BI 213 General Biology III: Populations

Syllabus for Spring 2021

Instructor: Dr. Peter Wetherwax

Remote Version of Bi213

This syllabus is based on the assumption that the entire course will be conducted remotely. We, of course, hope that this isn't the case. If we are able to come back to campus then we will make modifications and let everyone know of our plans moving forward.

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 online activities through the term to help them explore fundamental ideas in evolution and ecology.

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 and quantitative reasoning.

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 be able to distinguish between species concepts; to identify how and why scientists classify the organisms 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.

Course Format

Modules

The course will be divided into 9 weekly modules that consist of 4 major areas of evolution, a midterm and then 5 major areas of ecology (see schedule below). The materials for each module will be made available on Canvas by Monday of each week (or the preceding weekend). During each week, from Monday-Thursday, you will be asked to do a number of different activities (some graded) including:

- readings from the textbook, *Biological Sciences* by Freeman
- videos of lecture slides (and associated questions)
- online activities

The activities may have due dates during the week but you will always have advance notice of when they are due. No activities need to be done at a specific time (i.e., no synchronous lectures). You can complete them whenever it works

best for you, as long as they are completed by their due dates/time. All activities need to be completed by the end of the day on each Thursday.

Every Friday there will be an online quiz on the material covered in that week's module. The quizzes will be timed (approximately 45 minutes) and will need to be completed each Friday between 6am and 6pm Pacific Standard Time. For students allotted more time from the AEC office, we will allow that additional time for completion of the quizzes and exams.

Problem Sets (not graded) There will be practice problem sets that will be posted on Canvas for each module. It is very important that you work on these during each week. We will help you to understand how to solve these problems via emails and online office hours. There will be questions on the quizzes and exams based on the practice problem questions.

Exams: Weekly Quizzes, Midterm and Final There will be 9 weekly quizzes, one midterm and a final. All exams will be the same format: multiple choice or short answer taken on Canvas. The weekly quizzes will be on the material from that week (not cumulative). The midterm will be on the first four weeks (Evolution) and the final will be cumulative with slightly more emphasis on weeks 6-10 (Ecology).

The exams will cover material from all aspects of the course including readings and online activities. They will be open-book, open-notes but not "open-friends". We expect everyone to do their own work on the exams. Getting help from others, or giving help to others, is a violation of the academic integrity guidelines of the University. Individuals who don't adhere to these guidelines may receive a failing grade for the entire course. We are relying on everyone to conduct yourself with integrity.

Everyone will not get the exact same questions for the quizzes and exams. While the quizzes and exams are open-book, open-notes: you should be able to answer the questions without referring to your notes. The tests will be timed so you will not have time to learn about a topic while taking the exam. You will be expected to be able to answer the questions unaided, just like the types of exams you have had in past general biology courses. You will answer questions one at a time and not be given the opportunity to go back to previous questions. 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. **There will be no early or late weekly quizzes, midterms or final exams given. Everyone is required to take the final on Thursday June 11th at 10:15 AM PST.**

Evaluation

Component	Total Pecentage
Weekly Modules (9 total, 6% each) 4% each week for material submitted Monday - Thursday 2% for each Friday quiz (anytime between 6am and 6 pm PST)	54%
Midterm Friday of week 5 (May 1st, anytime between 6am and 6pm PST)	20%
Final Exam (Thursday, June 11th, 10:15-12:15)	26%

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

Course Materials

- ***Calculator*** You will need a scientific calculator capable of doing natural logarithms and square roots for use on online activities and exams.
- ***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. You are responsible for all of the assigned readings and this material will show up on quizzes and exams.

