



BIOB51 – Evolutionary Biology

Winter 2021

Tu & Th 10:00AM – 11:00AM

This course will be delivered entirely online

Instructor:	Dr. Kristen Brochu biob51 [at] utsc.utoronto.ca	Online Office Hours:	TBD (2 hours) or by appointment.
Teaching Assistants:	Nishant Singh JP Fontenelle Vanessa Luzuriaga Aveiga	Online Office Hour:	TBD TBD TBD
Course Coordinator:	Jennifer Campbell jac.campbell [at] utoronto.ca		

We wish to acknowledge this land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and most recently, the Mississaugas of the Credit River. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

COURSE DESCRIPTION

Evolutionary biology is the study of the processes that have produced the diversity of life on earth, the relationships between organisms, and the accumulated changes over time at all scales of biological organization (from populations to higher taxonomic groups). Evolutionary theory is the most fundamental and ubiquitous topic in biology, giving critical insights into a wide range of fields, including conservation, medicine, epidemiology, community ecology, and development. Over the course of the semester, we will explore three major themes to give you a firm foundation in modern evolutionary biology:

1) History of thought on evolutionary evidence, patterns, and processes

Darwin is the most famous scientist associated with evolution, but many scientists have contributed to our accumulated knowledge. We will discuss the research of historical and contemporary scientists that advance evolutionary biology and lead to the accumulation of evidence behind evolutionary theory.

2) Evolutionary methodology across scales

Scientists use a variety of methods to study evolution at different taxonomic scales. We will cover some of the most famous examples of evolution by delving into the scientific literature on evolutionary research and exploring the strengths and limitations of different techniques.

3) Evolutionary theory's predictive power and applications

Evolutionary theory is critical to understanding many aspects of biology because it has the predictive power to explain disparate biological phenomena. We will explore the links between evolutionary biology and other fields in the life sciences, developing both scientific literacy and breadth.



COURSE GOALS & OUTCOMES

The goal of this course is to provide all students with foundational knowledge on the evidence, patterns, and processes of evolution; the methodology used to study evolution at different scales, and the predictive power and applications of evolutionary theory. I aim to provide students with the necessary skills to discuss, analyze, and evaluate scientific literature about the theory of evolution. By the end of the course, you will be able to:

- 1.1) Discuss the history of evolutionary thought by explaining the major contributions of different scientists to evolutionary theory
- 1.2) Define evolution and describe at least two advancements in evolutionary biology
- 1.3) Compare and contrast the principal mechanisms of evolutionary change, both within and across species
- 2.1) Find, summarize, and synthesize primary scientific literature on the topic of evolution
- 2.2) Critically evaluate evidence for and against a given hypothesis by identifying the assumptions, strengths, and weaknesses of the data, and inferring logical conclusions
- 2.3) Formulate predictions based on hypotheses in evolutionary biology and suggest appropriate methodologies for testing them
- 3.1) Analyze the contribution of evolution to different fields of biology
- 3.2) Appraise the advantages of collaboration and productively engage in team projects

GRADING & EVALUATION

If you have a question about your grade on any assignment, please make an appointment to discuss it with me outside of class. If you dispute a grade on any assignment, please submit a written description of the issue and make a case for why you believe the grade should be altered with reference to the assignment guidelines and grading rubric. I will consider your request and meet with you to discuss my decision. Requesting a reassessment of your work will never result in a lower grade on the assignment in question.

The breakdown of your final grade is as follows:

(NOTE if you are taking BIOB90: Integrative Research Poster Project the alternate grading scheme is indicated in parentheses; the poster itself will be worth 10%)

