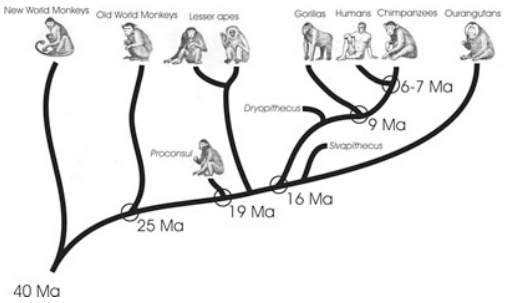
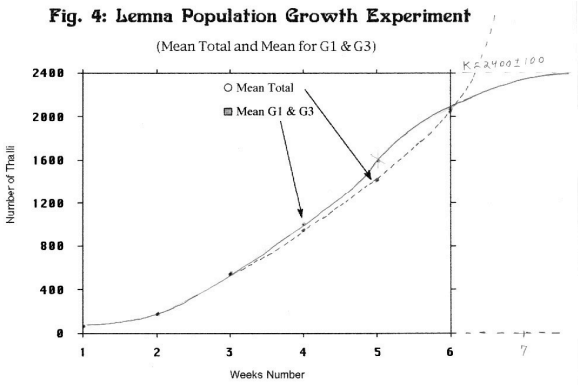
Bi 213 General Biology III: Populations

Information Sheet and Syllabus for Spring Quarter 2007

http://biology.uoregon.edu/classes/Bi213s07





Personnel	office hours	location	e-mail	Course Role (lab times)
Peter Wetherwax	Monday 11 -12 and by appt.	313 Pacific	pwax@uoregon.edu	lectures, course planning
Alan Dickman	Monday 1-2 and by appt.	301-B Pacific	adickman@uoregon.edu	lectures, course planning
Misty McLean	by appt.	120-F Huestis	mistym@uoregon.edu	lab preparation and coordination
Cristin Hulslander	Tuesday 4-5	302 Pacific	cristinh@uoregon.edu	W11, F8
Kai Blaisdell	Friday 9-10	360 Onyx	gblaisde@uoregon.edu	TH8, TH4
Nicole Menard	Thursday 11:30-12:30	Willamette Atrium	nmenard@uoregon.edu	W3, W5
Becky Mueller	Wednesday 9-10		rmueller@uoregon.edu	TH10, TH2
Margaret Yang	Wednesdays 12-1	Streisinger	myang@uoregon.edu	W1, TH12
Dan Cameron	The Biology Peer Tutor Center (room 25 KLA) will be staffed by Bi 213 peer tutors at these times: Mondays 12-1 and 2:30-3:30 Tuesdays 10-11 Wednesdays 4-5		dcc@uoregon.edu	TH8, F8
Jenna Gribbin			jgribbin@uoregon.edu	W1, W3
Laci Helmhout			lhelmhou@uoregon.edu	W5, TH4
Jon Newman			jnewman1@uoregon.edu	W11, TH12
Rachel Weintraub			rweintra@uoregon.edu	TH10, TH2

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 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 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 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 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 rm 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 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 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 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.

Project Working in groups, you will investigate an issue in ecology or evolution and give an oral presentation in lab during week 9 or 10. Projects, worth 25% of your grade, will consist of an annotated bibliography done by each person individually (worth 10% of your grade), a written plan for your presentation (one per group, worth 2% of your grade), and an oral presentation worth 13% 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. Project guidelines and suggested topics will be distributed in labs.

Practice Problems Practice problems will be posted on the course web site and solutions posted a day or two before each quiz or exam. The problems are similar to the types of problems you will see on exams. We will not collect your answers to these problems, but you will do much better on the exams if you work through the problems and write out answers on your own before looking up the answers on the web. The teaching staff will be happy to discuss the problems during office hours or in peer tutor center sessions. The times and locations of the sessions will be posted on the course web site during the first week of classes.

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.