Schedule

Week	Date	Topics	Friday Quiz
1	3/30 to 4/2	Module 1: Natural Selection	**4/3**
2	4/6 to 4/9	Module 2: Population Genetics	**4/10**
3	4/13 to 4/16	Module 3: Forces of Evolution	**4/17**
4	4/20 to 4/23	Module 3: Species Concepts and Phylogenetics	**4/24**
5	4/27 to 4/30	Module 4: Behavioral Ecology	**5/1**
6	5/4 to 5/7	Prepare for Midterm Week	**5/8**
7	5/11 to 5/14	Modeule 6: Population Ecology and Growth	**5/15**
8	5/18 to 5/21	Modeule 7: Limits on Population Growth	**5/22**
9	5/25 to 5/28	Module 8: Community Ecology	**5/29**
10	6/1 to 6/4	Module 9: Disturbance and Succession	**6/5**
Finals	6/11	**Cumulative Final Exam on Thursday 10:15 -12:15**	

Assigned Readings from Textbook
(5th or 6th editions are recommended)

Week	6th edition		5th edition		Subject
	Ch.	**Pages**	**Ch.**	**Pages**	
1	**22**	435-437, 445-455	**25**	444-446, 453-463	evolution and natural selection
2-3	**23**	456-465, 469-479	**26**	465-475, 478-486	population genetics
3	**27**	540-541	**30**	554-555	sickle-cell anemia & malaria
4	**24**	480-495	**27**	489-502	species concepts and speciation
4	**25**	496-503	**28**	505-511	phylogenetics
	Bioskills 13	47-48	**BS7**	B10-B11	reading a phylogenetic tree
5	**50**	1051-1054, 1061-1062	**53**	1082-1085, 1091-1093	behavior ecology, communication in bees
5	**50**	1064-1067	**53**	1095-1098	altruism
7	**51**	1070-1079	**54**	1101-1108	population growth models
7	**51**	1079-1080	**54**	1108-1112	regulation of population growth
7	**51**	1084-1086	**54**	1115-1118	human population growth
8	**52**	1092-1103	**55**	1123-1135	species interactions
8	**51**	1081-1083	**54**	1113-1115	consumption
9	**52**	1111, 1113	**55**	1143, 1145	measuring diversity
	54	1140-1144	**57**	1173-1177	patterns of biodiversity
9	**52**	1107-1111	**55**	1138-1142	succession
21	**52**	1112-1113	**55**	1143-1144	Island biogeography
22	**52**	1103-1107	**55**	1137-1138	networks: keystone species
	54	1148-1149	**57**	1181	invasive species
23	**53**	1117-1120; 1123-1129	**56**	1149-1153; 1156-1162	ecosystem energetics; biogeochemical cycles
24	**49**	1039-1048	**52**	1068-1079	types of ecosystems
	53	1121-1123	**56**	1153-1156	productivity
25	**54**	1152-1154	**57**	1184-1187	diversity & ecosystem function
26	**53**	1129-1136	**56**	1163-1169	global change
	54	1145-1151	**57**	1178-1184	consequences of change
27	**54**	1156-1159	**57**	1189-1193	conservation

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Class Courtesy

Please arrive in class on time. Late arrivals distract the instructor and the other students. 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. Do not leave class early unless you have cleared it with the instructor in advance. Ask questions if you did not hear or understand something.

Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the quarter (or before) so that I may address you properly.

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities. Classroom courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Our classroom is a learning environment, and as such should be a safe, inclusive and respectful place. Being respectful also includes using preferred pronouns for your classmates. Disrespecting fellow students as well as combative approaches, tones and/or actions are not acceptable. Please make me aware if there are classroom dynamics that impede your (or someone else's) full engagement.

Academic integrity

All students will be expected to adhere to the University's guidelines on academic integrity as outlined in the Student Conduct Code: https://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code. As detailed in the policy, academic misconduct means the violation of university policy involving academic integrity. This includes cheating ("any act of deception by which a student misrepresents or misleadingly demonstrates that the student has mastered information on an academic exercise that the student has not mastered"), and plagiarism ("using the ideas or writings of another as one's own.") The instructor has a zero tolerance policy for academic dishonesty. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures.