

Course Syllabus
Macroevolution (GLY 458/558) – 3 Credits
In-Person
University at Buffalo

Instructor: Dr. James Boyle

Email: jamesboy@buffalo.edu

Office: Cooke 453 ([zoom room](#))

Student Hours: Monday 10-11AM, Thursday 1-2PM, or by appointment ([zoom room](#))

Lecture Time: Tu/Th 9:30-10:50AM

Course Description:

Principal issues of macroevolutionary theory (i.e., issues at the species level and above, which are manifest on the scale of geological time) and hones analytical skills as preparation for undertaking graduate research. Evolutionary theory is an interdisciplinary topic that draws on information from ecology, population biology, systematics, anthropology, and paleobiology, and the course presumes prior study of evolutionary aspects of at least one of these areas as preparation.

Course Expectations:

Students are expected to attend the lectures and participate in discussions/exercises. While attendance is not an explicit part of your grade the in-class exercises will be much easier to complete, and more useful as a learning experience, if you are participating during class and discuss with your fellow students.

Course Objectives and Learning Outcomes:

The purpose of this course is to expand on the concepts and theories of evolution and trying to bridge the gap between population level genetics (ecological timescales) and species level evolutionary histories (geological timescales). We will focus on the role of history in understanding modern diversity, tree-thinking, and the emergence of quantitative analysis in macroevolutionary studies.

Desired Learning Outcomes:

Course Learning Outcome	Delivered through the Following Instructional Method(s):	Student Achievement Assessed with the Following Method(s)/Assignments:
1. Be able to read & construct phylogenetic trees and use them to infer evolutionary changes within a lineage	Lectures, In-class exercises, readings	In-class exercises, exams
2. Know what sources of uncertainty exist when addressing evolutionary questions	Lectures, In-class exercises, readings	In-class exercises, reading response, exams
3. Be able to critically evaluate whether claims in primary literature are supported by their data and analyses	Lectures, In-class exercises, readings	In-class exercises, reading response, exams
4. Know the role that history and fossils hold in understanding the diversity of	Lectures, In-class exercises, readings	In-class exercises, exams

Course Learning Outcome	Delivered through the Following Instructional Method(s):	Student Achievement Assessed with the Following Method(s)/Assignments:
modern organisms		
5. Be able to summarize evolutionary analyses from the primary literature	In-class exercises, readings	In-class exercises, reading response, exams

Materials:

There are no required textbooks for this course. Instead I will be posting readings each week (see assignments section for further information). However, if you wish to read more about the topic the texts below...

Genetics, Paleontology, and Macroevolution (2nd edition). Jeffery S. Levinton. 2001.
 The Structure of Evolutionary Theory. Stephen J. Gould. 2002.
 Species & Speciation. Warren D. Allmon & Margaret M. Yacobucci (eds.). 2016

GRADING POLICY: (SEE COURSE SCHEDULE AT THE END OF THIS DOCUMENT)

Final grades are letter-based (see [here](#) for more information on UB grade policy) and are a weighted average of quizzes, discussion boards, and min-exams throughout the semester. There is no final exam during final exam week at the end of the semester.

Weighting (undergraduate students)	Weighting (graduate students)	Assignment
36%	36%	Reading Summaries
40%	30%	In-class Exercises
24%	34%	Take-Home Exams

Assignments

Reading Summaries: Each Tuesday I will post three journal articles to UBLearn that are related to the topic we will be covering on the following Thursday and Tuesday. Undergraduate students must choose one of these three articles to read and provide a 1.5 to 2-page summary of the article based on the criteria and rubric that will be posted under “Course Information” tab on UBLearn. Graduate students may choose one of the three articles posted **or** locate another peer-reviewed journal article relevant to the topic published within the last ten years. The summary will be due on UBLearn before the start of class the following Tuesday. All students are required to submit six readings summaries over the course of the semester. If you choose to submit more reading summaries than required I will count the highest six scores.

In-class Exercises: Each Tuesday we will have in-class exercises where students will be asked to apply the information from the previous Thursday’s lecture. These exercises will often involve interpretation of published datasets or simple statistical analyses with associated sets of questions and/or discussions. All information needed for each in-class exercise will be posted on UBLearn under the “Assignments” tab. Most often a word or excel file will need to be completed and submitted by the start of the following class. I will be dropping the lowest two in-class exercise grades.

