

BIO 411 – Evolution – Fall 2022

Instructor: Dr. Logan W. Cole – E-mail: lwcole@brockport.edu – Phone number: 585-813-6923

Class time: Mondays and Wednesdays at 3:35 – 4:50 PM Location: Remote

Office hours: Tuesday 1-4 PM and Wednesday 1-2 PM

Prerequisite: BIO 302 Genetics

Course description: Commences with a review of philosophical and factual basis of evolutionary biology. Examines the physiochemical background for the evolution of life, mechanisms of evolution, population genetics, phylogeny, speciation, and consequences of the evolution of populations of living organisms. (3 credit hours)

Required textbook: *Evolution: Making Sense of Life* by Emlen and Zimmer (2020) 3rd Edition, Macmillan Learning. New York.

Date	Day	Topic	Readings/notes	Chapter
8/29	M	Introduction to evolution		1
8/31	W	History of evolutionary ideas	Malik et al. 2018	2
9/5	M	Labor Day (no class)		
9/7	W	History of evolutionary ideas	Wallace 1858	2
9/12	M	Paleontology		3
9/14	W	Paleontology	Question set 1 due	3
9/19	M	Phylogenetics: tree thinking	Baum 2008	4
9/21	W	Phylogenetics: tree inference	Research topics due	4
9/26	M	Review of genetics and genomics		5
9/28	W	EXAM 1		
10/3	M	Population genetics		6
10/5	W	Population genetics	Novembre et al. 2008	6
10/10	M	Quantitative genetics	Question set 2 due	7
10/12	W	Quantitative genetics		7
10/17	M	Mid-Semester break (no class)		
10/19	W	Gene trees and coalescent theory	Maddison 1997	8
10/24	M	Molecular evolution	Kern & Hahn/Jensen et al. 2018	8
10/26	W	Evolution of novelty	Carroll 2008	9
10/31	M	Empirical studies of natural selection	Question set 3 due	10
11/2	W	EXAM 2		
11/7	M	Evolution of sex and sexual selection		11
11/9	W	Life history evolution		12
11/14	M	Species and speciation	Research paper due	13
11/16	W	Species and speciation	Question set 4 due	13
11/21	M	Macroevolution	Gould & Eldredge 1977	14
11/23	W	Thanksgiving break (no class)		
11/28	M	Co-evolution		15
11/30	W	Evolution of behavior	Paper revisions due	16
12/5	M	Human evolution	Question set 5 due	17
12/7	W	Evolutionary medicine		18
12/12	M	FINAL EXAM		

EXAMS

There will be two in-class exams and a final during finals week. In-class exams will focus on new material and the final exam will be cumulative. Exams will mostly be short answer or essay style. Exam grades will be considered and adjusted in the context of how well the class does on particular questions.

RESEARCH PAPER

A research paper will be a major part of the grade for this class. The paper will be a ten-to-twenty-page review of some topic in evolutionary biology. The inclusion of some data analysis in the paper would be welcome but not required. This research paper will count as the equivalent of two exams in your final course grade.

REVIEW QUESTIONS

Five times during the semester, there will be a set of conceptual questions to complete. These questions will be meant to emphasize what is important from the lectures and readings in understanding evolution. I will use your responses to these questions as an opportunity to give you feedback.

PARTICIPATION AND ATTENDANCE

You cannot participate in class if you are not there; for each unexcused absence past two absences, there will be a deduction of 3% of the participation grade (which corresponds to a deduction of 0.3% of the course grade).

COURSE GRADE BREAKDOWN

EXAM 1	15%
EXAM 2	15%
FINAL EXAM	15%
TERM PAPER	30%
QUESTION SETS	15% (5x3%)
PARTICIPATION	10%

LEARNING OUTCOMES

- Recall the notions of evolution prior to Darwin and discuss how the theories of natural selection and common descent were formulated
- Define evolution in detail
- Distinguish between and define different evolutionary processes such as natural selection, genetic drift, mutation, nonrandom mating, and recombination
- Recognize neutral and non-neutral evolution empirically
- Describe the relationship between population genetic and macroevolutionary concepts
- Be able to construct and interpret phylogenies in the context of common ancestry and the distinction between ancestral and derived characters
- Recognize the role of the relationships between individual organisms in the context of co-evolution, sexual selection, and natural selection
- Recognize the relevance of evolutionary theory in the fields of medicine, infectious disease, human behavior, and general education
- Apply critical reasoning skills to analyze and critique both scholarly and non-scholarly writings on the topic of evolutionary biology
- Recognize errors in arguments and misconceptions described by opponents of evolutionary biology

Evolution is the organizing principle of biology. A strong understanding of evolution will work in concert with your prior understanding of biology and strengthen your understanding of biology writ large. This course is an upper-level introduction to evolution for biology majors.