Assignment	Short Description	Points (/100)	Due Date	Learning Outcome Assessed
EXTRA CREDIT	Complete the introductory survey and midterm evaluation	2	Jan 19, Feb 23	
Problem Sets	Three sets of multi-format problems (3 x 2 pts each)	6	Jan 28, Feb 11, Mar 25	1.1, 1.2, 1.3, 2.2, 2.3, 3.1
SaplingPlus Homework	Short homework assignments based on the textbook (10 x 1 pts each - 1 dropped)	9	Weekly	1.1, 1.2, 1.3, 3.1
Scientific Paper Synthesis	One page report (in pairs) comparing two scientific papers	6 (4)	Mar 11	2.1, 2.2, 3.1, 3.2
Scientific Paper Critique	One page report (in pairs) critiquing the papers from the synthesis assignment	9 (6)	Apr 8	2.1, 2.2, 3.1, 3.2
Online Discussion Participation	Two original posts (1 pt and 5 pts) Response to peers (4 x 1 pt each)	10	Weekly Fri/Sun	All
Midterm Exam	One hour exam consisting of multi-format questions (during class)	25 (20)	Feb 25	1.1, 1.2, 1.3, 2.2, 2.3, 3.1
Final Exam	Three hour exam consisting of multi-format questions (during final exam period)	35	TBD	1.1, 1.2, 1.3, 2.2, 2.3, 3.1



For each assignment I will post a document on the course website describing the guidelines and grading rubric. Late assignments will not be accepted without a valid reason. Valid reasons include students who add the course after an assignment was due or are registered with AccessAbility.

MISSED EXAMS

Students that are unable to attend the midterm for religious reasons, short-term illness, or several personal circumstance must notify the Course Coordinator (Jennifer Campbell) by email at least 3 working days before the midterm and submit documentation. Students that are unable to attend due to an AccessAbility issue should inform that office and Jennifer Campbell to arrange an accommodation. Students who miss the midterm for a medical reason must present a completed UTSC medical certificate (available via the registrar's website) that confirms their illness, and medical attention, at the time of the exam. *Medical certificates will be verified.*

There will be a single make-up for the midterm for students with a documented excuse or accommodation, as validated by Jennifer Campbell. Alternative arrangements are *NOT* possible, except as arranged by AccessAbility. The date of the make-up test will be announced on Quercus and it is the *SOLE RESPONSIBILITY* of the affected student to ensure they are aware of this date. Students that miss the midterm with no acceptable, documented excuse will receive a "0" grade for that test. Students that miss the midterm and the make-up and have documented, confirmed excuses for both will have their final grades adjusted accordingly.

Students that **miss the Final Exam** must petition the Registrar to write a deferred exam.

REQUIRED TEXTBOOK

Emlen DJ & C Zimmer (2020) Evolution: Making Sense of Life. 3rd Edition. Macmillan. New York.

Please ensure you purchase both the e-book (or hardcopy) and SaplingPlus (the online system). Both are required.

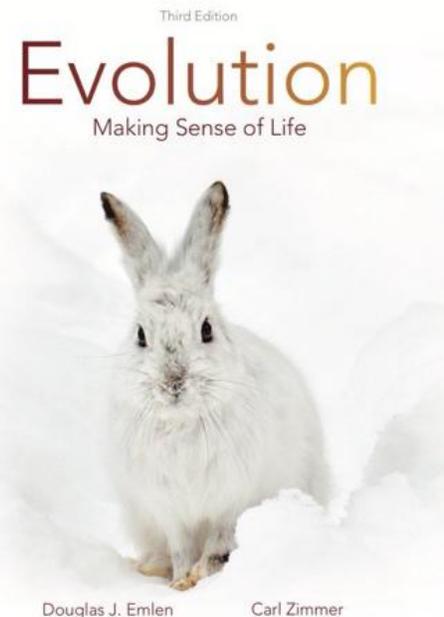
Readings to be completed in support of lecture material are indicated on the schedule below.

COURSE WEBSITE

You can find all course materials online via Quercus.

Lectures will be posted as pdf files by the night prior to the lecture to allow you to fill in details or refer to figures/tables/references.

Please see the information about Intellectual Property further down in this document.





COMMUNICATION POLICY

There are several ways to get help in this course. The first and best is through the online office hours held by myself and the TA. These office hours will be held using the 'Bb Collaborate' link on the Quercus navigation bar. I am also happy to arrange office hours by appointment if you cannot attend the weekly scheduled hours. Questions can also be posted to the online discussion board or emailed to [biob51 \[at\] utsc.utoronto.ca](mailto:biob51@utsc.utoronto.ca). The online discussion board will be checked more frequently, so please ask course content questions there rather than emailing. This system also helps your classmates benefit from the answers!