Take-home Exams: There will be three take-home exams due during the semester (exam I due October 11th, exam II due November 8th, and exam III due December 13th). Each of these take-home exams will be released at least one week before it is due. The exams will consist of a combination of short answer questions and data analyses on the topics most recently covered in class. You are allowed to use almost all resources at your disposal, including collaboration with your fellow students, but all work should be in your own words (i.e. no [plagiarism](#)). The only limit on resources is that you may not ask individuals not enrolled in the course for answers (i.e. no posting online to seek answers to questions). Graduate students will have additional questions which will focus on data analysis and interpretation.

Make-up Policy: Assignments for this course are built so that it is possible to complete the assignments outside of class. However, it will be much more difficult to complete the assignment if you are unable to participate during class. If you are unable to complete an assignment by the posted due date for some reason please contact me (Dr. Boyle) when you are able. It is usually possible to provide an extension.

Final Grades:

Grade	Quality Points	Percentage
A	4.0	94.0+
A-	3.67	90 – 93
B+	3.33	87 - 89
B	3.00	84 – 86
B-	2.67	80 - 83
C+	2.33	77 – 79
C	2.00	74 – 76
C-	1.67	70 - 73
D+	1.33	67 – 69
D	1.00	65 - 66
F	0	< 65

Academic Integrity: Academic integrity is a fundamental university value. Through the honest completion of academic work, students not only advance their educational objectives, they sustain the integrity of the university and facilitate the transmission of knowledge and culture based upon the generation of new and innovative ideas. The [Undergraduate Academic Integrity Policy](#) provides additional information about what UB considers to be academic dishonesty and the possible consequences for violating UB's policies on academic integrity. In particular, you should be sure that you are aware of what UB considers to be academic dishonesty and that you understand how to avoid academic dishonesty. If you are unsure about the meaning of any of this information please talk to me or your academic advisor about them and we will try to clarify our expectations.

Accessibility Resources: If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources, 25 Capen Hall, 645-2608, and also the instructor of this course. The Office of [Accessibility Resources](#) will provide you with information and review appropriate arrangements for reasonable accommodations.

Student Wellness: As a student you may experience a range of issues that can cause barriers to learning or reduce your ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns, or unwanted sexual experiences. Counseling, Health Services, and Health Promotion are here to help with these or other issues you may experience. You [learn can more about these programs and services](#) by contacting:

Counseling Services: 120 Richmond Quad (North Campus), phone 716-645-2720
 202 Michael Hall (South Campus), phone: 716-829-5800

Health Services: Michael Hall (South Campus), phone: 716- 829-3316

Health Promotion: 114 Student Union (North Campus), phone: 716- 645-2837

If you find yourself struggling with course-related issues, or any other issues regardless of the reason, please don't hesitate to contact me so I can help you resolve the difficulty or direct you to some other resource who can.

Lecture Schedule

Dates	Week	Tuesday	Thursday
8/29-9/2	1	A	B
9/5-9/9	2	C	D
9/12-9/16	3	E	F
9/19-9/23	4	G	H
9/26-9/30	5	I	J
10/3-10/7	6	K	L
10/10-10/14	7	M	N
10/17-10/21	8	O	P
10/24-10/28	9	Q	R
10/31-11/4	10	S	T
11/7-11/11	11	U	V
11/14-11/18	12	W	X
11/21-11/25	13	Y	Fall Recess
11/28-12/2	14	Z	AA
12/5-12/9	15	BB	CC

Colors correspond to blocks of material covered by each of the six exams. Each of the exams is due the Wednesday after the block of material being tested finishes.

Lecture Topics	
A	What is macroevolution
B	History of Evolutionary Thought
C	Systematics & Taxonomy
D	Phylogenetics I
E	Phylogenetics II
F	Species I
G	Species II
H	Adaptation I
I	Adaptation II
J	Speciation I
K	Speciation II
L	Development & Evolution I
M	Development & Evolution II
N	Constructional Morphology I
O	Constructional Morphology II

Lecture Topics	
P	Tempo & Mode of Evolution I
Q	Tempo & Mode of Evolution II
R	Dynamics of Morphological Time Series I
S	Dynamics of Morphological Time Series II
T	Coordinated Stasis I
U	Coordinated Stasis II
V	Species Selection & Effect Macroevolution I
W	Species Selection & Effect Macroevolution II
X	Diversity Patterns, Extinction, & Origination I
Y	Diversity Patterns, Extinction, & Origination II
Z	Mass Extinctions I
AA	Mass Extinctions II
BB	Speculative Zoology Realism I
CC	Speculative Zoology Realism II