Concepts in evolution, especially population genetics and molecular evolution, are deeply connected to concepts from molecular and classical (Mendelian) genetics, which were covered in BIO 302 Genetics. We will briefly discuss relevant concepts from genetics and genomics but if you need a refresher, review materials from your genetics course or from your genetics textbook.

REQUIRED TEXT

This course will utilize the third edition of *Evolution: Making Sense of Life* by Emlen and Zimmer. Course lectures will not necessarily closely adhere to the text but do emphasize what I think is important. Similarly, review questions will also reflect this emphasis. All of these components (lectures, textbook readings, primary literature assignments, and review questions) constitute the multiple ways of thinking that are conducive to a more complete understanding of evolution. It will be difficult to do well in this course if you do not give all of these components attention.

ADDITIONAL SUPPORT

I am pleased to help you with any issues you have understanding the material for the course. I will be very responsive to emails – I should almost always be able to respond in a day (usually much sooner) and if I don't, please send me a reminder because I probably just missed it. You can also come to my office hours online. If you cannot make those office hours but want to directly ask me some questions or get support in real time, we can also arrange an appointment to meet via Zoom or by telephone.

STATEMENT OF EQUITY AND OPEN COMMUNICATION

We recognize that each class we teach is composed of diverse populations and are aware of and attentive to inequities of experience based on social identities including but not limited to race, class, assigned gender, gender identity, sexuality, geographical background, language background, religion, disability, age, and nationality. This classroom operates on a model of equity and partnership, in which we expect and appreciate diverse perspectives and ideas. If anyone is experiencing exclusion, intentional or unintentional aggression, silencing, or any other form of oppression, I encourage open communication with myself and/or the class as a whole.

STUDENT CODE OF CONDUCT

The following is a link to the College's [Code of Student Conduct](#).

ACADEMIC INTEGRITY

Students are expected to read and abide by the policies and procedures set forth in the College's Policy of [Student Academic Dishonesty](#).

DISRUPTIVE STUDENT BEHAVIORS:

The following is a link to SUNY Brockport's policy [Procedures for Dealing with Students who are Disruptive in Class](#).

ATTENDANCE POLICY

Attendance in online courses is determined by appropriate participation in course activities. Professors are able to track both logging on times and dates as well as viewings of course materials. View the College's [Attendance Policy](#).

DISABILITY STATEMENT

SUNY Brockport is committed to fostering an optimal learning environment by applying current principles and practices of equity, diversity, and inclusion. If you are a student with a disability and want to utilize academic accommodations, you must register with Student Accessibility Services (SAS) to obtain an official accommodation letter which must be submitted to faculty for accommodation implementation. If you think you have a disability, you may want to meet with SAS to learn about related resources. You can find out more about Student Accessibility Services at https://www.brockport.edu/life/accessibility_services/, or by contacting SAS via sasoffice@brockport.edu, or 585-395-5409. Students, faculty, staff, and SAS work together to create an inclusive learning environment.

The following is a link to the College's policy [Procedure for Accessing Services for Students with Disabilities](#).

SEXUAL HARASSMENT/TITLE IX STATEMENT

Gender discrimination and sexual harassment are prohibited in class. Title IX legislation requires the College to provide gender equity in all areas of campus life. If you or someone you know has experienced gender discrimination, sexual harassment, or sexual assault, we encourage you to seek assistance and to report the incident through resources available at www.brockport.edu/titleix/index.html. Confidential assistance is available at Hazen Center for Integrated Care. For these and other regulations governing campus life, please see all of our Student Policies at www.brockport.edu/policies/index.php.

EMERGENCY MANAGEMENT

In case of emergency, the Emergency Alert System at SUNY Brockport will be activated. Students are encouraged to maintain updated contact information using the link on the College's Emergency Information website, <https://www.brockport.edu/support/emergency>. Included on the website is detailed information about the College's emergency operations plan, classroom emergency preparedness, evacuation procedures, emergency numbers, and safety videos. In addition, students are encouraged to familiarize themselves with the Emergency Procedures posted in the classrooms, halls, and buildings, and all college facilities.

ELECTRONIC DEVICES

The following is a link to the College's [electronic devices policy](#).