

Angie Roles (she/her/hers)

Lecture Instructor,
Tuesday Lab Instructor

Science Center A134
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Office Hours: M 2-3:30 p.m., T 10-11:30
a.m., W 11-noon, F 11-noon, or by ap-
pointment

Mike Moore (he/him/his)

Wednesday Lab Instructor

Science Center K111
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Office Hours: posted outside office or by
appointment

Class Meetings

Lecture: MWF 10-10:50 a.m. Science Center A155

Lab: T or W 1:30-4:20 p.m. Science Center K119

Enrollment in both lecture and laboratory is required of all students.

Course Description

This course provides biology majors and others with an integrated introduction to key principles of ecology and evolution, including selection, drift, sources of variation, and patterns of diversity, as well as factors and processes governing biotic and abiotic interactions that influence the distribution and abundance of organisms. Labs feature indoor and field exercises and discussions designed to develop critical thinking and quantitative skills in data collection, analysis, and interpretation. Field trips required. Prerequisites: BIOL 100. Attributes: 4NS, QFR.

Course Objectives

Students completing this course should be able to:

- Understand and apply fundamental evolutionary and ecological concepts.
- Apply all parts of the scientific method to ecological and evolutionary questions.
- Appreciate the nature of variation and the importance of stochasticity in natural systems, across levels of organization from the molecule to the ecosystem.
- Be aware of the broad diversity of life, past and present, and the major patterns of life through time.
- Interpret graphical presentations of empirical relationships and theoretical models.
- Employ basic techniques of field biology.
- Begin to use and appreciate basic statistical methods.
- Recognize the relationship of biology to other sciences, disciplines, and society.

Required Texts

- *Principles of Biology* published by Nature Education This text serves as a source reference for topics covered in lecture and lab. Modules will be assigned for reading *before* lecture meetings. You should find the search function, index, text, and figures

very useful in studying material emphasized in lecture and lab. This is an electronic textbook which you purchase the right to access. You may also purchase it in hard copy. Access codes are available in the bookstore or may be purchased from the publisher's website when you create your account (register at <http://www.dynamicbooks.com> and enroll using the Course Catalog link).

- *Epigenetics: How Environment Shapes Our Genes* by R.C. Francis (2011, W.W. Norton & Company, Inc.)

This nonfiction book is aimed at a general audience and will help you to better understand the complex connections and feedbacks between genetics, inheritance, cellular/molecular processes, and environmental conditions. You will be assigned readings from this book to complement the readings from *Principles of Biology*. This book is available from the bookstore.

Grading

Component	Number	Each	Weight
Midterm Exams	4	13 %	52 %
Comprehensive Final Exam	1	13 %	13 %
Reading Questions	24	0.25 %	6 %
Laboratory Prep Quizzes	10	0.5 %	5 %
Laboratory Assignments	11	2 %	22 %
Seminar Report	1	2 %	2 %
		Total	100 %

Course Policies

Honor Code

You are expected to sign the Honor Code:

1. On exams and quizzes, affirming the work is your own, without giving or receiving aid;
2. On literature analyses and seminar reports, affirming that the work is your own and that you have cited references accurately;
3. On lab assignments, affirming that you have worked only with classmates and have used only course material provided to you for the current academic term.

Your instructors are 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 grade of zero on any relevant assigned work. More information on the Oberlin Honor Code may be found here: <http://new.oberlin.edu/students/policies/honor-system-charter>.

