

# BIOL 206

## Evolutionary Genetics

Winter Term (2014-15)

### 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.

LEARNING HOURS 120 (36L;24Lb;60P) RECOMMENDATION BIOL 201/3.0 and BIOL 202/3.0. PREREQUISITE A minimum grade of C- in BIOL 205/3.0.

### SCHEDULE

**Lectures: Monday 1:30-2:30pm, Wednesday 12:30-1:30pm, Friday 11:30-12:30pm. ETHERINGTON AUD.**

**Labs: See SOLUS for a list of various lab times. BIOSCI.**

<b>Instructor</b>	<b>Dr. V. Friesen</b>
<b>Instructor Contact</b>	<a href="mailto:vlf@queensu.ca">vlf@queensu.ca</a> Phone: 533-6156, Rm. 4443A Bioscience Post questions on Moodle forum
<b>Office Hours</b>	TBA
<b>Program Associate</b>	Dr. Fern Gauthier
<b>Program Associate Contact</b>	Phone: 533-6000 x77666, Rm. 3321 Bioscience Email: <a href="mailto:gauthier@queensu.ca">gauthier@queensu.ca</a>
<b>Teaching assistants</b>	See Course Website

### Learning Objectives

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 influencing the phenotype from biochemistry to behaviour, while evolutionary forces shape the sequence of genes and how they are expressed. Evolutionary genetics covers evolution over both shorter timescales ('microevolution') and geological timescales ('macroevolution'). We will discuss how the genetic machinery produces and stores genetic variation as the raw material for evolution. We will then introduce the major mechanisms of evolutionary change: natural selection, random evolutionary processes and gene flow and how these processes work together to create the mind-boggling diversity of life on Earth. In each case, we'll explore concepts through experimental and comparative case studies with an aim to understand not only the principals involved but how they have been generated and by whom. 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.

**Learning Hours**

<i>Teaching method</i>		<i>Average hours per week</i>	<i>Number of weeks</i>	<i>Total hours</i>
In-class hours	Lecture	3	12	36
	Seminar			
	Laboratory	2.4	10	24
	Tutorial			
	Practicum			
	Group learning			
	Individual instruction			
Other	Online activity			
	Off-campus activity			
	Private study	5	12	60
Total hours on task				120

**Course Outline**

- What is evolution?
- The case for evolutionary thinking
- Evolutionary Patterns
- What is and is not evolutionary science
- Genetic variation
- Natural selection
- Random evolutionary processes
- Gene flow
- Disease evolution
- Mating system evolution
- Evolution of complex traits
- Adaptation
- Evolution of sex
- Sexual selection & mate choice
- Social evolution
- Speciation & the evolution of biodiversity

**Textbooks/Readings**

Herron & Freeman 2013. Evolutionary Analysis, 5<sup>th</sup> Edition. Pearson.

**Grading Scheme**

<b>Component</b>	<b>Weight (%)</b>	<b>Date</b>
Midterm 1	15%	Fri 30 Jan, 1130-1220h
Midterm 2	15%	Fri 6 Mar, 1130-1220h
Midterm 3	15%	Fri 3 Apr, 1130-1220h
5 online lecture quizzes	1% each = 5%	na
3 lab quizzes	2% each = 6%	TBA, see course website

2 Group presentations	5% each = 10%	TBA, see course website
Journal Club questions	2%	TBA, see course website
Lab 1 Evolution of flies	13%	TBA, see course website
Lab 2 Multicellularity	19%	TBA, see course website

### **Grading Method**

- 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.

#### ***Arts & Science Letter Grade Input Scheme***

<b>Assignment mark</b>	<b>Numerical value for calculation of final mark</b>
A+	93
A	87
A-	82
B+	78
B	75
B-	72
C+	68
C	65
C-	62
D+	58
D	55
D-	52
F48 (F+)	48
F24 (F)	24
F0 (0)	0

Your course average will then be converted to a final letter grade according to Queen's Official Grade Conversion Scale:

#### ***Queen's Official Grade Conversion Scale***

<b>Grade</b>	<b>Numerical Course Average (Range)</b>
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

### **Academic Integrity and Queen's Code of Conduct**

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and conduct conform to the principles of academic integrity. Information is available in the Arts and Science Calendar (see Academic Regulation 1 - <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>, on the Arts and Science website (see <http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity>), and at Biology's website (<http://www.queensu.ca/biology/undergrad/integrity.html>) 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 regulations 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 should consult the Biology Department's website for details about how to proceed (<http://www.queensu.ca/biology/undergrad/integrity.html>). In general, the earlier a course coordinator is apprised of an extenuating circumstance, the more likely an accommodation can be made. Students are encouraged to be proactive in anticipating difficulties, when it is possible to do so.

Students may apply to write a make-up or deferred exam if they have an exam conflict as defined in the Academic Regulations of the Faculty (See Arts and Science Calendar Regulation 8 - <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>). In this case, the student should report to the Exams Office first to verify that there is a genuine exam conflict. Biology professors will not consider your situation to be a conflict unless it meets the criteria set out by the Faculty of Arts and Sciences.

Students may request a make-up or deferred exam if they have an exam conflict with off-campus travel associated with a field course (e.g BIOL-307/3.0 or 407/3.0) that is held during the fall or winter terms.

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### **Accommodation of Disabilities**

*Queen's University is committed to achieving full accessibility for persons 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. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact the Disability Services Office (DSO) and register as early as possible. For more information, including important deadlines, please visit the DSO website at: <http://www.queensu.ca/hcds/ds/>*