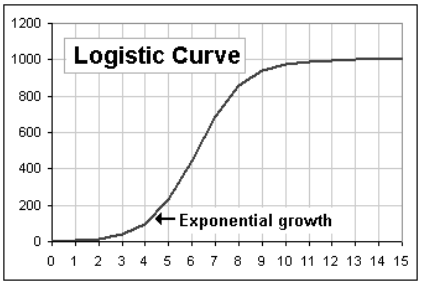
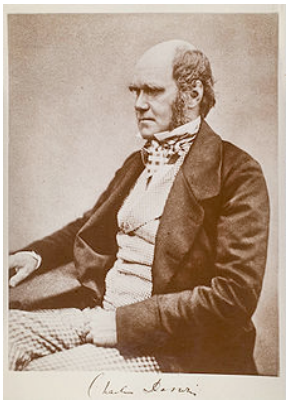
Bi 213 General Biology III: Populations

Information Sheet and Syllabus for Spring Quarter 2010





Personnel	office hours	location	e-mail	Course Role (lab times)
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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, analysis of evolutionary patterns, population genetics, population growth, species interactions, biodiversity, and ecosystem-level processes.

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 (Ch 111, 113, 221 or 224), and genetics (Bi 211 or equivalent). Bi 212 is not a prerequisite for Bi 213. 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 term 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 both the findings and how the science was conducted. You will practice doing science by forming and testing hypotheses (even in lecture), 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 appreciate that science is not just a body of facts, but a way of learning about the world.

Course Format

Lectures (Monday, Wednesday and Friday, 10:00-10:50 in room 150 Columbia)
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 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 (Wednesday through Friday in room 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 ecology and evolution are about. Often you will be working in groups, posing questions, making observations, and presenting your findings in written or oral form. There will be labs dealing with population genetics, phylogenetics, biodiversity, behavior, and species interactions. Lab handouts will be turned in at the end of each lab or at the beginning of your lab the following week. The due date for each lab will be announced in lab. Each lab will be graded on a 5 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. This is only an option if arrangements are made in advance and permission is granted from instructors.

Problem Solving Sessions (time & location to be announced)
The single biggest problem students have in general biology is solving the kinds or problems presented in homework problems and exams. These are similar to the kinds of questions that biologists ask; they can't be solved by memorization of facts. In the problem solving sessions, we will go over both homework problems and discuss ways to approach these problems. Although attendance is not required, we strongly encourage you to attend the sessions on a regular basis, or to regularly attend the office hours of one of the GTFs or tutoring session of one of the Biology Peer Tutors.

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.

Project You will investigate an issue in ecology or evolution and give an oral group presentation in lab during week 9 or 10. Projects, worth 27% of your grade, will consist of an annotated bibliography done by each person individually (worth 12% of your grade), a written plan for your presentation (one per group, worth 3% of your grade), and an oral group presentation worth 12% of your course grade. Late work on the first two parts will be accepted but discounted 2% for each day (including weekends) during the first week that it is late; it may not be accepted if turned in more than one week late. Each group will present their project in lab. There will be no late presentations.

Homework Problems Many of the problems are similar to the types of problems you will see on exams. The teaching staff will be happy to discuss the problems during office hours, in peer tutor center sessions and during the problem solving sessions. See the class schedule for homework due dates. Homework solutions will be posted on the course blackboard site immediately after they are due. **Late homework will not be accepted.**

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. If you cannot attend the trip, you will be given an alternative assignment (see description in course packet lab handout section): a 3-5 page paper on plant succession in Cascade forests. Wednesday, Thursday and Friday trips depart 1PM and return 7PM; Saturday trips depart 10AM and return 5PM.

Exams There will be three exams: two midterms and a final. All exams will be the same format: short-answer. The final is cumulative. The exams will cover material from all aspects of the course including lectures, labs, readings and homework 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. Exams are graded by the GTFs under the supervision of the faculty. To promote consistency, a single person grades each question. Everyone is required to take the final exam which is on **Thursday** of final's week. **There will be no early or late exams given.** Your final grade will be automatically calculated two ways and the better grade will be assigned. Version A uses the score of all three exams. Version B uses the score of your best midterm and the final. If you miss a midterm, **for any reason**, then we will use Version B for calculating your final grade.

