

BIOL 535

Macroevolution and Speciation

Winter Term (2022-23)

CALENDAR DESCRIPTION: Topics vary from year to year. Please consult the Department of Biology website for more information.

PREREQUISITE

Level 4 and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List or permission of the Department.

Biological Foundations List

BIOL 102/3.0; BIOL 103/3.0; BIOL 200/3.0; BIOL 201/3.0; BIOL 202/3.0; BIOL 205/3.0; BIOL 206/3.0; BIOL 212/3.0; BIOL 300/3.0; BIOL 330/3.0; BIOL 334/3.0; BIOL 339/3.0; BIOL 341/3.0; BIOL 302/3.0; BIOL 303/3.0.

SCHEDULE

Tutorials: Monday 2:30-4:00 PM. Thursday 4:00-5:30 PM. Biosciences 3112

Instructor: Dr. Stephen C. Lougheed

Instructor Contact: steve.lougheed@queensu.ca

Office Hours: By appointment

Teaching Modality: In tutorial

Important University Dates:

- *Monday January 9, 2023:* Winter Term classes begin
- *Friday January 20, 2023:* Last date to add Winter Term classes
- *Friday January 20, 2023:* Last date to drop Winter Term classes without financial penalty
- *Monday February 20, 2023:* Family Day (classes will not be held)
- *Tuesday February 21, 2023 to Friday February 24, 2023:* Mid-term Reading Week (classes cancelled)
- *Friday March 3, 2023:* Last date to drop Winter Term classes without academic penalty
- *Tuesday March 7, 2023:* Last date to apply for accommodation for an official examination conflict for the April examination session
- *Friday March 31, 2023:* Last date to apply to the University for upper-year full-time admission for Summer Term from another post-secondary institution
- *Friday March 31, 2023:* Last date to apply for admission to Upper-Year Program at the Bader International Study Centre for Summer Term (May-June Session)
- *Saturday April 1, 2023:* Refer to http://www.queensu.ca/artsci_online/apply/dates-and-deadlines for deadlines for admission to Undergraduate Online Studies for Summer Term
- *Saturday April 1, 2023:* Last date for Queen's students to apply for admission to a Dual Degree Program for Summer Term
- *Friday April 7, 2023:* Good Friday (University closed. Classes will not be held)
- *Monday April 10, 2023:* Winter Term classes end
- *Tuesday April 11, 2023 to Friday April 14, 2023*
- *Winter Term pre-examination study period:* Friday April 14, 2023 to Saturday April 29, 2023
- Final examinations in Winter Term and multi-term classes

- *Sunday April 30, 2023*: Last date for receipt of required documentation from students seeking admission for Summer Term to full- or part-time study, including transfer students, to ensure that an admission decision is made before the Term begins
- *Sunday April 30, 2023*: Winter Term ends

Welcome Message: Welcome to Biology 535 an in-depth exploration of the ecology of the tropics and the challenges for conservation therein. The course we will create together emphasizes curiosity-driven research and exploration of the literature, peer engagement and collaboration, and critical thinking on some of the most important issues in conservation. We will not use a textbook but rather will use the primary literature, video resources, and other sources. I will use a simple website to communicate/house some of the material (URL below). I have spent a lot of the time in the tropics – mostly Latin America and East Africa – and am excited to be offering this course for the first time.

Equity, Diversity, and Inclusivity Statement: Queen's is committed to counteracting discrimination in this institution and developing a climate of educational equity that recognizes and respects the equal dignity and worth of all who seek to participate in the life, work, and mission of the University. Such a climate is created and maintained by developing a university-wide commitment to and understanding of educational equity, supported by policies, programs, curricula, practices, and traditions that facilitate individuals - and equity-seeking groups- free, safe, and full participation.

Land Acknowledgement: I understand that the territory upon which Queen's University lies is included in the *Dish With One Spoon Wampum Belt Covenant*, an agreement between the Iroquois Confederacy and the Confederacy of the Ojibwe and Allied Nations to peaceably share and care for the resources around the Great Lakes. The Kingston Indigenous community continues to reflect the area's Anishinaabek and Haudenosaunee roots. There is also a significant Métis community as well as First Peoples from other Nations across Turtle Island present here today.

Expectations: This is a fourth-year special topics class and presumably you have chosen it because you have some interest in diversity, the tropics, ecology, and conservation issues. As I am passionate about the tropics and have taught many field courses there, I can promise enthusiasm and dedication to the course material. I encourage open discussion and ask (expect) interactions and constructive discourse in class and tutorial. Throughout this course, there will be opportunities for you to interact with me and your classmates. I expect you to behave with integrity always, both in in-person interactions and when engaging with each other online. See the Netiquette guidelines below which I expect each of us to adhere to when interacting with one another whether in person or online.