Exams There will be three types of exams: quizzes, a midterm, and a final. All exams will include short-answer questions. The quizzes will cover material from the previous weeks' lectures and readings (see schedule for exact lectures). The midterm and final are cumulative. The exams will cover material from all aspects of the course including lectures, labs, readings and problem sets. 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. Make your travel plans carefully as the final will not be given early and it is scheduled for Monday of finals week, June 11. Exams are graded by teaching assistants under the supervision of the faculty. To promote consistency, a single person grades each question.

Evaluation

COMPONENT	PERCENT of GRADE
Laboratory (7 labs)	**7%**
Field Trip	**3%**
Exams (drop low quiz: exams total 65% of course grade)	
best of two quizzes	**12%**
midterm	**21%**
final exam	**32%**
Project	**25%**
annotated bibliography (13%)	
presentation plan (2%)	
oral presentation to peers in lab (10%)	

Posting of Grades Scores for assignments and exams will be posted on the web and updated after quizzes and midterm. We will make announcements in class when they are updated. Check your scores each time we post them as you must notify us of any errors within one week after they are posted.

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; 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	4/2 4/4 4/6	L1: Introduction to evolution (PW) L2: Population genetics: introduction (PW) L3: Natural selection (PW)	Lab 1 Population Genetics: part 1 fern spore inoculations
2	4/9 4/11 4/13	L4: Population genetics: evolutionary forces (PW) L5: What is a species? (AD) L6: Mechanisms of speciation (AD)	Lab 2 1) Population Genetics: part 2 2) pick issue topic
3	4/16 4/18 4/20	L7: Phylogenetics (MacClade) (AD) L8: Major trends in plant evolution (AD) L9: **quiz #1 on L1-L6** Early life on earth (AD)	Lab 3 Plant Diversity
4	4/23 4/25 4/27	L10: Later life on earth (AD) L11: Primate and human evolution (AD) L12: Behavioral ecology (PW	Lab 4 Phylogenetic Analysis of Plant Diversity
5	4/30 5/2 5/4	L13: Behavioral ecology (PW) L14: Populations: understanding how they grow (AD) L15: Populations: regulation of population growth (AD)	Lab 5 1) Honey Bee Behavior lab 2) plan for field trip **Annotated bibliography due**
6	5/7 5/9 5/11	**Midterm Exam on L1-13** L16: Populations: human population growth (AD) L17: Communities: introduction (PW)	No regular lab Field Trip Thurs, Fri or Sat
7	5/14 5/16 5/18	L18: Communities: species interactions (PW) L19: Communities: species interactions (PW) L20: Communities: succession (PW)	No regular lab Field Trip Thurs, Fri or Sat **Presentation Plan due**
8	5/21 5/23 5/25	L21: Communities: conservation biology (PW) L22: **quiz #2 on L14-19** Communities: biodiversity (PW) L23: Ecosystems: introduction (AD)	Lab 6 1) Predation Experiment 2) Work on Issues Presentation
9	5/28 5/30 6/1	**Memorial Day no class** L24: Ecosystems: energetics and productivity (AD) L25: Ecosystems: nutrient cycling (AD)	Lab 7 **Project Presentations**
10	6/4 6/6 6/8	L26: Ecosystems: carbon cycling (AD) L27: Climate change (AD) L28: Synthesis, Advice, Evaluations	Lab 8 **Project Presentations**
Finals	**6/11**	**Final Exam Monday at 10:15AM**	

Textbook
The text, *Biology,* 7th ed., by Campbell and Reece, 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.

