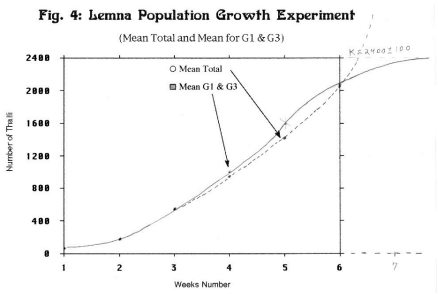
BI 213 GENERAL BIOLOGY III: POPULATIONS

Syllabus for Summer 2019

August 19 - September 13



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Office Hours and Tutor Sessions will be held in 112 Huestis

COURSE OVERVIEW

In this third term of the general biology sequence we build on concepts of how cells and organisms function to study the patterns and mechanisms of evolutionary change over the past 4.5 billion years that have led to the diversity of life that exist on earth today. We begin by examining mechanisms that cause genetic change in populations over time with a special focus on natural selection. We then examine the species concept and look at patterns of evolutionary change over long time periods. In the second half of the term, we examine ecological theory including different models of population growth and factors that regulate population growth in various organisms. We study ways in which two or more species interact, how ecological communities are formed and organized, and apply these ideas to current issues such as invasive species and loss of biodiversity. We end the term by examining how energy flows and nutrient cycle in ecosystems, how we have altered these functions, and consider the consequences of these changes for global biodiversity. Students participate in a field trip to collect data on plant diversity in a local forest which is used as the basis of understanding evolution of land plants, succession and diversity.
The goals for BI 213 fall into two general categories: (1) to learn the foundational concepts related to evolution and ecology (2) to build on the skills developed in BI 211, including critical thinking, quantitative reasoning, and the development of communication skills.

COURSE GOALS

There are two major kinds of goals in the general biology sequence. This session we emphasize:

Concept-based goals:

1. To identify the mechanisms that cause biological evolution in populations; to identify and explain the tenets of natural selection.
2. To apply the Hardy-Weinberg model to populations to investigate evolution.
3. To understand the connections between some of the major events in the history of life on earth.
4. To apply mathematical models to understand growth in populations; to describe the factors involved in regulating population growth.
5. To identify the important types of species interactions, such as competition and predation, that are important for shaping biological communities.
6. To describe diversity at the genetic, species, and functional level, including mathematical indices.
7. To become familiar with how communities changes across space and time. To describe how matter and energy flows through ecosystems and understand some of the major fluxes and stores in biogeochemical cycles.
8. To understand some of the ways in which humans have impacted the natural world.

Skill-based goals:

1. To develop competency in the basic terminology and methodologies used in the biological sciences.
2. To learn the process of scientific inquiry and its applications.
3. To learn how to learn about biology.
4. To learn to communicate knowledge, ideas and reasoning clearly and effectively in oral and written forms appropriate to the biological sciences; to prepare an oral presentation and practice public speaking.
5. To become familiar with the use of science relevant search engines, and learn to identify primary work; to develop the ability to think critically about information, evaluate the validity of arguments, and weigh the merits of disparate scientific conclusions.
6. To experience the collaborative nature of the biological sciences.

COURSE FORMAT

Lectures

(Monday, Tuesday, Wednesday and Thursday 9:00-10:50 in 16 Pacific)

You should do the assigned readings before coming to the lectures. During some of the lectures there will be activities that will help you to learn concepts; these will often be done collaboratively with students discussing the problem together for a few minutes before independently writing your own solution. You will not turn these in but your active participation will help you understand the material and prepare you for exams.

Lab/Discussion

(Tuesday AND Wednesday 12:00-1:50 OR 2:00-3:50 in 112 Huestis)

We consider the labs to be an integral part of the course. We have tried to design active learning experiences that will broaden your understanding of what ecology and evolution are about. Often you will be working in groups, posing questions, designing experiments or making observations, and presenting your findings in written or oral form. There will be labs dealing with natural selection, population genetics, plant biodiversity, phylogenetics, behavior, and island biogeography. Lab handouts will usually be turned in at the end of each lab. Each lab will be graded on a 10-point scale. Part of this grade will be based on participation in lab. ***Most labs cannot be made up because they involve special material or equipment. Late lab reports will not be accepted***. If you let us know in advance about a lab you cannot attend, it may be possible to attend another lab section. This is only an option if arrangements are made in advance and permission is granted from your instructors.

Clickers (Personal Response Systems)

Clickers will be used in almost every class to encourage participation and to provide valuable feedback to instructors and students. (The original iClicker or iClicker 2 will both work for this course.) Each student is expected to purchase a clicker for use in this class. You should register your clicker on the course Canvas site. Questions during lecture that require clickers will be multiple choice. Points will be earned two different ways: (1) 2-point questions: 2 points will be awarded based on participation alone, not on whether the question is answered correctly; (2) 4- point questions: 4 points for correct answer, 2 points for incorrect answer. Total percent for the clicker portion of your grade will be based on 85% of the total possible points: your clicker grade = total points earned/85% of total possible (not to exceed 100%).

