Deployed site: https://aroles.github.io/biol322/

Welcome to BIOL 322, Spring 2026!

All course materials will be provided via this website or links therein.

Syllabus

Lecture Instructor

Angie Roles (she/her)

Office: Science Center A134

Email: aroles@oberlin.edu

Cell: 443-695-1680

Drop-In Student Hours

MTW 2:00-3:30pm, or email for appointment. Sign up for student hours here.

Student Hours are times that I have set aside specifically to meet with students. I will be in my office and available – you can sign up for a slot on my gcal or just stop by and give the door a knock! You can drop in by yourself or bring friends; you may have specific questions or just want to say hi – any reason is good enough. If you aren't available during these intervals, I'm happy to find another time that works – just email me with some times you are available.

Class Meetings

Regular meetings: MWF 10:00-10:50 am in SCTR A155.

Lab: W 2:30-4:20pm in SCTR A262. This is the computer lab across the hall from Love Lounge.

Course Description

The evolution of phenotypic traits results from the action of selective and non-selective forces on the distribution of genetic variation within and among populations. We will use mathematical and computational models to study adaptation and the genetic architecture of complex traits in the context of natural populations. These evolutionary approaches have critical applications in the study of disease, conservation biology, agriculture, and the response to climate change. Labs are computer-based and focused on modeling. Prerequisites: BIOL 200 or 210/211. Attributes: 4NS, QFR.

Course Objectives

Students completing this course will:

- Gain knowledge of and appreciation for topics in evolutionary genetics.
- Learn to develop and evaluate computational evolutionary models.
- Practice reading and understanding scientific literature.
- Improve scientific writing and oral communication skills.
- Gain a deeper understanding of critical thinking as applied to evolutionary genetics.
- Practice carrying out open-ended, investigative research projects.

Statement on Accessibility and Inclusion

Central to this course is an understanding and appreciation of how diversity is generated and maintained in nature. In line with that value, I aim to make this course accessible and inclusive of all students. Each individual brings with them a unique set of experiences which inform their perspective when interacting with others and learning new information. All are welcome in this class and expected to put in the work to learn more than you knew coming in. You have the right to ask for assistance, access, or additional resources to meet your learning needs. If you find yourself unable to fully access the course in any way, you are welcome to contact me to discuss your needs. During the first week of classes, we will discuss community norms to guide us in our interactions.

In case of emergency... Should circumstances arise that prevent you from fulfilling your responsibilities, such as completing exams on time or making it to lab, you should contact me ASAP. If you anticipate issues or conflicts arising in advance, please contact me so that we may make arrangements.

Course Materials

Conservation and the Genetics of Populations, 2nd ed. (2013) by FW Allendorf, G Luikhart, and SN Aitken, published by Wiley-Blackwell, is required for this course. It is available in the bookstore or may be ordered online. The College library has access to an electronic version of the text, available here.

I will be providing PDFs of additional reading material, some from textbooks, some primary literature. Below I list several suggested texts that are good references when you need more information about a topic.

All course materials are available via links within this webpage. There is no Bb site for this course.

Suggested References:

- Conner, JK and DL Hartl. 2004. A primer of ecological genetics. Sinauer Associates, MA.
- Futuyma, DJ. 1998. Evolutionary biology. 3rd ed. Sinauer Associates, MA.
- Neal, D. 2004. Introduction to population biology. Cambridge University Press, Cambridge, UK.
- van Emden, H. 2008. Statistics for terrified biologists. Blackwell Publishing, MA.

Honor Code

You are expected to adhere to the Oberlin College Honor Code in this course.

1. Unless otherwise indicated, you may discuss assignments with your classmates but your written work must be your own, with proper citation and credit for sources used (when appropriate).
2. You should include the honor pledge and your signature on all submitted work. Digital signatures (initials) are acceptable.

I am required to report any suspected violations of the Honor Code to the Honor Committee. Independent of any deliberations of the Honor Committee, in this course suspected violations of the Honor Code may result in a non-passing final grade in the course. More information on the Oberlin Honor Code may be found here: http://new.oberlin.edu/students/policies/honor-system-charter.

Use of Artificial Intelligence (AI)

The Oberlin Honor Code charter specifies that using AI in courses is considered cheating when, "Utilizing artificial intelligence software or other related programs to create or assist with assignments on the behalf of a student unless otherwise specified by the faculty member and/or the Office of Disability & Access."

Generally, using AI to write any assignments in this course is not appropriate. However, use in helping to write or troubleshoot code can be useful. We will discuss the nuances of this in class, considering the potential benefits, pitfalls, and abuses of AI. Use of AI for coursework is only permitted when expressly allowed by Angie; for any other uses, not specified, seek approval from Angie.

Resources Offering Support

Angie is available for individual consultation during student hours or by appointment. If you are looking to improve your performance or are struggling in ways new to you but not sure how to proceed, I am happy to discuss and provide suggestions.