Please use your university email address for email and treat all of our communication professionally. I treat all of my students with respect and expect to be granted the same courtesy. Please allow at least 48 hours for a response to your email. For course administration questions (e.g., I missed the midterm, I just joined the course) email Jennifer Campbell ([jac.campbell \[at\] utoronto.ca](mailto:jac.campbell@utoronto.ca)). Major announcements will be posted to Quercus. Reminders are usually on the first couple of slides in lectures, but will NOT be in the posted lecture pdf. It is your responsibility to be aware of announcements made in class.

STUDENT EXPECTATIONS

I expect all students to not only view lectures (either live or recorded), but to be engaged with the material through effective note taking and asking questions when they arise. This course involves weekly assignments for each topic so it is vitally important for you to establish and maintain a weekly schedule, as it would be very easy to fall behind. You should understand the material in the lectures and textbook, know the theory behind it, and ensure you can follow the examples outlined in the lectures and the textbook. Please attend office hours to ask questions, especially if you're struggling.

CLASS DISCUSSION ETIQUETTE

Please feel welcome to turn your video on during lecture, but it is not required. Feel free to discuss the course in the chat window, but please stay on topic and be respectful of your fellow students. Some of the material covered in this course may elicit strong reactions or opinions, but it is our responsibility to maintain rationale and inclusive discussions throughout the course. I support freedom of expression in this class, including disagreements and challenging opinions; however, I will not tolerate contributions that degrade, abuse, or harass an alternative viewpoint. This applies to both live discussions as well as discussion boards on Quercus.

In addition to the weekly discussion topics, there will be two general discussion boards. One will be for student-to-student communication, where I will not comment. The other will be for comments and/or questions for me. I will monitor this discussion board regularly, but students are also welcome to respond to threads and answer questions. Please allow 24 hours for a response. This Discussion Board acts as a running FAQ for the course. Again, I ask that all content related questions are directed to the discussion board so the answers can be shared with the entire class. Responses to Discussion Board questions tend to be far more detailed than an email response. I recommend that you regularly check the discussion board for new content to enhance your studying. Again, please respect your fellow students on these discussion boards and maintain a considerate dialogue. Please see the EDI statement below for a link to the Student Code of Conduct.



EQUITY, DIVERSITY, AND INCLUSION STATEMENT

“The Department of Biological Sciences acknowledges the barriers that people of colour and other marginalized groups face, particularly in science and academia. As a department, we are highly committed to creating a welcoming scientific community where everyone feels safe, comfortable participating, and which provides the necessary support to thrive. We acknowledge and are disheartened that Black, Indigenous and other marginalized communities are, and always have been, disproportionately impacted by systemic racism and face barriers within academia. In August 2020, our department formed an equity and inclusion task force that will meet regularly to discuss equity and inclusion and enact improvements to our departmental practices by actively engaging with the literature on best practices, and seeking ongoing input from all members of the department including students, post-doctoral fellows, staff and faculty. Among our main priorities will be a commitment to hire and support faculty and staff that are representative of our diverse student population, and to promote a departmental culture that will foster inclusive teaching and research excellence.”

Part of the aim of this course is to familiarize you with biological and cultural diversity with regards to evolution. As such, I expect everyone to show respect for the different backgrounds, experiences, beliefs, and values expressed by any member of this class. There will be no tolerance for behaviour or speech that violates the Code of Student Conduct (found here: <https://www.utsc.utoronto.ca/edio/policies-procedures>). Find out more about UTSC's commitment to EDI here: <https://www.utsc.utoronto.ca/edio/>.

ACCOMMODATIONS STATEMENT

We welcome students with diverse learning styles and needs in this course. If you may require special accommodations in this class, you are encouraged to contact both the AccessAbility Services Office, and myself as soon as possible to ensure that we have time to implement any necessary accommodations. AccessAbility Services staff (located in room AA142) can be reached by phone (416-287-7560) or email ([ability \[at\] utsc.utoronto.ca](mailto:ability[at]utsc.utoronto.ca)) and are available by appointment to assess specific needs, provide referrals, and arrange appropriate accommodations.