Support Services

- All instructors are available for individual consultation during office hours or by appointment. Available times are posted at the instructors' offices.
- The [OWLS \(Oberlin Workshop & Learning Sessions\)](#) available for this course are Kathy LaTourrette and Juan Contreras. The OWLS organize weekly sessions (Sun and Thu 8-9:30p.m. in A254) to support students in both “what to learn” and “how to learn”.
- Students who have been approved by [Student Academic Services](#) (Peters Hall 118) for special exam arrangements must make appropriate arrangements with Ms. Roles one week prior to the first exam.
- Tutors are available through Student Academic Services (Peters Hall 118). This service is free and you are encouraged to arrange for a tutor as soon as you like.
- The [Writing Center](#), located in Mudd 101A, has peer writing associates who can assist students at all stages of the writing process.
- The [Quantitative Skills Drop-in Tutoring Center](#) is located in the Science Library (Room N175) and can assist students with math skills, statistics, computer software like Excel, or programming languages. No appointment is necessary. Fall 2016 hours are: Sun-Thu 7-11pm (closed Friday and Saturday).

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Technology-in-the-Classroom

Audio or video recording of class sessions - of any duration - is prohibited without the written consent of the instructor.

You are encouraged to take notes by hand rather than using a laptop or tablet, though use of a tablet or laptop is not prohibited. If your use of technology becomes a distraction to your classmates or instructors, you may be asked to discontinue that usage out of respect for needs of others.

Absence/Lateness

All course work is expected to be completed on time – late work is not accepted. If circumstances arise making it difficult to complete work in a timely fashion, you may request an extension from your instructor (Ms. Roles for lecture or T lab and Mr. Moore for W lab). Requests for extensions MUST be submitted in advance of an assignment's due date, except in case of emergency.

Lecture:

- Exams: Extensions or make-up exams will be granted only under extreme circumstances, e.g. serious health issues or major conflicts. In case of the anticipated issues or conflicts, you must clear the situation well in advance with Ms. Roles. In case of unexpected circumstances, contact Ms. Roles as soon as possible.
- Reading Questions: Must be completed via Blackboard before the start of class. Late submissions will not be accepted.

Laboratory:

- Attendance: Laboratory exercises are different each week and may involve group work or field trips. If you must miss your lab during a given week, you must make arrangements with your lab instructor *in advance*.
- For every lab missed lab or late arrival (past 1:35 p.m. as determined by instructor), 1% will be deducted from the final grade.
- Preparatory Quizzes: Must be completed via Blackboard by noon on lab day. Late assignments will not be accepted.
- Assignments: Lab assignments are due in lab by 1:35 p.m. on lab day. Late assignments will not be accepted.

Assignment Descriptions

Assignments will be turned in either electronically or in hard copy, as specified by your instructor.

Midterm Exams: Each lecture exam will focus primarily on recent material, though a solid understanding of material covered earlier remains important and useful in later exams. Exams may include the following types of questions:

- Multiple-choice or True/False problems requiring knowledge and comprehension skills
- Short—one or two sentence—problems that are more complex and require some application and analysis skills
- Problem solving, such as genetics problems to determine genotype frequencies which require comprehension, analysis, and evaluative skills
- Short paragraph essay problems that require analysis, synthesis, and evaluative skills

All questions regarding exam grades must be resolved within two weeks of the date the exam is returned.

Comprehensive Final Exam: The comprehensive final exam will focus specifically on synthesis and evaluation, spanning topics visited throughout the semester and emphasizing connections among them. Knowledge and comprehension of the semester's material will be critical but insufficient for success on the final exam.

Reading Questions: For each Monday and Friday lecture meeting, I will assign a few questions relevant to the day's topic that must be completed on Blackboard before the start of the class period. These assignments will be graded for completion with no credit for late submissions (2 pts = fully completed; 1 pt = partially completed; 0 pts = missed, late, or less than 25% completed). The purpose of this assignment is to help you prepare for the day's lecture by encouraging you (1) to do the reading in advance of class and (2) to think about the reading before we discuss it in lecture. This preparation will increase your absorption and depth of understanding of the course material. Your 3 lowest scores will be dropped.

Laboratory Prep Quizzes: Each week of lab, there will be a short quiz based on the lab exercise for that week. The quiz must be completed via Blackboard before noon on your lab day. The purpose of this assignment is to help you prepare for the day's lab by

encouraging you (1) to do the reading in advance of lab and (2) to think about the lab before we begin working on it together. This preparation will increase your absorption and depth of understanding of the course material.

