

BISC-300, Evolution, Fall 2022

Lecture: Mon, Wed, Fri 12:30-13:20 WMC3260
Tutorial: Mon (D101) 13:30-14:20 RCB5125
Mon (D103) 15:30-16:20 AQ5017
Wed (D104) 13:30-14:20 AQ5048
Wed (D106) 15:30-16:20 AQ5028

Lectures are synchronous and in-person, however, lecture recordings will be posted*. Tutorials, quizzes, and midterms are in-person only (see schedule below).

*Some lectures may be asynchronous and recorded only (if needed). Announcements will be made via e-mail and over Canvas.

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Teaching assistant: Emma Green
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Office Location: Shrum Science, B8227
Office Hours: Wed, 11:30-12:30 & by appointment

Pre-requisites: BISC 202 with a grade of C- or better. Students with credit for BISC 400 may not take this course for further credit.

Textbook: Evolutionary Analysis (5th Edition) by Jon C. Herron and Scott Freeman.

Course Description: The phenomenon of organic evolution, and the major forces leading to changes in allele frequencies over time, i.e. natural selection and genetic drift. Topics include adaptation, speciation, the origin of life, and the major evolutionary trends over geological time.

Grade Breakdown:

| | |
|---------------------------------------|-----|
| Midterm Exams (×3, in-class) | 50% |
| Quizzes (×6, lowest one dropped) | 20% |
| Podcast assignment (due Oct 24) | 15% |
| Textbook entry assignment (due Dec 9) | 15% |

The quizzes are meant for you to keep up with the course and to review your lecture notes.

The midterms are designed to help you digest the textbook, while the podcast and textbook assignments are exercises in science translation of that primary literature (you don’t really understand something until you have to explain it!).

Letter Grade Distribution:

| | | | | | | | | | | |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ≤ 50 | 50– | 55– | 60– | 65– | 70– | 75– | 80– | 85– | 90– | 95– |
| F | D | C- | C | C+ | B- | B | B+ | A- | A | A+ |

Final grades may be curved in a fair and impartial manner, with distribution reflecting the performance and effort of the class.

Course Schedule

Highlighted dates indicate *midterm (blue)* and *quiz (red)* dates.

Note: this outline is tentative and will be updated as we progress.

| Dates | Content | Reading | Tutorial Topic |
|--------------------|---|-------------------------------|----------------------------------|
| Sept 7,9 | Introduction Natural Selection Mutation | 1.1–1.3 3.2–3.4 5.1–5.4 | No tutorial |
| Sept 12,14,16 | Migration Drift Evolutionary genetics | 7.1 7.2 6.1, 6.2, 6.4 | Introduction to R |
| Sept 21,23 | Inbreeding Phylogenetics | 7.4 4.1-4.4 | Queen's funeral No tutorial |
| Sept 26,28 | Adaptation | 10.2–10.4, 10.6–10.7 | Hardy-Weinberg, Dice rolling |
| Oct 3,5,7 | Neutral theory Midterm 1 | 7.3 | Lemur phylogenetics |
| Oct 12,14 | Sex and recombination | 8.1, 8.3 | Thanksgiving No tutorial |
| Oct 17,19,21 | Quantitative genetics | 9.1–9.7 | Review midterm 1 |
| Oct 24,26,28 | Sexual selection Life-history | 11.1–11.6 13.1–13.6 | Student height data analysis |
| Oct 31 Nov 2,4 | Cooperation / Conflict Midterm 2 | 12.1–12.5 | No tutorial |
| Nov 7,9 | Genome evolution | 15.1–15.4 | No tutorial |
| Nov 14,16,18 | Speciation | 16.1–16.4 | Review midterm 2 |
| Nov 21,23,25 | Origins | 17.1–17.4 18.3–18.6 | Fly genetic distance plotting |
| Nov 28,30 Dec 2 | Human evolution History/Society | 20.1-20.3 | No tutorial |
| Dec 5 | Midterm 3 | | No tutorial |

- Midterms and quizzes are closed book, closed notes, unless instructed otherwise.
- No makeup assignments or quizzes will be given.

- Midterm 1 covers lecture slides –10 (everything up to and including “Adaptation”).
- Midterm 2 covers lecture slides 11 – 20 (Neutral theory up to and including Life History Theory).
- Midterm 3 covers lecture slides 21– (everything from Cooperation onwards).

The following Table indicates figures (from Evolutionary Applications, 5th Edition) that should be considered “essential” material for understanding course material. You should be able to understand and explain the following figures to someone (as well as those we have covered in lecture). Note that for sections we have not yet covered in class, these are tentative.

| Midterm 1 | |
|------------------|--|
| Chapter | Figures |
| 1 | 1.1, 1.8, 1.10, 1.11, 1.13, 1.15, 1.29 |
| 3 | 3.4, 3.6, 3.7, 3.10, 3.11, 3.13–3.16 |
| 4 | 4.2–4.14, 4.18, 4.19, 4.22, 4.23, 4.28, 4.29, 4.31 |
| 5 | 5.11–5.14, 5.21, 5.22, 5.25–5.30, 5.32–5.34, Computing Consequences Box 5.2 |
| 6 | 6.2–6.15, 6.20, Computing Consequences Box 6.3 |
| 7 | 7.1, 7.2, 7.15–7.17, Computing Consequences Boxes 7.3, 7.4 |
| 10 | 10.6–10.8, 10.11, 10.15–10.17, 10.19, 10.33, Computing Consequences Box 10.1 |
| Midterm 2 | |
| Chapter | Figures |
| 7 | 7.21–7.30, 7.37, Computing Consequences Box 7.5 |
| 8 | 8.2–8.14, 8.18–8.19, 8.26–8.31, Computing Consequences Box 8.1 |
| 9 | 9.1–9.11, 9.14, 9.16–9.19, 9.25–9.27, 9.30, 9.31, 9.34 |
| 11 | 11.6, 11.8, 11.10, 11.12, 11.14, 11.16–11.18, 11.24, 11.25, 11.27–11.32, 11.35, 11.40–11.44 11.48, 11.49 (note: legend for lines is reversed - solid is with null MS), 11.50, 11.51 |
| 13 | 13.2–17, 13.19, 13.20, 13.22–13.28, 13.30–13.32, 13.34–13.36, 13.37, 13.39 |
| Midterm 3 | |
| 12 | 12.3, 12.7, 12.8, 12.11–12.14, 12.18–12.25, 12.29–12.33, 12.37 Computing Consequences Box 12.2 |
| 15 | 15.1–15.4, 15.7, 15.8, 15.10, 15.12–15.19, 15.24, 15.26. 15.27, 15.33 |
| 16 | 16.1–16.4, 16.6–16.11, 16.13–16.26 |
| 17 | 17.1, 17.7, 17.9, 17.10, 17.16–17.20 17.24, 17.30–17.34 |
| 18 | 18.27, 18.33, 18.34, 18.37, 18.41, 42, 18.43, 18.44 |
| 20 | 20.1–20.7, 20.9, 20.12, 20.13, 20.29–20.32, 20.34–20.38 |