- Students who have been approved by the Office for Disability and Access (Peters Hall 127) for accommodations should speak with the instructors to ensure that your needs are being met in this course. Please reach out in advance so that we may make appropriate arrangements before they are needed.
- Peer Tutors are available - for free - through the Academic Advising Resource Center (AARC), https://www.oberlin.edu/aarc/peer-tutoring or email peertutoring@oberlin.edu. You are encouraged to arrange for a tutor as soon as you like.
- The Executive Functioning Program offers peer tutors, freely available through the ODA office. If you struggle with planning and organization skills, you might contact this program!
- Additional support is available via the CLEAR Quantitative Skills Drop-in Tutoring Center (Science Center K100). They can assist students with math skills, statistics, computer software like Excel, or programming languages. No appointment is necessary.
- Health & Wellbeing: The offices of Student Health Services and Counseling and Psychological Services are located in Dascomb Hall, Suite B. Services are free and drop-in hours are available.

Assessment via Contract Grading

In this course, we use contract grading, a method of assessment in which you write a contract laying out the work you will complete (to a satisfactory level) in order to earn the grade you desire. I will provide a template contract, requesting you to complete portions of it and you will submit it for my agreement by the end of the first week of class (Fri Feb 6).

Your written contract will describe: * how completed work lines up with expectations for each grade, * due dates for work to be turned in, * the consequences for you if you do not meet the expectations you set.

I choose to use contract grading to provide you agency over your grade and to enable you to focus on learning rather than grades. For details, see the template grade contract. We will also discuss this in class.

Assignments

All assignments will be turned in electronically, via Google Forms.

Participation You are expected to actively participate in this course. This includes doing the assigned readings in advance of class, attending class, asking and answering questions posed during class or discussions, and actively discussing assigned readings during class meetings.

Reading Questions They are intended to guide your reading of the text. It's recommended that you complete them on your own earlier in the week, before attending class. During class meetings, we will

frequently discuss the assigned questions. It's suggested that you turn these in weekly but you will choose the regular due date in your grade contract.

Short-answer Exams All exam questions will be take-home, open-note, and open-book (but you may not consult sources that were not specifically used in the class and you may not work with others). Questions are grouped into 4 exams (A, B, C, D), each with suggested due dates. Actual due dates will be specific to your grade contract.

Lab Exercises For the first half of the semester (7 lab meetings), you will work in assigned groups to create and then evaluate the assigned model each week. These assignments will also help you to practice the skills you are developing and to explore the use of models to address and study a question. Each individual should write up and turn in their own lab report, suggested to be due within one week of the lab exercise.

Modeling Project & Presentation In a group of 2-3 students, you will develop a computational model to address an open problem/question in evolutionary genetics. This will require some initial literature review and your project topic must be approved by me. One objective of this assignment is to improve your comfort and facility with using modeling approaches to gain a general appreciation of the value of this approach. A second objective is practice of research skills and learning how to ask and address research questions to gain a deeper understanding of a subject. The results of your project will be presented to the class, informally, at the end of the semester (May 6, final meeting of the lab).

Expected Weekly Schedule

Date	Topic/Reading	Lab
M Feb 02	Course Introduction	
W Feb 04	Ch 1. Genetics and conservation	Lab 1. Intro to modeling software
F Feb 06	Ch 2. Phenotypic variation	
M Feb 09	Ch 3. Genetics Variation I	
W Feb 11	Ch 4. Genetic variation II	Lab 2. Hardy-Weinberg
F Feb 13	Ch 5. Hardy-Weinberg principle	
M Feb 16	Discussion of human genetic diversity	
W Feb 18	Ch 6. Genetic drift	Lab 3. Drift
F Feb 20	Tasmanian devil paper(s)	
M Feb 23	Ch 7. Effective population size	
W Feb 25	Wallaby N_e papers	Lab 4. Selection
F Feb 27	Ch 8. Natural selection	
M Mar 02	Discussion of selection on skin pigmentation	
W Mar 04	Ch 9. Population subdivision	Lab 5. Gene flow
F Mar 06	Discussion of selection and drift in watersnakes	
M Mar 09	Ch 10. Multiple loci	
W Mar 11	Continue Ch 10. Multiple loci	Lab 6. Multiple loci
F Mar 13	Discussion of shifting balance theory	
M Mar 16	Ch 11. Quantitative genetics	
W Mar 18	Discussion of genetics of mouse behavior	Lab 7. Inbreeding
F Mar 20	Ch 12. Mutation	
M Mar 23	SPRING BREAK WEEK – NO CLASSES	
M Mar 30	Discussion of cancer evolution	
W Apr 01	Ch 13. Inbreeding depression	Modeling projects
F Apr 03	Discussion of epigenetics and inbreeding	
M Apr 06	Ch 14. Demography and extinction	
W Apr 08	Continue Ch 14. Demography and extinction	Modeling projects
F Apr 10	Florida panther papers	
M Apr 13	Ch 15. Metapopulations and fragmentation	
W Apr 15	Ch 16. Units of conservation	Modeling projects
F Apr 17	Ch 17. Hybridization	

Date	Topic/Reading	Lab
M Apr 20	Discussion of hybridization and conservation	
W Apr 22	Ch 18. Exploited populations	Modeling projects
F Apr 24	Discussion of harvest-induced evolution	
M Apr 27	Ch 19. Conservation breeding and restoration	
W Apr 29	Ch 20. Invasive species	Modeling projects
F May 01	Discussion of assisted migration	
M May 04	Ch 21. Climate change	
W May 06	Discussion of climate change evolution	Model presentations
F May 08	Ch 22. Genetic identification and monitoring	
May 9-12	Reading Period	
May 13	Final exam, due at 9pm	