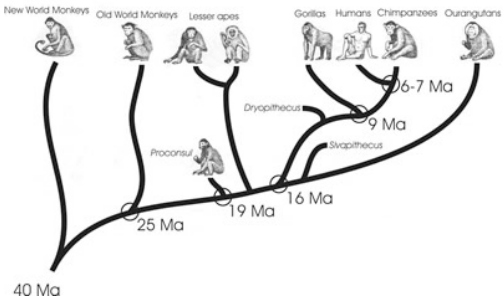
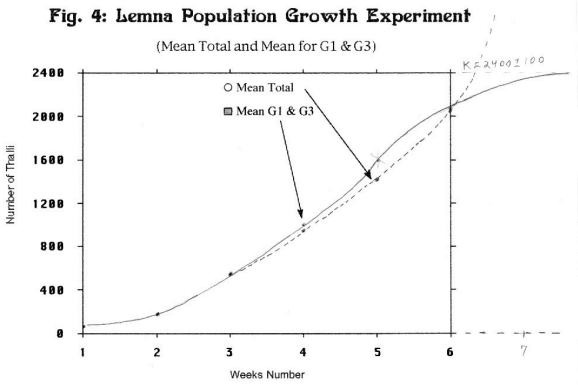
Bi 213 General Biology III: Populations

Information Sheet and Syllabus for Spring Quarter 2008

http://biology.uoregon.edu/classes/bi213s08





Personnel	office hours	location	e-mail	Course Role (lab times)
Peter Wetherwax	Monday 11 -11:50 and by appt.	313 Pacific	pwax@uoregon.edu	lectures, course planning
Alan Dickman	Tuesday 11-11:50 and by appt.	478 Onyx	adickman@uoregon.edu	lectures, course planning
Misty McLean	by appt.	120-F Huestis	mistym@uoregon.edu	lab preparation and coordination
Cristin Hulslander	Tuesday 10-10:50	269 Onyx	cristinh@uoregon.edu	TH8, TH10
Ted Cornforth	Thursday 3-3:50	360 Onyx	tcornfor@cs.uoregon.edu	W11, TH4
Rob Hoshaw	Wednesday 12-12:50	360 Onyx	rhoshaw@uoregon.edu	W5, F8
Kirsty Jamieson	Wednesday 11-11:50	360 Onyx	kjamieso@uoregon.edu	TH8, TH10
Nicole Menard	Tuesday 12:30-1:30	360 Onyx	nmenard@uoregon.edu	W1, W3
Cam Stewart	Friday 11-11:50	360 Onyx	cstewar5@uoregon.edu	TH12, TH2
Jarrett Arnold	The Biology Peer Tutor Center (25 KLA) will be staffed by Bi 213 peer tutors: Monday 4, Thursday 10, Friday 12, Friday 2		jarnold@uoregon.edu	W1, TH12
Marissa Duncan			mduncan2@uoregon.edu	W11, W3
Jenna Gribbin			jgribbin@uoregon.edu	W5, TH2
Tyrel Love			tlove@uoregon.edu	TH4, F8

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 111 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 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 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. If you let us know in advance about a lab you cannot attend, it may be possible to attend another lab or to do an alternative assignment (e.g., term paper). This is only an option if notified in advance and with a written excuse.

Problem Solving Sessions (most Mondays 1:00, 5 Klamath)
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 these 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.

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 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 group 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.

Homework Problems Homework problems will be posted on the course web site and solutions posted immediately after they are due. 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. The times and locations of the sessions will be posted on the course web site during the first week of classes. Late homework will not be accepted. If you arrive to lecture late on the day that homework is due, you will not be able to turn in your homework for a grade.

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. Thursday and Friday trips depart 1PM and return 7PM; Saturday trips depart 10AM, 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 **Tuesday** of final's week. **There will be no early or late exams given.** Your final grade will be 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 (7)	**7%**
Field Trip	**3%**
Exams Version A (58% total)	
Midterm Exams (13% each)	**26%**
Final Exam	**32%**
Exams Version B (58% total)	
Best midterm exam	**18%**
Final Exam	**40%**
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 three times during the term: right after each midterm and during the 10th week of class. Check your scores every times we post them as you will have only <u>three days</u> after the posting to notify us about mistakes or omission.

