

Biology 222 – Evolution – Syllabus – Spring 2025

Professors Daniel E. Bunker and Michael Nelson

Summary: Evolution is happening right now in every living species on planet Earth. Evolutionary biology is not about bones and fossils – they are just helpful clues nature has left for us. Evolutionary biology is all about genes and populations, mutations and natural selection, reproduction and survival. Evolution cuts across and unifies the biological sciences – from genetics and molecular biology to ecology and conservation biology to disease and medicine, evolution informs our understanding. Indeed, as the renowned geneticist Theodosius Dobzhansky observed, “Nothing in biology makes sense except in the light of evolution.”

Learning Objectives:

Upon successful completion of this course, students will:

- Understand evolutionary mechanisms including genetic drift and natural selection.
- Understand how to construct and interpret phylogenetic trees.
- Understand the history and geography of life on Earth.
- Understand the species concept and mechanisms of speciation.
- Understand mechanisms of evolution of life history, sexual selection, coevolution, and evolution of disease.

Course prerequisites: (BIOL 201 and BIOL 202 or R120 201 and R120 202) and (BIOL 205 and BIOL 206 or R120 205 and R120 206) with a grade of C or better.

Bio 222-002 meets: Tuesday and Thursday, 10:00 am – 11:30 am

Location: CKB G-08

Bio 222-004 meets: Tuesday and Thursday, 2:30 pm – 3:50 pm

Location: CKB G-08

Required Materials:

1. **Text: Evolution**, by **Bergstrom and Dugatkin, 2nd Edition**. ISBN: 978-0-393-92592-0, Norton & Co. Note that they offer the text as a more affordable eBook. **IMPORTANT:** The 2nd edition is very different from the 1st edition which is not an acceptable substitute. The 3rd edition is also ok.
2. **A laptop computer that can run Lockdown Browser and ‘New Quizzes’ in Canvas. iPads are not an acceptable substitute.**

Grading:

| | |
|---------------------|-----|
| Quizzes | 5% |
| In-class activities | 35% |
| Exam 1 | 15% |
| Exam 2 | 15% |
| Exam 3 | 15% |
| Exam 4 | 15% |

Grading scale:

| | | | |
|----|--------|---|-------|
| A | 90-100 | C | 70-78 |
| B+ | 88-90 | D | 60-70 |
| B | 80-88 | F | 0-60 |
| C+ | 78-80 | | |

Note that these cutoffs are precise. Final point totals above 90 are an A, while point totals below 90 (but above 88) are a B+. Professors do not round up (or down!). Students who ask to round up will be assessed a 1% debit on their final grade.

Contact info and office hours:**Prof Bunker**

Email: dbunker@njit.edu

Office hours: Monday 2-3:30 pm and Thursday 11:30 am – 1 pm.

Office hours location:

<https://njit-edu.zoom.us/j/91811111111>

Appointments are required for office hours meetings! Email Prof Bunker at: dbunker@njit.edu

Prof Nelson

Email: michael.nelson@njit.edu

Office hours: Monday and Wednesday 11:30-12:30 am. (appointment not needed)

Office hours location: CKB339A (inside the Biology Offices on the 3rd floor of CKB)

Course Web page: Canvas (<https://canvas.njit.edu>).

We will use Canvas for coursework submission, announcements, exams and quizzes, and various activities. If you have not used NJIT canvas before, go here

<<https://ist.njit.edu/ucid/>>, or call the NJIT helpdesk for assistance (973 596 2900). Be sure to check your NJIT email or set it to forward to your everyday email account.

Check Canvas regularly for assignments, quizzes, announcements, etc. Your course grades can be found on Canvas as well.

HOW THE COURSE WORKS:**CLASS MEETINGS**

- We will generally cover one chapter/topic each day that the course meets. You will read the chapter and review the pre-recorded lecture BEFORE the class when we cover the material. In class we will have a QUIZ on the material, a discussion of the quiz results, and time for questions about the chapter. Most days we will have some sort of activity that will help you better understand the topic. All of these ACTIVITIES are REQUIRED. These activities happen when they are scheduled and cannot be made up!! However we will drop exactly 4 quiz and 4 activities scores (free passes). We strongly recommend you use these 'free passes' when you need them. If you miss class, and thus a quiz and an activity, FOR ANY REASON, these grade cannot be made up. But they can be dropped as part of your 4 free passes.
- FOR EACH LECTURE, you will:

- READ the chapter in the textbook, Bergstrom and Dugatkin, BEFORE CLASS
- REVIEW the pre-recorded lecture posted to Canvas, BEFORE CLASS
 - Note that we also post the lecture slides themselves.
- ATTEND class.
 - Take the QUIZ at the beginning of class.
 - QUIZZES will be on canvas, using Lockdown Browser (see EXAMS, below).
 - This is the only time the quiz is available!!
 - Participate in discussions and activities.
- Bring your laptop to class with you every day!

EXAMS

- You will take four exams. The exams are not cumulative, although topics covered later in the course do build upon fundamentals (natural selection, phylogenies, etc.)
- All exams AND QUIZZES will be in class on Canvas and will require Lockdown Browser. You MUST have a computer that can run Lockdown Browser. Contact the Dean of Students if you need assistance acquiring the necessary hardware.
- We use Lockdown Browser simply to verify that your work is your own and to prevent cheating on exams. Cheating on exams violates the NJIT honor code and also devalues your degree – if NJIT is known for cheating, future employers or schools will not trust that you have learned anything from your NJIT courses. When your classmates cheat, they are devaluing your college degree and are therefore stealing from you. Cheating in any form will not be tolerated in Bio 222.
- Calculators, phones, watches, etc are not allowed during exams. You will have access to a calculator within the quiz if it is needed.

