

Molecular Evolution

Course Information

Instructor: Abigail Lind (abigail.lind@gatech.edu)

Course Prefix and Number: BIOS 4225 A, 3 credits

Term: Fall 2026

Course Description

This course covers the principles and methods of molecular evolution, with an emphasis on understanding how and why DNA and protein sequences change over time. Topics include models of nucleotide and protein substitution, molecular phylogenetics and evolutionary inference, and comparative genomics and genome evolution.

Course Learning Outcomes

1. **Learn and apply molecular evolutionary models and approaches**
 - o Understand and apply key models of nucleotide and amino acid substitution to different types of molecular data
 - o Understand and apply principles of phylogenetic tree reconstruction
 - o Understand and apply comparative methods for evolutionary inference
2. **Learn new knowledge in the fields of molecular and genome evolution**
 - o Integrate findings from modern -omics research into evolutionary context
 - o Understand how genome-scale data are used to study molecular evolution
3. **Read and critically analyze scientific literature**
 - o Read, critically evaluate, and synthesize primary scientific literature in molecular and genome evolution
 - o Identify strengths, limitations, and assumptions in published research
4. **Present research to peers**
 - o Deliver professional scientific presentations and lead peer discussions

Required Course Materials

No textbooks or materials are required.

Suggested textbooks (available from the instructor and from Georgia Tech library):

- *Fundamentals of Molecular Evolution* by Graur & Li. Sinauer Associates. ISBN: 0878932666
- *Molecular Evolution and Phylogenetics* by Nei & Kumar. Oxford University Press. ISBN: 0195135849

Grading Policy

This course is graded on a letter grade basis. The grade will be assigned based on the following components:

Component	Weight
Quizzes (10 x 10 pts each, lowest 2 dropped)	45%
In-class labs	20%
Group paper presentations	30%
Attendance and participation	5%

Letter grade scale:

- A: 90–100%
- B: 80–89%
- C: 70–79%
- D: 60–69%
- F: 0–59%

Quizzes;

There will be 10 semi-weekly quizzes covering material discussed since the previous quiz. Graduate students will receive a few additional questions reflecting the graduate-level expectations of the course. Undergraduate students may attempt the graduate-level questions for extra credit. There are no quiz make-ups; instead, the two lowest quiz grades will be dropped.

Labs:

In-person labs will utilize the Georgia Tech compute cluster ICE. These labs are designed to be completed during class and are graded on completion rather than correctness. Students will receive full credit for submitting materials demonstrating that they attempted the lab. In special circumstances, students may complete a lab outside of class only if they email the instructor **before the beginning of the lab** and arrange this in advance. The lowest lab grade will be dropped.

Presentations:

Students will give a 15-minute in-class presentation on a molecular evolution research paper. Undergraduate and graduate students will present in pairs, with one group of three or individual presentations permitted if needed to accommodate an odd number of students. Undergraduate and graduate students will select papers from separate pools,

with graduate papers emphasizing molecular evolution methods; students should therefore form groups within their respective undergraduate or graduate cohort.

Attendance Policy

Regular attendance and active participation are essential to the format of this course. Students are allowed two unexcused absences. Additional absence may be excused by advance notice to the instructor or after the event with appropriate documentation. Because a significant portion of the course involves in-class labs, student-led presentations and peer discussion, missing these sessions has a direct impact on course performance and the learning environment for all students.

No make-ups will be permitted for quizzes. Instead, the two lowest quiz grades will be dropped. Completing labs outside of class time will only be permitted if the student arranges this with the instructor **before** the beginning of class.

Academic and Research Honesty/Integrity Statement

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review the [Student Code of Conduct](#) and the [Academic Honor Code](#), especially [Appendix A: Graduate Addendum to the Academic Honor Code](#).

Students are expected to perform research in an ethical and responsible manner. Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Allegations of scientific or scholarly misconduct are handled in accordance with the procedures outlined by the [Policy for Responding to Allegations of Scientific or Other Scholarly Misconduct](#).

Core IMPACTS

Not applicable

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, [contact the Office of Disability Services](#) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. [The Student-Faculty Expectations](#) articulates some basic expectations that you can have of me and that I have of you. Additional information for research-related work is given in [The Expectations of Advisors and Advisees](#). In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.