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

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

Field Trip times
Thursday and Friday trips depart 1PM and return 7PM; Saturday trips depart 10AM, return 5PM

Readings (see the following page for list of articles posted on course website)

Week	Lecture	Readings
1	1	Ch 22: 438-446 (evolution and natural selection) article by Rennie: 15 misconceptions
	2	Ch 23: 454-458 (population genetics)
	3	Ch22: 446-451 (natural selection)
2	4	Ch23: 459-464; 469-470 (population genetics and forces of evolution) Ch23: 466-468; Ch5: 84 ; Ch14: 267; Ch28: 555-556 (sickle-cell anemia & malaria)
	5	Ch 24: 472-478 (species and speciation)
	6	Ch 24: 479-488; (macroevolutionary patterns and processes) article by Kocher: cichlid evolution
3	7	Ch 25: 491-508 (phylogenetics)
	8	Ch 29: 573-579; 580-581; 584-585; 597-601; (overview of plant evolution, mosses and ferns) Ch 30: 591-601 (seed plants)
	9	Ch 26: 510-512; 521-522; (early life on Earth)
4	10	Ch 26: 522-531; 516-519 (evolution of eukaryotes, Cambrian explosion)
	11	Ch 34: 694-707 (primate evolution) articles by Johnson: Human Evolution, MacAndrew: FOXP2
	12	Ch 51: 1106-1107, 1128-32 (social behavior) article by Dugatkin
5	13	article by Collett (honey bee communication)
	14	Ch 52: 1136, 1143-47 (population growth models)
	15	Ch 52: 1148-1152 (regulation of population growth pages 25 –27 of packet article by Krebs (snowshoe hare populations)
6	16	Ch 52: 1161152-1156 (human population growth) article by Carnevale
	17	Ch 53: 1159 (introduction to community ecology)
7	18	Ch 53: 1159-1165, 1168-1169 (species interactions)
	19	pages 27-35 of packet article by Krebs (snowshoe hare populations)
	20	Ch 53: 1175-1178 (biodiversity and biogeography)
8	21	Ch55: 1224-1232, 1238-1240 (biodiversity) articles by Payne; Tolme
	22	Ch53: 1165-1166, 1171-1175 (succession)
	23	Ch 54: 1184-1190 (introduction to ecosystem ecology)
9	24	Ch 54: 1191-1194 (ecosystem energetics)
	25	Ch 54: 1195-1202 (nutrient cycling) article by Cox (Land Institute. perennial grains)
10	26	article by Knapp et. al (tallgrass prairie)
	27	Ch 54: 1202-1206 (climate change)
	28	reread the entire book ☺

Journal Articles

These articles will be used in lectures, 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 website.

Natural Selection and Population Genetics

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

Speciation and Phylogenetics

Kocher, Thomas. 2004. **Adaptive Evolution and Explosive Speciation: The Cichlid Fish Model.** *Nature Reviews Genetics* 5: 288-298

Human Evolution

Johnson, Norman. 2004. **Human Evolution.** chapter 9 of the *Rediscovering Biology* online text http://www.learner.org/channel/courses/biology/

MacAndrew, Alec. 2003, 2005. **FOXP2 and the Evolution of Language.** http://www.evolutionpages.com/FOXP2_language.htm

Behavior

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

Collett, T. 2000. **Measuring Beelines to Food.** *Science* 287:817-818.

Populations

Krebs, C.J., et al. 2001. **What Drives the 10-yr Cycle of the Snowshoe Hares?** *BioScience* 51(1): 25-35

Carnevale, Ellen, and others at the Population Reference Bureau. 1999. **World Population: more than just numbers.** viewed at http://www.prb.org/ on January 11, 2007

Community Ecology

Payne. R.B. 1998. **Brood Parasitism in Birds: Strangers in the Nest.** *Bioscience* 48(5):377-386.

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

Ecosystems

Cox, Thomas, et al. 2006. **Prospects for Developing Perennial Grain Crops.** *BioScience* 56(8): 649-659.

Knapp, A.K., J.M. Blair, J.M. Briggs, S.L. Collins, D.C. Hartnett, L.D. Johnson, E.G. Towne. 1999. **The Keystone Role of Bison in North American Tallgrass Prairie**. *BioScience* 49(1):39-50.