Laboratory Assignments: These will be due at the beginning of a lab period and must be turned in before 1:35 p.m. Late assignments will not be accepted. Lab assignments may include a completed handout from the previous week's lab, a problem set, or other written assignment. Lab assignments will generally be turned in as a hard copy unless otherwise noted. The purposes of these assignments are (1) to give you practice in working with and thinking about the topics of the course, (2) to practice and improve your quantitative and formal reasoning (QFR) skills, and (3) to prepare you to delve deeper into topics during lab exercises.

Seminar Report: For this assignment, you will attend one approved seminar during the fall semester and write a response paper that summarizes the seminar as well as reflects on your thoughts about the seminar. The instructors will announce upcoming approved seminars and provide you with a rubric with detailed instructions on writing the Seminar Report. If you find a seminar not on the approved list that may qualify, you must seek pre-approval of your lab instructor to ensure credit for the assignment. The purposes of this assignment are to (1) experience a standard way in which scientists explain their research to others, (2) make the connection between the science and the people who do science, and (3) practice contextualizing specific research topics within a broader framework.

Expected Lecture Schedule – Fall 2016

POB = *Principles of Biology* modules

Epigen = Chapters from *Epigenetics: How Environment Shapes Our Genes*

	Date	Lecture Topic	Reading
	M Aug 29	1. Diversity and Unity	POB 1. Evolution and Life on Earth 2. Energy and Matter
1	W Aug 31	2. Cells and Endosymbiotic Theory	POB 13. Cells 14. Eukaryotic Cells 24. Biological Energy Transfer 74. Early Evolution of Life
	F Sep 02	3. Chromosomes and DNA	POB 41. Chromosome Theory 44. DNA 47. Chromosomes
	M Sep 05	<i>Labor Day (no class)</i>	
2	W Sep 07	4. Mitosis, Meiosis, and Life Cycles	POB 35. Inheritance in the Sexual Life Cycle 36. Meiosis and Sexual Reproduction Epigen Preface, Ch. 1, and Ch. 2 (29pp)
	F Sep 09	5. DNA Replication and Gene Expression	POB 45. DNA Replication 48. Gene Expression Epigen Ch. 3 (10pp)
	M Sep 12	6. Transcription & Translation	POB 49. Transcription 50. Translation Epigen Ch. 4 (16pp)
3	W Sep 14	7. Basic Inheritance	POB 38. Mendel's Principles 38. Mendelian Inheritance Epigen Ch. 5 (16pp)
	F Sep 16	8. Linkage	POB 42. Linkage Epigen Ch. 6 (12pp)
	M Sep 19	9. Complex Inheritance	POB 39. Non-Mendelian Inheritance Epigen Ch. 7 (16pp)
4	W Sep 21	Midterm Exam 1	
	F Sep 23	11. Population Genetics: Hardy-Weinberg	POB 65. Forces that Drive Evolution 67. Calculating Changes in Allele Frequencies Epigen Ch. 8 (12pp)

