Bi 213 General Biology III: Populations

Syllabus for Summer Session 2009

MUWH 10:00-11:50 Lecture, UH 1:00-2:50 Lab

Course website: https://blackboard.uoregon.edu

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Course Overview

In this third term of the general biology sequence we build on concepts learned in Bi 211 and Bi 212 to study processes and patterns that occur between different organisms and with organisms and their environments. Major areas of study include processes of evolution, evolutionary patterns, population genetics, population growth, species interactions and biodiversity, and factors affecting ecosystem productivity.

The course is designed primarily for students who are science majors, but is open to any student with knowledge of math (Math 95 or greater), chemistry (Chem 211 or higher), and genetics (Bi 211). Students who complete Bi 211 through 214 and have taken organic chemistry are eligible to take any of the 300-level biology courses. Biology majors must complete either this sequence (Bi 211 to 214) or the Foundations sequence (Bi 251 to 253).

Course Goals

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

concepts You will gain some basic knowledge about the fundamental concepts of ecology and evolution that will help you better understand Earth's biological history, how living organisms function and how human actions influence other life on the planet.

skills It is important for all citizens to be scientifically literate, whether or not they are practicing scientists. Part of literacy is the ability to find information, evaluate the information and communicate or act on that information. We will practice these skills in this course and will work on the ability to analyze and understand quantitative information (such as graphs).

science To learn to be a better scientist you will read papers from various sources and discuss not only the findings, but how the science was conducted. You will practice being a scientist by learning to form and test hypotheses (even in lecture), by doing experiments, by making observations, and by using models and simulations. You will gain an understanding of how ecologists and evolutionary biologists work. In particular, we hope you will come to appreciate that science is not just a body of facts, but a way of learning about the world.

Course Format

Lectures (Monday, Tuesday, Wednesday and Thursday 10:00-11:50 in rm 5 Klamath)
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 difficult concepts; these will often be done collaboratively with two or three students discussing the problem together for a few minutes before each independently writes a solution. You will not turn these in but your active participation will help you to better understand the material and prepare you for exams.

Lab/Discussion (Tuesday and Thursday 13:00-14:50 in rm 5 Klamath)
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 the science of biology is all about. Often you will be working in groups posing your own questions, designing experiments or making observations, and presenting your findings in written or oral form. There will be labs dealing with population genetics, plant diversity, phylogenetics, and behavior. In addition you will work with other members of the class on an issues project of your own choosing, which will be presented to your peers during labs 6 & 7 of the session. Lab handouts will usually be turned in at the end of each lab or at the beginning of class the following day (we will announce this during each lab). Each lab will be graded on a 5-point scale, with part of the grade based on participation in lab. Some labs cannot be made up because they involve special material or equipment. In some circumstances labs that involve computer exercises *may* be made up during office hours **only if arrangements are made in advance of the lab**.

Clickers (Personal Response Systems) Clickers will be used in almost every class to encourage participation and to provide valuable feedback to instructors and students. Each student is expected to purchase a clicker for use in this class. You should register your clicker on the course blackboard site. (If you've already registered your clicker this term, for another class, then you don't need to register it again.) Questions during lecture that require clickers will most likely be multiple choice or true/false. 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.

Problem Sets There are problem sets for some lectures that will posted to the course website. You will not turn these in for a grade but you will be asked to solve similar problems on the exams so it is to your advantage to do these problems. The solutions to the problem sets will be posted on the course website. We will be prepared during office hours to help you work through the problem sets.

Field Trip Each student will take a field trip with the class to Fall Creek to investigate succession of woody plants. The material covered on the trip is an integral part of the course.

Project Working in groups, you will do a class project culminating in an oral presentation the last two labs of the session. Projects will focus on a scientific issue pertaining to ecology or evolution. Projects, worth 25% of your grade, will consist of three parts: annotated bibliography (13%), presentation plan (2%) and a group oral presentation (10%, group grade). Each group will present their project in lab. There will be no late presentations. Project guidelines, requirements, and suggested topics are in the course packet.

Exams There will be a midterm and a final. All exams will include short-answer questions. The midterm and final are cumulative. The exams will cover material from all aspects of the course including lectures, labs, readings and problem sets. Your problem sets will help you to concentrate on the reading material that we think is particularly important as well as give you practice with the kind of questions you will see on the exams. (Many of the questions in the problem sets are from previous-years' exams.) 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. Everyone is required to take the midterm and final exam. Make your travel plans carefully as the final will not be given early and it is scheduled for the last day of class, Thursday August 13.

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 at lab and lecture on time and stay until class is over without making unnecessary noise that could distract your classmates (please turn cell phones off). Please read the student conduct code at the back of the time schedule; academic dishonesty includes cheating, plagiarizing (taking credit for the work of others) or knowingly supplying false information -- it is a serious offense. We want you to learn and to do well in the course, but we will not tolerate academic dishonesty. Sanctions for academic dishonesty may include a lowered or failing course grade. If you find yourself in trouble, or if you are aware of academic dishonesty occurring, please talk to one of the instructors. Personal crises happen --if you are having difficulties that interfere with your ability to do well in the class, please tell one of the instructors 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. Finally, we promise to respect you as students and as individuals, and ask that you return that respect to the staff and to your classmates.

