes – 12%. There will be three quizzes on OnQ, one each in approx. weeks 3, 7 and 11. Each quiz will consist of 5 questions. Each quiz will be open for several days, but once you begin a quiz, it must be completed within 60 minutes. Quizzes will cover lecture content, readings, and videos from the preceding two weeks.

Tutorials - 28% - There will be 7 tutorials over the course of the semester, each worth 4% (see Timeline for specific schedule). Tutorials will be run as synchronous sessions: students are expected to attend the tutorial session in which they are registered, and are expected to actively participate throughout the entire tutorial. During tutorial sessions, students will work in groups to complete a worksheet. Each group will hand in one completed assignment at the end of your tutorial, and all group members will receive the same grade. Although worksheets are designed to be completed within the tutorial session, there is a 24-hour grace period to accommodate electronic submissions to OnQ if required (i.e. submissions received within 24 hours of the end your tutorial session will be considered as on time). Submissions received after the grace period will be subject to a 10% penalty for each 24-hour period (or part thereof), up to a maximum of 5 days, after which the assignment will not be accepted. Late penalties apply to all group members.

Lectures - Lectures will be presented live at the designated lecture times. Slides will be available on OnQ before lectures.

Absences and Missing Assignments:

Quizzes and tests must be conducted during the window provided unless you have an approved academic consideration.

If you miss a test (midterm or final exam) you must apply for academic consideration to be eligible to write the deferred test at a later date. If you are also unable to write a deferred midterm, the weight of the test will be transferred to the final exam. Deferred tests may not follow the same structure as the original test, and may consist of more short answer questions.

Tutorials

For **tutorial assignments**, all members of your group will be penalized 10% for each day that an assignment is late, up to a maximum of 5 days, after which the assignment will not be accepted. Missing assignments will be given a 0. If you are unable to attend your scheduled tutorial, please submit a request for academic consideration within 4 days of the missed tutorial. With an approved academic consideration, you will be permitted to complete the tutorial assignment independently. Once you have received your approved academic consideration, please contact biol206@queensu.ca to receive a copy of the assignment and your revised due date. Students are encouraged to submit requests as soon as the need becomes apparent and to make contact as soon as possible once consideration has been verified. Any delay in contact may limit the consideration options available. If you have not submitted your academic consideration within 4 days, or for academic considerations of 4 days or longer, please email biol206@queensu.ca as soon as possible to discuss alternatives.

Grading

All components of this course will receive numerical percentage marks. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to Queen's Official Grade Conversion Scale:

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

Contacting the Teaching Team

The teaching team contact information is located on the Homepage of the course (see “Teaching Team”). We prefer that students use the course email (biol206@queensu.ca) and forums rather than contacting instructors directly.

For general questions about the course, please post to the Course Questions Forum, (located under Help in the navigation bar). For questions about course content (lectures, quizzes, etc) please post to the Course Content Forum (located in the Communications tab). Feel free to help answer your peers’ questions on these forums. Most questions are answered within 24 hours (Monday - Friday).

Please use your Queen’s email for inquires that are more personal in nature, or for issues such as academic accommodations or marking. If you need to have a more detailed conversation, please contact your instructor.

Etiquette

You are expected to maintain respect in your dealings with fellow students and the teaching team in any course. The following guidelines are a reference to guide your online communication in this course.

1. Make a personal commitment to learn about, understand, and support your peers.
2. Give others the benefit of the doubt.
3. Ensure your writing is respectful and inclusive.
4. Recognize and value the experiences, abilities, and knowledge that each person brings.
5. Carefully re-read your writing before posting or sending to others.
6. It’s okay to disagree with ideas, but personal attacks will not be tolerated.

Queen's Email

The university communicates with students via Queen's email. Please check your email regularly to ensure you do not miss important information related to your course. Be sure to sign up for Announcements as well, as important information (e.g. readings, canceled lectures) will be communicated this way.

Calculator Policy

As noted in Academic Regulation 9.2, “Calculators acceptable for use during quizzes, tests and examinations are intended to support the basic calculating functions required by most Arts and Science courses. For this purpose, the use of the Casio 991 series calculator is permitted and is the only approved calculator for Arts and Science students.”

Copyright

Course materials created by the course instructor, including all slides, presentations, handouts, tests, exams, and other course materials are the intellectual property of the instructor. 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 consent. A student who engages in such conduct may be subject to penalty for a departure from academic integrity and may also face legal consequences for infringement of intellectual property rights.

Accessibility/Accommodations

Queen's University is committed to achieving full accessibility for all students. 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.

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 ([click here](#)).

To register your academic accommodation for this course, please select the Accommodations button on the course homepage and follow the instructions.

Note that principles of universal design have been built into the quizzes and tutorial assignments so extra time will not be provided and no extensions will be granted. Individual extra time accommodations will be applied to the midterm tests and final exam.

Academic Considerations for Students in Extenuating Circumstances

Queen's University is committed to providing academic consideration to students experiencing extenuating circumstances that are beyond their control and are interfering with their ability to complete academic requirements related to a course for a short period of time. For more information, please see the [Senate Policy on Academic Consideration for Students in Extenuating Circumstances](#).

Please see the Academic Consideration Requests button on the course homepage to apply for an academic consideration in this course. Note that you will be taken to the student request portal where you will be required to provide the name and email address of the instructor/coordinator. For this course, please be sure to use the following email address: biol206@queensu.ca. For further guidance on submitting requests, please see refer to the Resource Guides available on the [Academic Consideration website](#) under "Applying for Academic Consideration."

For more information about missing an assessment, please refer to the section "Assessments and Activities Description".

Academic Integrity

Academic integrity is constituted by the six core fundamental values of honesty, trust, fairness, respect, responsibility, and courage.

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar (see Academic Regulation 1), on the Arts and Science website, and from the instructor of this course.

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.