Course Overview: The tropics are celebrated for their remarkable biodiversity. Indeed, tropical diversity inspired the travels of European naturalists like Alexander von Humboldt, Alfred Russel Wallace, and Charles Darwin, and such renowned artists as Maria Sibylla Merian; and tropical research seeking to understand the factors that underpin and maintain such spectacular biotic richness contributed to the emergence of modern ecology and evolutionary biology. However, tropical ecosystems are also highly threatened. Of the 36 identified biodiversity hotspots, most occur in the tropics within developing nations comprising about 1/3 of the global human population. By 2050, some 50% of the human population will live in tropical countries, bringing even greater pressures on these species and ecosystems. In this course, we will explore diverse tropical terrestrial ecosystems (e.g. mesophyll forests, flooded varzea forests, dry deciduous woodlands, cerrado) and keystone species within them. We will discuss factors that shape the distribution of tropical ecosystems and species and hypotheses for variation in species richness. Finally, we will consider the striking conservation challenges facing tropical countries, and evaluate proposed solutions from scientific, policy, socioeconomic, and Indigenous Knowledge vantages.

Learning Objectives: Biology 535 explores tropical ecology, the diversity of ecosystems and species that exist between roughly 23° N and S of the equator, the causes and consequences of the latitudinal gradient of biodiversity, conservation challenges in tropical countries (against an historical,

socioeconomic and cultural backdrop), and the value of Indigenous Knowledge systems and land practices in conservation. The course also aims to promote critical thinking and improve students' scientific literacy and writing skills. To these ends the course uses a mixture of lectures, open discussion, critiques of papers from the primary literature, group debates, and individual research essays. Students will explore papers from the primary scientific literature, as well as using reviews and other sources. After taking this course, the student should have:

- A strong understanding of latitudinal gradient in species richness and the potential causes of it.
- An appreciation for the diverse terrestrial, freshwater and marine ecosystems that occur in the tropics.
- A knowledge of biodiversity hotspots and the challenges in conserving them.
- Greater insight on the importance of Indigenous ways of knowing, relationships to the land and its inhabitants, and traditional practices of conservation and stewardship.
- Improved writing, oral presentation, and critical thinking skills.

Article critique and presentation: I will assign each student a paper from the primary literature.

Students will prepare an ~15-minute presentation summarizing the background, objectives, methods and overarching findings of their assigned paper – providing also a one-page overview with citation and summary of the major findings. **15%**

Debate: Biodiversity/wildlife conservation lies at the nexus of myriad issues spanning socioeconomics and human poverty, Indigenous rights, asymmetries in GDP & wealth among nations, climate change, pollution, international trade, human wildlife conflict, industrial agriculture, tourism, and emerging zoonotic and human diseases. Conservation issues in tropical countries can be particularly stark and challenging. Potential solutions to these problems come neither easily nor without controversy – and no plan of action will please all stakeholders. I will choose 5 focal 'propositions' related to conservation for debate. Teams of 3 (or 4) students will be asked to stage a debate where one person defends a position, another opposes, and acts as moderator. These will not be clean, simple, dichotomous issues and you will have to discuss with your group mates how you wish to approach them. You must also ensure that both sides of the argument pro and con are well covered even if you all agree that one is more supportable than the other. **25%**

Poster: I would like you to choose a country that lies between the Tropics of Capricorn and Cancer. I would then like you then to imagine that you are to attend a global conference on biodiversity on conservation in Nairobi, Kenya. You are to prepare a poster that touts the rich diversity of your selected country but also presents the conservation challenges and their history and cause. We will have an in-class poster session and we will engage in peer review. **20%**

Term paper: In consultation with the instructor each student will select an important topic, either on tropical ecology or tropical conservation, and will write a review on this topic after a literature review. Your paper will be modeled after the Reviews type of article on Conservation Letters or the Synthesis article type in Ecology Letters, albeit with fewer references than indicated in author guidelines (minimum of 15 references from the primary literature). **30%**

Through the **term paper** students will gain skills in critically reviewing the primary, peer-reviewed literature and exploring current controversies on a major theme in tropical ecology and conservation.

Participation: In an upper-year course as small as this it is important that everyone contribute to discussion. This is not simply a way to assign grades but rather discussions are made much richer when multiple points of view are expressed. We will on occasion read papers together and then have an open discussion on the findings and import. I will keep track of your contributions and assign a grade out of 10. **10%**

Approximate Learning Hours

Teaching method		Average hours/wk	Number of weeks	Total hours
In-class hours	Lectures	0.5	10	5
	Seminar			
	Laboratory			
	Tutorial	2.5	10	25
	Practicum			
	Group learning	1.25	10	12.5
	Individual instruction	0.5	12	6
Other	Online activity	2	12	24
	Off-campus activity			
	Private study	3.25	12	39
Total hours on task				111.5

Course Outline: Main Topics

- The history of tropical ecology and exploration
- What are the tropics and what climatological, oceanographic, geographical factors play a role in defining them?
- Paleontological perspectives on the extent of the tropics
- The temperate-tropical disparity in species richness and the latitudinal gradient
- Tropical ecosystems
- Biodiversity hotspots, their definitions and causes
- Conservation in developing versus developed nations and the challenges therein
- International agreements in conservation
- The value of Indigenous insights in conservation

Textbooks/Readings

There is no textbook for this course. Rather we will use readings from the primary literature to underpin our work, paired with articles from the grey literature, and websites from such organizations as IUCN, the World Resources Institute, Conservation International.