Evaluation

COMPONENT	PERCENT of GRADE
Laboratory (7 labs)	**7%**
Homework (6)	**6%**
Clicker questions in lecture (total points earned/85% of total possible)	**4%**
Field Trip	**3%**
Exams Version A (53% total)	
Midterm Exams (11% each)	**22%**
Final Exam	**31%**
Exams Version B (53% total)	
Best midterm exam	**15%**
Final Exam	**38%**
Project	**27%**
annotated bibliography (12%)	
presentation plan (3%)	
oral presentation to peers in lab (12%)	

Posting of Grades Scores for assignments and exams will be posted on the web a couple of times during the term: right after each midterm and after the final exam. Check your scores each time we post them as you will have only **one week** after the posting to notify us about mistakes or omissions.

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 be familiar with the student conduct code (http://studentlife.uoregon.edu/LinkClick.aspx?fileticket=puLfAzFDbsg%3D&tabid=69); 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 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. There is a crisis center on campus that you should not hesitate to call if you, or a friend, are in need of assistance. 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 the staff and to your classmates.

Lecture and Lab Schedule

Week	Date	Lecture Topic	Lab/Discussion
1	3/29 3/31 4/2	L1: Introduction to evolution L2: Population genetics: introduction L3: Natural selection	Lab 1 1) Population genetics: part 1 2) Fern spore inoculations
2	4/5 4/7 4/9	L4: Population genetics: evolutionary forces L5: Species definitions & speciation L6: Using phylogetics to understand evolution **HW1 due by 5PM Friday**	Lab 2 1) Population genetics: part 2 2) Pick issue topic
3	4/12 4/14 4/16	L7: Using phylogenetics to understand evolution L8: Evolutionary trends in the plant kingdom L9: History of life on Earth **HW2 due by 5PM Friday**	Lab 3 Plant evolution & diversity
4	4/19 4/21 4/23	L10: History of life on Earth L11: Behavioral ecology: social behavior L12: Behavioral ecology: bees and fish **HW3 due by 5PM Friday**	Lab 4 Phylogenetic analysis of plant diversity
5	4/26 4/28 4/30	**Midterm Exam on L1-10** L13: Populations: how do they grow? L14: Populations: how is growth regulated? **Annotated bibliography due by 5PM Friday**	Lab 5 1) Honey bee behavior 2) Plan for field trip to Fall Creek
6	5/3 5/5 5/7	L15: Populations: human demography L16: Communities: introduction L17: Communities: competition and herbivory **HW4 due by 5PM Friday**	No regular lab Field trip Wed, Thurs, Fri or Sat
7	5/10 5/12 5/14	L18: Communities: predation and mutualism L19: Communities: keystone species & species introductions L20: Communities: biodiversity **HW5 due by 5PM Friday** **Presentation plan due by 5PM Friday**	No regular lab Field trip Thurs, Fri or Sat
8	5/17 5/19 5/21	**Midterm Exam 2 on L11-18** L21: Communities: conservation biology L22: Communities: ecological succession	Lab 6 1) Species interactions exercise 2) Work on issues presentation
9	5/24 5/26 5/28	L23: Ecosystems: introduction L24: Ecosystems: energetics and productivity L25: Ecosystems: intro to nutrient cycling, nitrogen cycle **HW6 due by 5PM Friday**	Lab 7A Project presentations (only required to attend if this is the week you are presenting)
10	5/31 6/2 6/4	**Memorial Day no class** L26: Ecosystems: carbon cycling L27: Global change	Lab 7B Project presentations (only required to attend if this is the week you are presenting)
Finals	6/10	**Thursday at 10:15 AM**	

Course Materials

Course Packet This packet contains many of the handouts you will need during the quarter including lab and lecture activity guides, and the issues project instructions.

Calculator You will need a scientific calculator capable of doing natural logarithms and square roots for use on homework problems, in lab, and on exams.

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. There are copies of the text on reserve in the Science Library.

Journal Articles These will be posted on the course blackboard site. There will likely be additional articles posted during the term that we will announce in lecture.