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	3/31 4/2 4/4	L1: Introduction to evolution (PW) L2: Population genetics: introduction (PW) L3: Natural selection (PW)	Lab 1 Population Genetics: part 1 fern spore inoculations
2	4/7 4/9 4/11	L4: Population genetics: evolutionary forces (PW) **Problem solving session in 5 Klamath Monday at 1 (PW)** L5: What is a species? (AD) **HW1 due beginning at beginning of Wed. lecture** L6: How do species arise? (AD)	Lab 2 1) Population Genetics: part 2 2) pick issue topic
3	4/14 4/16 4/18	L7: Evolutionary trends in the plant kingdom (AD) **Problem solving session in 5 Klamath Monday at 1 (AD)** L8: Life on earth: anaerobic world (AD) **HW2 due beginning at beginning of Wed. lecture** L9: Life on earth: aerobic world (AD)	Lab 3 Plant Diversity
4	4/21 4/23 4/25	L10: Using phylogenetics to understand evolution (AD) **Problem solving session in 5 Klamath Monday at 1 (AD)** L11: Behavioral ecology (PW) **HW3 due beginning at beginning of Wed. lecture** L12: Behavioral ecology (PW)	Lab 4 Phylogenetic Analysis of Plant Diversity
5	4/28 4/30 5/2	**Midterm Exam on L1-10** L13: Populations: how do they grow? (AD) L14: Populations: how is growth regulated? (AD) **Annotated biblio. due at beginning of Fri. lecture**	Lab 5 1) Honey Bee Behavior lab 2) plan for field trip
6	5/5 5/7 5/9	L15: Populations: human demography (AD) **Problem solving session in 5 Klamath Monday at 1 (AD)** L16: Communities: introduction (PW) **HW4 due beginning at beginning of Wed. lecture** L17: Competition and Herbivory (PW)	No regular lab Field Trip Thurs, Fri or Sat
7	5/12 5/14 5/16	L18: Predation and Mutualism (PW) **Problem solving session in 5 Klamath Monday at 1 (PW)** L19: Species introductions and Keystone Species (PW) **HW5 due beginning at beginning of Wed. lecture** L20: Community succession (PW) **Presentation Plan due at beginning of Fri. lecture**	No regular lab Field Trip Thurs, Fri or Sat
8	5/19 5/21 5/23	**Midterm Exam 2 on L11-18** L21: Biodiversity (PW) L22: Ecosystems: introduction (AD)	Lab 6 1) Predation Experiment 2) Work on Issues Presentation
9	5/26 5/28 5/30	**Memorial Day no class** L23: Ecosystems: energetics and productivity (AD) **HW6 due beginning at beginning of Wed. lecture** L24: Ecosystems: nutrient cycling (AD)	Lab 7 **Project Presentations**
10	6/2 6/4 6/6	L25: Ecosystems: carbon cycling (AD) **Problem solving session in 5 Klamath Monday at 1 (PW)** L26: Global change (AD) **HW7 due beginning at beginning of Wed. lecture** L27: Conservation biology (PW)	Lab 8 **Project Presentations**
Finals	**6/10**	**Final Exam Tuesday at 10:15AM**	

Course Materials

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, 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.

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 about evolution
	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: 472-476 (species concept) article by Ostrander: dog evolution
	6	Ch 24: 476-488; (speciation)
3	7	Ch 29: 573-581; 584-585; 510-511 (overview of plant evolution, mosses and ferns) Ch 30: 591-601 (seed plants)
	8	Ch 26: 516-518; 521-522; (early life on Earth) article by Novacek: current extinction event
	9	Ch 26: 523-531; 518-519 (last 2 billion years of life on Earth)
4	10	Ch 25: 491-508 (phylogenetics)
	11	Ch 51: 1106-1107, 1128-32 (social behavior) article by Dugatkin (just read sections on reciprocal altruism and kin selection)
	12	Ch 51: 1111-1112 (communication) article by Seeley: decisions in honey bee swarms)
5		(midterm one)
	13	Ch 52: 1136, 1143-47 (population growth models)
	14	Ch 52: 1148-1152 (regulation of population growth
6	15	Ch 52: 1161152-1156 (human population growth) article by Carnevale: world human population
	16	Ch 53: 1159 (introduction to community ecology)
	17	Ch 53: 1159-1165, (species interactions)
7	18	article by Krebs: snowshoe hare populations)
	19	Ch 53: 1168-1169 (keystone species, species introductions) article by Blumenthal: causes of plant invasions
	20	Ch53: 1171-1175 (succession)
8		(midterm two)
	21	Ch53: 1165-1166, 1175-1178 Ch55: 1209-1211 (biodiversity and biogeography)
	22	Ch 54: 1184-1190 (introduction to ecosystem ecology)
9	23	Ch 54: 1191-1194 Ch53: 1167-1168 (ecosystem energetics)
	24	Ch 54: 1195-1202 (nutrient cycling) article by Cox (Land Institute. perennial grains)
10	25	article by Knapp et. al (tallgrass prairie)
	26	Ch 54: 1202-1206 (climate change) pp.1-6 of IPCC Climate Change 2007 Synthesis summary for policy makers
	27	article by Tolme: shadegrown coffee

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 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.

Earth History

Novacek, Michael. 2008. **It happened to him. It's happening to you.** *Washington Post.* Sunday, January 13, 2008.

Speciation and Phylogenetics

Ostrander, Elaine. 2007. **Genetics and the Shape of Dogs.** *American Scientist* 95 (5): 406-413.

Behavior

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

Seeley, T.D. et al. 2006. **Group Decision Making in Honey Bee Swarms.** *American Scientist* 94:220-229.

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 5, 2008

Community Ecology

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

Blumenthal, D. 2008. **Interrelated Causes of Plant Invasion.** *Science* 310:243-244.

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.

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 5, 2008.

Conservation Biology

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