Project

Working in groups of 2-3, you will do a class project culminating in an oral presentation given during one of the last two labs of the session. Projects will focus on a scientific issue pertaining to ecology or evolution. Projects, worth 20% of your grade, will consist of three parts: annotated bibliography (8%), presentation plan (2%) and a group oral presentation (10%, group grade). There will be no late presentations. Project guidelines, requirements, and suggested topics can be found in the course packet.
If you are retaking this course, you will not be allowed to resubmit issues project work from the previous time you took Bi213. The work you do this term must be original.

Post-lecture and Pre-lab Quizzes

The post-lecture quizzes will be posted on Canvas within a few hours after most lectures. The lecture questions will be based on the material you just learned in that lecture. The Pre-lab quizzes will be based on the upcoming lab and due before that lab. You will need to read the lab handout in order to answer the lab questions. See Canvas for due dates of the quizzes.

Problem Sets (not graded)
There will be practice problem sets that will be posted on Canvas during the term. It is very important that you work on these during each week. We will help you to understand how to solve these problems in the help sessions. The practice problems are very similar to the types of questions you will see on the exams (in fact, many of the problems are from past exams). The practice problems are designed to help you master the material needed to do well on the exams.

Field Trip
Each student will take a field trip with the class to the Mohawk Resource Natural Area to investigate succession of woody plants. The material covered on the trip is an integral part of the course. If you cannot attend the trip, you will be given an alternative assignment (see handout on Canvas): a 4-5 page paper on plant succession in Cascade forests that will be graded - Due within a week of the field trip. The field trip will take place on Thursday August 29th. We will depart campus after lecture at 11 a.m. and return no later than 7 p.m. ***Wear close-toed shoes and long pants to protect against brush, brambles, insects, etc.*** Bring plenty of food and water for lunch and snacks.

Exams
There will be a midterm exam and a final. All exams will be the same format: short-answer with occasional multiple choice or true/false questions. The final is cumulative. The exams will cover material from all aspects of the course including lectures, labs, the field trip, quizzes, readings and practice problems. Exams will be designed to probe a deep understanding of the concepts and principles discussed, and an ability to apply the concepts to novel situations rather than a memorization of detail. Exams cannot be made up. There will be no early or late exams given.
Midterm regrade policy To be fair to all students, it is essential that all exams be graded according to the same criteria. If you wish to submit a midterm for a regrade, you must use the following guidelines. You must submit a written statement within one week of the return of the exam, along with your original exam, explaining specifically why your answer merits a higher score. Keep in mind that we will regrade the entire exam and a regrade may result in a higher, lower, or unchanged score. Please do not abuse this system. We reserve the right to eliminate this option at our discretion.

EVALUATION

Component	% of Total Grade
Labs	**12**
Field Trip	**5**
Quizes	**4.75**
Clicker Scores	**3.25**
Exam (Midterm)	**25**
Exam (Final)	**30**
Project	**20**

Posting of Grades
Scores for assignments and exams will be posted on Canvas. Check your scores every time we post them, as you will have only one week after the posting to notify us about mistakes or omissions.

COURSE POLICIES

Learning Environment
At the University of Oregon, we are working to create inclusive learning environments. (more info at http://aec.uoregon.edu). Please notify us if there are any aspects of the instruction or design of this course that result in barriers to your participation. You may also wish to contact the UO Accessible Education Center in 164 Oregon Hall at 346-1155 or uoaec@uoregon.edu.

Professional Conduct
We will work hard to make this course valuable to your learning. We welcome suggestions from you at anytime about things you think could be done to improve the course. In return, we ask that you arrive to lab and lecture on time and stay until class is over without making unnecessary noise that could distract your classmates. **Please put away and do not use your own computers, cell phones, or other electronic devices during lecture or lab.** Computers are not a very good way for taking notes in biology courses and they are distracting to other students.
Cheating devalues the reputation of our institution, its faculty, its students, and your academic degree. Academic misconduct is particularly unfair for students who do their work with integrity and honor. The University Student Conduct Code (https://studentlife.uoregon.edu/conduct) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students' obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at https://researchguides.uoregon.edu/citing-plagiarism. We want you to learn and to do well in the course, but we will not tolerate academic dishonesty. Sanctions for academic dishonesty will be a lowering of the final grade or failure. If you find yourself in trouble, or if you are aware of academic dishonesty occurring, please talk to one of the instructors.