Evaluation

COMPONENT	PERCENT of GRADE
Laboratory (7)	**7%**
Field Trip	**3%**
Clicker questions	**10%**
Exams	
midterm exam	**20%**
final exam	**35%**
Project	**25%**
annotated bibliography (13%)	
presentation plan (2%)	
oral presentation to peers in lab (10%)	

Lecture and Lab Schedule

Week	*Date*	*Lectures*	*Lab/Discussion*
1	7/20 7/21 7/22 7/23	L1: Mechanisms of evolution - Natural Selection; Darwin's finches - **Introduction to issues project** L2: Population genetics - Hardy-Weinberg L3: What is a species? - Species concepts - Speciation, isolating mechanisms L4: Phylogenetics and adaptive radiations	7/21 Lab 1 Population genetics: Part I **Topic choices for project due** 7/23 Lab 2 Population genetics: Part 2
2	7/27 7/28 7/29 7/30	L5: Earth history and the origins of life - major events - adaptations to life on land L6: Behavioral biology - sociobiology L7: Population ecology I - growth models **Midterm exam (L1-7 & Labs 1-3)**	7/28 Lab 3 Plant diversity **Annotated bibliography due** 7/30 Lab 4 Behavior **Prepare presentations** **Presentation plan due in lecture on 8/4**
3	8/3 8/4 8/5 8/6 8/7	L8: Population ecology II - regulation and human populations L9: Community ecology I - species interactions L10: Community ecology II - succession, measuring biodiversity L11: Community ecology III - biodiversity and conservation biology **Field trip to Fall Creek**	8/4 Lab 5 Phylogenetics & plant diversity Plan for field trip 8/6 Lab 6 **Project presentations**
4	8/10 8/11 8/12 8/13	L12: Ecosystems I - productivity, biomass and energetics L13: Restoration ecology (Walk to Whilamut restoration area of Alton Baker Park) - goals of restoration projects and local restoration work L14: Ecosystems II - nutrient cycles **Final exam at 10:15 (cumulative)**	8/12 Lab 7 **Project presentations - lecture and lab times will be switched on 8/12**

Readings

Textbook

The text, *Biological Science,* 3rd ed., 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.

Articles

Several articles from scientific journals will be assigned throughout the session. They are included on the readings list below and will be announced in class. The articles will be available for download from the course website.

Course Packet

This packet contains handouts you will need during the session including lecture handouts, lab handouts, and the issues project instructions.

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.

Week	Lecture	Readings
1	1	Ch 24: pgs. 481-484, 489-499 (evolution and natural selection) article by Rennie: 15 misconceptions about evolution
	2	Ch 25: pgs. 503-520 (population genetics) Ch 16: pgs. 347-348; Ch29: pgs. 595-596 (sickle-cell anemia & malaria)
	3	Ch 26: pgs. 526-535 (species concepts and speciation) article by Ostrander: dog genetics and evolution
	4	Ch 27: pgs. 558-560 (adaptive radiations) Ch 27: pgs. 543-548 (phylogenetics) BioSkills 2: pgs. B3-B5 (reading a phylogenetic tree)
2	5 (& lab 3*)	Ch 30: pgs. 630-648, 653-661 (evolution of land plants) Ch 27: pgs. 550-557 (life's time line), 560-564 (extinction episodes) article by Novacek: current extinction episode article by Leslie: origin of photosynthesis
	6	Ch 51: pgs. 1149-1150, 1167-1170 (intro to behavioral ecology & altruism) article by Dugatkin (just read sections on reciprocal altruism and kin selection)
	7	Ch 51: pgs. 1161-1164 (communication in bees)
3	8	Ch 52: pgs. 1173-1180 (population growth models) Ch 52: pgs 1181-1183 (regulation of population growth) Ch 52: pgs 1187-1190 (human population growth)
	9	Ch 53: pgs. 1196-1209 (introduction to community ecology) Ch 52: pgs 1184-1186 article by Krebs: snowshoe hare populations
	10	Ch 53: pgs. 1211-1212 (keystone species, species introductions) Ch 55: pgs. 1249-1252 article by Blumenthal: causes of plant invasions
	11	Ch 53: pgs. 1209-1211, 1212-1216 (succession) Ch 53: pgs. 1217-1219 (biodiversity and biogeography) Ch 55: pgs. 1244-1249
4	12	Ch 50: pgs. 1127-1139 (skim descriptions of aquatic and terrestrial ecosystems) Ch 54: pgs. 1222-1225 (introduction to ecosystem ecology) Ch 54: pgs. 1226-1230 (ecosystem energetics)
	13	Ch55: pgs. 1250-1254 (conservation)
	14	Ch 54: pgs. 1230-1237 (biogeochemical cycles) article by Knapp et. al: role of bison in tallgrass prairies Ch 50: pgs. 1142-1143 (how global warming affects ecosystems)