	M Sep 26	12. Mutation	POB	46. Mutations 66. Genetic Variation in Populations
			Epigen	Ch. 9 (14pp)
5	W Sep 28	13. Drift & Gene Flow	POB	71. Geographic Factors in Speciation
			Epigen	Ch. 10 (20pp)
	F Sep 30	14. Natural Selection & Nonrandom Mating	POB	68. Effects of Natural Selection
			Epigen	Ch. 11 and Postscript (22pp)
	M Oct 03	15. Quantitative Genetics	POB	TBD
6	W Oct 05	16. Speciation	POB	70. The Biological Species Concept 72. Pace of Speciation
	F Oct 07	17. Evolution & Development	POB	54. Cell Differentiation 76. Phylogenies 78. Evolutionary History Clues in the Genome and Molecular Clocks
7	M Oct 10	18. Genomics	POB	61. Genomics 62. Genome Diversity
	W Oct 12	<i>Yom Kippur (no class)</i>		
	F Oct 14	Midterm Exam 2		
Fall Break (Oct 17-21)				
	M Oct 24	19. Ecology Overview	POB	173. Ecology
8	W Oct 26	20. Animal Behavior	POB	169. Animal Behavior 170. Learning
	F Oct 28	21. Behavioral Ecology	POB	158. Animal Reproduction 171. Mate Choice
	M Oct 31	22. Population Growth	POB	178. Populations 181. Managing Populations
9	W Nov 02	23. Life History Strategies	POB	69. Interactions in Evolution 179. Life History Strategies
	F Nov 04	24. Species Interactions: Competition	POB	182. Species Interactions
	M Nov 07	25. Species Interactions: Symbiosis	POB	122. Plant Defense 186. Disease Ecology
10	W Nov 09	26. Species Interactions: Coevolution	POB	TBD

	F Nov 11	27. Community Ecology: Diversity	POB	183. Dominant and Keystone Species
	M Nov 14	28. Community Ecology: Stability	POB	184. Disturbance and Succession
11	W Nov 16	29. Community Ecology: Energy	POB	187. Energy and Biomass
	F Nov 18	Midterm Exam 3		
	M Nov 21	30. Patterns of Biodiversity	POB	185. Large-Scale Biogeographic Factors and Community Diversity
12	W Nov 23	31. Ecosystems: Productivity	POB	TBD
	F Nov 25	<i>Thanksgiving Holiday (no class)</i>		
	M Nov 28	32. Ecosystems: Nutrient Cycling	POB	188. Matter Cycles
13	W Nov 30	33. Biomes	POB	176. Terrestrial Biomes 177. Aquatic Biomes
	F Dec 02	34. Physiological Ecology	POB	31. C3, C4, and CAM Photosynthesis 125. Thermoregulation in Animals
	M Dec 05	35. Human Impacts on the Biosphere	POB	189. Human Impacts
14	W Dec 07	36. Climate Change	POB	174. Climate Change
	F Dec 09	37. Conservation Biology	POB	191. Conservation Biology 192. Landscape & Regional Conservation Ecological Restoration
	F Dec 16, 2-4 p.m. Exam 4 and Final Exam			

Lab Schedule – Fall 2016

Date	Lab	Assignment Due
Aug 30/31	1. Tree of life	
Sep 06/07	2. Tree Building I: UPGMA	(1) Completed Lab 1 handout
Sep 13/14	3. PCR and Inheritance	(2) Completed Lab 2 handout
Sep 20/21	4. Hardy Weinberg Equilibrium	(3) Completed Lab 3 handout and (4) Hardy Weinberg problem set
Sep 27/28	5. Population genetics	(5) Completed Lab 4 writeup
Oct 04/05	6. Molecular Phylogenetics	(6) Lab 5 Agony of Choice writeup
Oct 11/12	<i>Yom Kippur, no lab</i>	
Oct 17-21	Fall Break	
Oct 25/26	7. Detecting Competition Among Annual Plants I: Field Data Collection	(7) Completed Lab 6 handout
Nov 01/02	8. Detecting Competition Among Annual Plants II: Data Analysis	(8) R tutorial assignment
Nov 08/09	9. Invertebrate Community Diversity in Wetlands I: Data Collection	(9) Lab 8 analysis writeup
Nov 15/16	10. Invertebrate Community Diversity in Experimental Wetlands II: Data Analysis	
Nov 22/23	<i>Thanksgiving, no lab</i>	
Nov 29/30	11. Adaptive Morphology of N. American redbud trees (<i>Cercis canadensis</i>)	(10) Lab 10 analysis writeup
Dec 06/07	12. Ecological Models	(11) Lab 11 analysis writeup