ENGLISH LANGUAGE SUPPORT

The academic writing style is unfamiliar to most students at the beginning of their University programs. To help you master scientific texts, consider taking the free and confidential 20-minute Academic English Health Check (AEHC) (<https://www.utsc.utoronto.ca/eld/academic-english-health-check-aehc>) and using the free resources available at the English Language Development Centre to support your learning (<https://www.utsc.utoronto.ca/eld/english-language-development-support-consultations>).

ACADEMIC INTEGRITY

It is critical for all members of the scientific community, including students, to respect the value of each other's intellectual work and trust the contributions that we all make to the greater body of knowledge. As such, we must all work to protect the integrity of our community, our degrees, and our work by respecting the rules outlined in the University of Toronto's Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>). All students in this course must abide by this code, which outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Academic



dishonesty (which includes cheating, plagiarism, and the use of unauthorized assistance) is a serious offense that can lead to suspension or expulsion. Please familiarize yourself with the offenses listed under Section B of the code. If you have any questions about what constitutes a violation of the code, please get in touch with me so that we can discuss it further.

INTELLECTUAL PROPERTY

Part of academic integrity is respecting the intellectual property of content creators/owners. You should be aware that your courses contain the intellectual property of the instructor, the TAs and possibly the University of Toronto. Sharing any course materials (e.g. lecture content, such as audio/visual recordings, handouts, or presentations; assignment materials, such as problem sets/solutions and exams; and other copyrighted material, such as primary literature pdfs) without the express permission of the creator/owner of those materials is a violation of intellectual property rights.

DISCLAIMER

I reserve the right to modify this syllabus and its contents throughout the semester to better achieve course goals and/or to enhance the quality of the course in response to unexpected circumstances or student feedback. I will always endeavor to give students advance notification of any changes. These notifications will be made in class and on Quercus, with the most up-to-date version posted to Quercus.

TENTATIVE SCHEDULE

Week	Day	Date	Topic	Reading	Due
1	Tu	Jan 12	Intro: How & Why We Study Evolution	Syllabus & Ch 1	
	Th	Jan 14	History of Evolutionary Thought	Ch 2	
2	Tu	Jan 19	Darwin & the Evidence for Evolution	Ch 2 & 10	Homework 1
	Th	Jan 21	Natural Selection	Ch 10	
3	Tu	Jan 26	Mutations & Heritability	Ch 5	Homework 2
	Th	Jan 28	Gene Flow & Genetic Drift	Ch 6	Problem Set 1
4	Tu	Feb 2	Speciation	Ch 13	Homework 3
	Th	Feb 4	Speciation	Ch 13	
5	Tu	Feb 9	Fossils & Extinction	Ch 3	Homework 4
	Th	Feb 11	Phylogenetics	Ch 4	Problem Set 2
6	Tu	Feb 16	Reading Week		
	Th	Feb 18	Reading Week		
7	Tu	Feb 23	Midterm Review		
	Th	Feb 25	Midterm		Midterm
8	Tu	Mar 2	Phenotypic Plasticity	Ch 7	Homework 5
	Th	Mar 4	Molecular Evolution	Ch 8	
9	Tu	Mar 9	Molecular Evolution	Ch 9	Homework 6
	Th	Mar 11	Sexual Selection	Ch 11	Paper Summary
10	Tu	Mar 16	Life History Evolution	Ch 12	Homework 7
	Th	Mar 18	Social Evolution & Altruism	Ch 16	
11	Tu	Mar 23	Macroevolution	Ch 14	Homework 8
	Th	Mar 25	Biogeography		Problem Set 3
12	Tu	Mar 30	Co-Evolution	Ch 15	Homework 9
	Th	Apr 1	Human Evolution	Ch 17	
13	Tu	Apr 6	Evolution in Pop Culture		Homework 10
	Th	Apr 8	Final Review		Paper Critique