Grading Scheme (considered final after first week)

Component	Weight	Date
Critique of paper from the primary literature	15%	January
Poster	20%	February
Debate	25%	March
Term paper - critical review	30%	First week of April
Participation (attendance and contribution to class discussions)	10%	na

There is no final exam

BIOL 535 Class Schedule 2023

WEEK & DATES	ACTIVITIES
Week 1: Jan. 9-13	• Class organization & introductory lectures
Week 2: Jan. 16-20	• Lectures & class discussions
Week 3: Jan. 23-27	• Student seminars
Week 4: Jan. 30-Feb. 3	• Student seminars
Week 5: Feb. 6-10	• Lectures
Week 6: Feb. 13- 17	• Student Debates
Reading Week. Feb. 20-24	NA
Week 7: Feb. 27- March 3	• Guest lecture and in-class work on posters
Week 8: March 6 - 10	• Poster sessions
Week 9: March 13 - 17	• Lectures and class discussions
Week 10: March 20 - 24	• Class discussions focused on assigned papers to be read by all
Week 11: March 27 - 31	• Lectures and class discussions
Week 12: April 3 - 7	• Final summation lectures and debriefs

Your term will be due Friday April 7th at 11:59 pm giving me enough time to grade them.

Grading Method

In this course, all components will be graded using numerical percentage marks. When letter grades are employed, the following scale will be used for 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

Queen's students, faculty, administrators and staff all have responsibilities to uphold the fundamental values of academic integrity; honesty, trust, fairness, respect, responsibility and courage. These values are central to building, nurturing, and sustaining 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).

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 (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, use of forged materials, contract cheating, unauthorized use of intellectual property, unauthorized collaboration, failure to abide by academic rules, departure from the core values of academic integrity, 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 appropriate to the severity of the departure 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.

Plagiarism

Please note that we have had issues in the past with unintended plagiarism in this course, particularly in the final essay. Regardless of how and where you retrieve information, the principles of academic integrity apply. Please visit these helpful websites to help you to write things in your own words:

- <https://www.queensu.ca/academicintegrity/students/avoiding-plagiarismcheating>
- <https://integrity.mit.edu/handbook/academic-writing/avoiding-plagiarism-paraphrasing>

- http://writing.wisc.edu/Handbook/QPA_paraphrase.html

Group Work

- You are encouraged to consult with your peers on course work, but individual assignments are to be your own work. The debate is expressly designed as a collaborative project among small groups of students – you are asked here expressly to collaborate and present together.
- We all share in maintaining a culture of integrity, if you become aware of anyone trying to take short cuts, please remind them that this is against the rules and inform your instructor immediately.

Copyright

Course materials created by me, including all slides, presentations, handouts, and other similar course materials, are my intellectual property. 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 (including note sharing sites), 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.

Netiquette

In any course you often communicate with your peers and teaching team through electronic communication. You are expected to use the utmost respect in your dealings with your peers.

Here is a list of netiquette guidelines. Please read them carefully and use them to guide your communication in this course and beyond.

- Make a personal commitment to learn about, understand, and support your peers.
- Assume the best of others and expect the best of them.
- Acknowledge the impact of oppression on the lives of other people and make sure your writing is respectful and inclusive.
- Recognize and value the experiences, abilities, and knowledge each person brings.
- Pay close attention to what your peers write before you respond. Think through and re-read your writings before you post or send them to others.
- It's ok to disagree with ideas, but do not make personal attacks. Be generous in your discourse.
- Be open to being challenged or confronted on your ideas and to challenging others with the intent of facilitating growth. Never demean or embarrass others.
- Encourage others to develop and share their ideas.

Course Technology

In this course we may use the following additional technology/software:

- Zoom
- Feedback Fruits

Late Policy: Because assignments involve peer assessment and in-class presentations deadlines for tutorial assignments cannot be altered. If you anticipate issues or become ill we will of course work to accommodate you. For your term essay, you will lose 10% for each day past the deadline. Please approach Dr. Lougheed in advance should this be an issue.

Attendance: It is easy to blow off in class tutorials but note that there will be only a handful of formal lectures (and I will not post PDFs on-line) and it is engagement in class and presentations by me and peers that will provide the meat of the course. Note too that if you are seeking to get something out of the course class engagement and discussion are indispensable.