

# BIOL 440

## Macroevolution and Speciation

Fall Term (2014-15)

### CALENDAR DESCRIPTION

**An exploration of higher-level processes in evolution spanning considerations of mechanisms of speciation, extinction, adaptive radiation, and phylogenetics**

PREREQUISITE BIOL 302/3.0 or BIOL 303/3.0

### SCHEDULE

**Lectures: Monday 3:30-4:30pm, Wednesday 2:30-3:30pm. BIOSCI 1102.**  
**Tutorials: Refer to Timetable for listing.**

<b>Instructor</b>	<b>Dr. Stephen C. Lougheed</b>
<b>Instructor Contact</b>	<a href="mailto:steve.lougheed@queensu.ca">steve.lougheed@queensu.ca</a> Phone: 613-533-6128.
<b>Office Hours</b>	Wednesday 9-12 am
<b>TA:</b>	Rebecca Taylor; Megan Snetsinger
<b>TA Contact Information</b>	Rebecca Taylor: <a href="mailto:13rst@queensu.ca">13rst@queensu.ca</a> Megan Snetsinger: <a href="mailto:8ms65@queensu.ca">8ms65@queensu.ca</a>
<b>Office Hours</b>	TBA

### Learning Objectives

Biology 440 explores evolutionary processes and the patterns that they produce at and above the species level. The course aims to promote critical thinking and improve students' scientific literacy and writing skills. To these ends the course uses a mixture of lectures, interactive tutorials, group research projects, and individual research essays. Students will explore papers from the primary scientific literature, as well as using reviews and texts. After taking this course, the student should have:

- A strong understanding of evolutionary principles and main genetic mechanisms.
- An appreciation of evolutionary time scales and major events in the fossil record.
- Opinions about the relationship between micro- and macroevolution.
- An understanding of theory underlying speciation and extinction and knowledge of salient examples.
- An appreciation of the diversity of research approaches used to study evolutionary processes.
- Improved writing and presentation skills.

**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	2	12	24
	Seminar			
	Laboratory			
	Tutorial	3	8	24
	Practicum			
	Group learning	4	5	20
	Individual instruction			
Other	Online activity	1	4	4
	Off-campus activity			
	Private study	4	12	48
Total hours on task				<b>120</b>

**Course Outline: Main Topics**

- Review of microevolutionary principles and distinct features of macroevolution.
- Species concepts.
- Ecological versus geographical models of speciation.
- Sexual selection, sexual conflict and speciation.
- Phylogenetics and phylogenomics.
- Introduction to biogeography.
- The genomics of speciation.
- Coevolution & co-speciation.
- Palaeontology and the fossil record.
- Evolutionary developmental biology (EVO/DEVO)
- Causes and patterns of extinction.

**Textbooks/Readings**

There is no comprehensive textbook on both speciation and macroevolution. Assigned and recommended readings vary from year to year and are available on the course website.

**Grading Scheme (considered final after first week)**

<b>Component</b>	<b>Weight</b>	<b>Date</b>
Phylogenetics Group Exercise	25%	October & November
Major Paper Proposal	10%	Mid-October
Major Paper	30%	End November
Tutorial Exercise	25%	September & October
Tutorial Participation	10%	

**Grading Method**

In this course, some components will be graded using numerical percentage marks. Other components will receive letter grades, which for purposes of calculating your course average will be translated into numerical equivalents using the Faculty of Arts and Science Letter Grade Input Scheme. When letter grades are employed, the following scale will be employed for purposes of calculating your course average:

**Arts & Science Letter Grade Input Scheme**

Assignment mark	Numerical value for calculation of final mark
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**

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

### **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/>*