Personal crises do happen.
If you are having difficulties that are interfering with your ability to do well in the class, please tell an instructor as soon as possible. We may be able to refer you to someone for help or to make special arrangements if the need is real and if you have done your best to deal with the situation in a timely manner. There is a crisis center on campus

that you should not hesitate to call if you, or a friend, are in need of assistant. Their phone number is 346-4488.

Finally, we promise to respect you as students and as individuals, and ask that you return that respect to us and to your fellow classmates.

COURSE MATERIALS

Calculator You will need a scientific calculator capable of doing natural logarithms and square roots for use on problem sets, in lab, and on exams. Calculators that have the ability to store text will not be allowed. Cell phone calculator-apps cannot be used during exams.

iClickers The original iClicker or iClicker 2 will both work for this course.

Textbook The text, *Biological Science,* 5th or 6th edition (4th ok, but not recommended—you will be responsible for determining the appropriate reading by comparing to a later version on reserve) by Scott Freeman, should be used as a general reference. The readings include background material useful for preparing you for lecture and for studying for exams. We don't expect you to remember all the details in the text. A good strategy would be to skim over the entire chapter first, concentrating on the major concepts, then to read more carefully the specific pages that are assigned. There are copies of the text on reserve in the Science Library.

Course Packet The packet is available in the UO Bookstore. It includes lab handouts that you will need in order to answer pre-lab quiz questions and to complete the lab. A copy is also available in the Science Library. You are required to bring lab handouts to each lab.

Journal Articles These articles will be used in lectures, homework problem sets and exams. They are listed in the order in which you will read them. See the reading list for specific dates. They will be available on the Bi213 course Canvas site.

Natural Selection and Population Genetics

Rennie, J. 2002. 15 common misconceptions about evolution (excerpted from a slightly longer article). Scientific American 287(1): 78-85.

Earth History

Leslie, M. 2009. On the origin of photosynthesis. Science 323: 1286-1287.

Pollard, K.S. 2009. What makes us human? Scientific American 300(5): 44-49.

Behavior

Dugatkin, L.A. 1997. The Evolution of Cooperation. Bioscience 47(6): 355-362.

Conservation Biology

Worldwatch Institute. 2002. The Plight of Birds. Available at:

Ecosystems

Environmental Protection Agency. 2009. Frequently asked questions about global warming and climate change: back to basics.

IPCC (Intergovernmental Panel on Climate Change). 2013. IPCC Fifth Assessment Report (AR5). 'Summary for Policymakers'.

SCHEDULE

WEEK	DATE	LECTURES	LABS
1	**8/19**	L1: Mechanisms of evolution - natural selection; Darwin's finches	
1	**8/20**	L2: Population genetics - Hardy-Weinberg; forces of evolution	**Lab 1** Artificial Selection ('AS') 1: Survey trichomes of P_o; Plant evolution & diversity; *Introduction to issues project*
1	**8/21**	L3: What is a species? - species concepts - speciation, isolating mechanisms	**Lab 2** Population genetics; Allele frequency modelling *Topic choices for project due*
1	**8/22**	L4: Using phylogenetics to understand evolution	
2	**8/26**	L5: Earth history and the origins of life - major events - evolutionary trends in the plant kingdom	
2	**8/27**	L6: Behavioral biology	**Lab 3** Phylogenetics & plant diversity *Annotated bibliography due*
2	**8/28**	L7: Population ecology I - growth models	**Lab 4** Honey bee behavior; Plan for field trip
2	**8/29**	**Midterm exam (Lectures 1-6 & Labs 1-4)**	
2	**8/29**	**FIELD TRIP TO MOHAWK (11:00-19:00)**	
3	**9/2**	**NO CLASS (Labor Day)**	
3	**9/3**	L8: Population ecology II - regulation, human populations	**Lab 5** 'AS' 2: Survey trichomes of F_1; Population growth
3	**9/4**	L9: Community ecology I - introduction, species interactions	**Lab 6** 'AS' 3: Data analysis; Presentation preparation
3	**9/5**	L10: Community ecology II - keystone species, ecological succession	
4	**9/9**	L11: Community ecology III - biodiversity, conservation biology	
4	**9/10**	L12: Ecosystems I - productivity, energy flow	**Lab 7** Presentations
4	**9/11**	L13: Ecosystems II - nutrient cycles, global change	**Lab 8** FINAL REVIEW
4	**9/12**	**FINAL EXAM (cumulative)**	**END OF THE TERM** Enjoy your break!

Non-discrimination Policy

The University of Oregon affirms the right of all individuals to equal opportunity in education and employment, without regard to race, color, religion, sex, gender, age, handicap, national origin, sexual orientation, or any other extraneous consideration not directly and substantively related to effective performance.