Week	Lecture	Assigned Readings
1	1	Ch 24: pgs. 481-484, 489-491, 495-498 (evolution and natural selection) article by Rennie: 15 common misconceptions about evolution
	2	Ch 25: pgs. 503-508 (population genetics)
	3	Ch24: pgs. 491-495, 499 (natural selection)
2	4	Ch25: pgs. 508-520 (population genetics and forces of evolution) Ch16: pgs. 347-348; Ch29: pgs. 595-596 (sickle-cell anemia & malaria)
	5	Ch 26: pgs. 526-531 (species concepts); Ch 26: pgs. 531-535 (speciation); Ch 27: pgs. 558-560 (adaptive radiations)
	6	Ch 27: pgs. 543-548 (phylogenetics) BioSkills 2: pgs. B3-B5 (reading a phylogenetic tree)
3	7	Ch 27: pgs. 543-548 (phylogenetics) BioSkills 2: pgs. B3-B5 (reading a phylogenetic tree)
	8	Ch 30: pgs. 630-648, 653-661 (evolution of land plants)
	9	Ch 27: pgs. 550-557 (life's time line), 560-564 (extinction episodes) article by Leslie: On the origin of photosynthesis
4	10	Ch 34: pgs. 762-767 (hominin radiation) article by Pollard: What makes us human?
	11	Ch 51: pgs. 1149-1150, 1167-1170 (intro to behavioral ecology & altruism) article by Dugatkin (just read sections on reciprocal altruism and kin selection)
	12	Ch 51: pgs. 1161-1166 (communication in bees & honest vs. deceitful communication)
5		(midterm exam one)
	13	Ch 52: pgs. 1173-1180 (population growth models)
	14	Ch 52: pgs 1181-1183 (regulation of population growth)
6	15	Ch 52: pgs 1187-1190 (human population growth) article by Carnevale: World human population growth
	16	Ch 53: pgs. 1196-1209 (introduction to community ecology)
	17	
7	18	Ch 52: pgs 1184-1186
	19	Ch 53: pgs. 1211-1212 (keystone species, species introductions) Ch 55: pgs. 1249-1252
	20	Ch 53: pgs. 1217-1219 (biodiversity and biogeography) Ch 55: pgs. 1244-1254
8		(midterm exam two)
	21	Ch55: pgs. 1250-1254 (conservation) article by Tolme: Made in the shade article by Worldwatch Institute: The plight of birds
	22	Ch 53: pgs. 1209-1211, 1212-1216 (succession)
9	23	Ch 50: pgs. 1127-1139 (skim descriptions of aquatic and terrestrial ecosystems) Ch 54: pgs. 1222-1225 (introduction to ecosystem ecology)
	24	Ch 54: pgs. 1226-1230 (ecosystem energetics)
	25	Ch 54: pgs. 1230-1237 (biogeochemical cycles; focus on nitrogen cycle)
10	26	Ch 54: pgs. 1230-1237 (biogeochemical cycles; focus on carbon cycle)
	27	Ch 50: pgs. 1142-1143 (how global warming affects ecosystems) Ch 54: pgs. 1238-1241 EPA FAQ about climate change IPCC Climate Change 2007 Synthesis Report (summary for policymakers pgs. 1-6)

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 on the preceding page for the specific dates. They are available on the Bi213 course blackboard site. There will likely be additional journal articles that we would like you to read. These will be announced in lecture and posted on blackboard.

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.

Populations

Carnevale, Ellen, and others at the Population Reference Bureau. 1999. **World Population: more than just numbers.** viewed at http://www.prb.org/ on March 15, 2010

Conservation Biology

Tolme, P. 2004. **Made in the Shade.** *Audubon* July/August: 56-69.

Worldwatch Institute. 2002. **The Plight of Birds**. Viewed at http://www.worldwatch.org on March 15, 2010.

Ecosystems

Environmental Protection Agency. 2009. **Frequency asked questions about global warming and climate change: back to basics.** Viewed at http://www.epa.gov/climatechange/ on March 15, 2010.

IPCC (Intergovernmental Panel on Climate Change). 2007. **IPCC Fourth Assessment Report (AR4)**. Pages 1-6 of summary for policymakers. Viewed at http://www.ipcc.ch/ on March 15, 2010.