NOTE

- Each chapter also has learning objectives and flashcards which are posted on Canvas and which you may find useful.

INTEGRATE THE POLICY ON ABSENCES HERE: <https://biology.njit.edu/policy-absences>

Makeup Policy:

Exams can only be made up following verification from the Dean of Students or with prior approval from your Professor. If you miss an exam for unforeseen circumstances, explain your situation to the Dean of Students – if your absence is ‘verified’ by the Dean of Students, your Professor may offer you the opportunity to take a make up exam, if appropriate, and at the Professor’s discretion. If you have a conflict with an exam, you must contact your Professor WITHIN THE FIRST TWO WEEKS OF CLASS to make alternative arrangements.

Quizzes and in-class activities cannot be made up. They happen in real time!! We will drop four of each of these from your grade – use these free passes wisely.

Note that this makeup policy supersedes the Policy on Absences of the Department of Biological Sciences posted here: <https://biology.njit.edu/policy-absences>

Disability accommodations:

If you need accommodation due to a disability please contact the Office of Accessibility Resources and Services to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodation will be required.

This syllabus is not a contract: Rather, it is the planned course outline. Activities, quizzes, and even exams may be added, subtracted, or changed at the discretion of the professors. Any such changes will be posted on Canvas and will take precedence over all other versions.

Academic Integrity:

You are expected to abide by the NJIT Code of Student Conduct <<https://www5.njit.edu/doss/policies/conductcode/index.php>> and the NJIT University Code on Academic Integrity <<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>>, which you agreed to do upon entering NJIT. Please re-read the NJIT University Code on Academic Integrity, which describes conducts that are considered unethical and thus unacceptable (cheating, violating the US Copyright law, etc), as well as consequences for violating the Code. We will not tolerate cheating – it is my responsibility to protect my honest students from cheaters and we will do so. Cheating during exams will not be tolerated, nor will any form of plagiarism.

“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu”

No distractions allowed: Cell phones, texting, web surfing, listening to music, watching videos, earphones/headphones/earbuds, and any other internet use are not permitted during class unless expressly authorized and requested by the professor. Students who violate this policy will be asked to leave the classroom.

Cellular Phones: All cellular phones must be switched off during all class times.

Key Dates:

Jan. 27: Last day to add/drop.

Jan. 27: Last day to withdraw with 100% refund

Feb 3: Last day to withdraw with 90% refund

Feb. 11: Exam 1.

Feb. 17: Last day to withdraw with 50% refund

Mar. 6: Exam 2

Mar. 10: Last day to withdraw with 25% refund

Mar. 16-22: Spring break

April 3: Wellness day, no classes

April 7: Last day to withdraw.

April 10: Exam 3

May 6: Exam 4

Course outline, assignments, and exam schedule:

| Lecture | Day | Date | Topic/Chapter | Preparation |
|---------|-----|--------|--|------------------------|
| 1 | Tue | 21-Jan | An Overview of Evolutionary Biology & Logistics | Read Ch. 1 |
| 2 | Thu | 23-Jan | Early Evolutionary Ideas and Darwin's Insight | Read Ch. 2 |
| 3 | Tue | 28-Jan | Natural Selection | Read Ch. 3 |
| 4 | Thu | 30-Jan | Phylogeny and Evolutionary History | Read Ch. 4 |
| 5 | Tue | 4-Feb | Inferring Phylogeny | Read Ch. 5 |
| 6 | Thu | 6-Feb | Exam review | Bring your questions!! |
| 7 | Tue | 11-Feb | Exam 1 | Study for exam! |
| 8 | Thu | 13-Feb | Transmission Genetics and Genetic Variation | Read Ch. 6 |
| 9 | Tue | 18-Feb | The Genetics of Populations | Read Ch. 7 |
| 10 | Thu | 20-Feb | Evolution in Finite Populations | Read Ch. 8 |
| 11 | Tue | 25-Feb | Evolution at Multiple Loci | Read Ch. 9 |
| 12 | Thu | 27-Feb | Genome Evolution | Read Ch. 10 |
| 13 | Tue | 4-Mar | Exam review | Bring your questions!! |
| 14 | Thu | 6-Mar | Exam 2 | Study for exam! |
| 15 | Tue | 11-Mar | The Origin and Evolution of Early Life | Read Ch. 11 |
| 16 | Thu | 13-Mar | Major Transitions | Read Ch. 12 |
| 17 | Tue | 25-Mar | Evolution and Development | Read Ch. 13 |
| 18 | Thu | 27-Mar | Species and Speciation | Read Ch. 14 |
| 19 | Tue | 1-Apr | Extinction and Evolutionary Trends | Read Ch. 15 |
| | Thu | 3-Apr | Wellness day (no classes) | Be well! |
| 20 | Tue | 8-Apr | Exam review | Bring your questions!! |
| 21 | Thu | 10-Apr | Exam 3 | Study for exam! |
| 22 | Tue | 15-Apr | Sex and Sexual Selection | Read Ch. 16 |
| 23 | Thu | 17-Apr | The Evolution of Sociality | Read Ch. 17 |
| 24 | Tue | 22-Apr | Coevolution | Read Ch. 18 |
| 25 | Thu | 24-Apr | Human Evolution | Read Ch. 19 |
| 26 | Tue | 29-Apr | Evolution and Medicine | Read Ch. 20 |
| 27 | Thu | 1-May | Exam review | Bring your questions!! |
| 28-Jan | Tue | 6-May | Exam 4 (Classes follow Thursday schedule) | Study for exam! |

NO FINAL EXAM during the final exam period!!!!