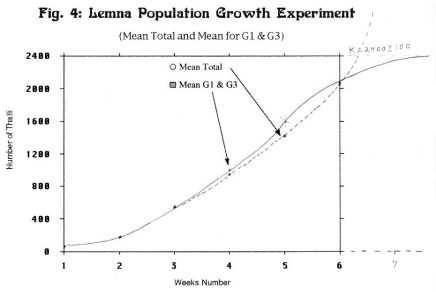
Bi 213 General Biology III: Populations

Information and Syllabus for Summer 2013
August 12 - September 5



Tobias Policha (Lecturer) tpolicha@uoregon.edu; Office hour: time & location TBA
Hannah Wilson (Lab Instructor) hwilson1@uoregon.edu; Office hour: time & location TBA
Kali Gashette (GTF) kalig@uoregon.edu; Office hour: time & location TBA
Hanna Deutsch (Lab Assistant) deutsch@uoregon.edu; Peer tutor session: time & location TBA
Lauren Gedlinske (Lab Assistant) lgedlins@uoregon.edu; Peer tutor session: time & location TBA

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 9:00-10:50 in 302 Gerlinger)

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 discussing the problem as a whole class. Your active participation in lecture will help you to better understand the material and prepare you for exams.

Lab/Discussion (Tuesday and Thursday 12:00-1:50 OR 2:00-3:50 in 129 Huestis)

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. There will be labs dealing with population genetics, plant diversity, phylogenetics, and behavior. 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. Labs that involve computer exercises may possibly be made up during office hours **only if arrangements are made in advance of the lab**.

Problem Sets

There are four problem sets due during the session. The problem sets will be posted to blackboard. They will be graded on a 5-point scale. We will collect these at the beginning of lecture on the day that each is due (see schedule for specific due dates). The solutions to the problem sets will be available on blackboard. We will be prepared during office hours to help you work through the problem sets. **No late homework 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. The field trip will take place on Friday August 23rd and Saturday 24th (**each student will only go on one of the days**). We will depart campus at 10 a.m. and return no later than 4 p.m.

Clickers (Personal Response Systems)
Clickers will be used in class to encourage participation and to provide valuable feedback to instructors and students. You will need to register your clicker on the course blackboard site. 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.

Issues Project
Working in groups of 2-3, you will do a class project culminating in an oral presentation given during one of 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 (10%), presentation plan (2%) and a group oral presentation (13%, group grade). There will be no late presentations. Project guidelines, requirements, and suggested topics can be found in the course packet.

If you are retaking this course, you will not be allowed to resubmit issues project work from the previous time you took Bi213. The work you do this term must be original.

Exams
There will be two exams: a midterm and a final. 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. The final is scheduled for Thursday September 5 at 9:00 in 302 Gerlinger.
Midterm regrade policy - To be fair to all students, it is essential that all exams be graded according to the same criteria. If you wish to submit a midterm (not an option for the Final) for a regrade, you must use the following guidelines. First, refer to the exam key available on blackboard to see how closely your answer(s) match the key. If you still wish to have a midterm exam answer regraded, you must submit a written statement along with your original exam, explaining specifically why your answer merits a higher score by Monday the 26th. Keep in mind that we will regrade the entire exam and a regrade may result in a higher, lower, or unchanged score. Please do not abuse this system. **We reserve the right to eliminate this option at our discretion.**

Evaluation

Component	% of Total Grade
Labs	**12**
Field Trip	**5**
Problem Sets	**4**
Clicker Scores	**4**
Exam (Midterm)	**20**
Exam (Final)	**30**
Project	**25**

Lecture and Lab Schedule

Week	Date	Lectures	Labs
1	**8/12** **8/13** **8/14** **8/15**	L1: Mechanisms of evolution - natural selection; Darwin's finches L2: Population genetics - Hardy-Weinberg; forces of evolution L3: What is a species? - species concepts - speciation, isolating mechanisms L4: Using phylogenetics to understand evolution *** Homework #1 due at beginning of lecture**	 **Lab 1** Population genetics: Part I Introduction to issues project **Lab 2** Population genetics: Part 2 *** Topic choices for project due**
2	**8/19** **8/20** **8/21** **8/22** **8/23 or 24**	L5: Earth history and the origins of life - major events - evolutionary trends in the plant kingdom L6: Behavioral biology *** Homework #2 due at beginning of lecture** L7: Population ecology I - growth models **Midterm exam (Lectures 1-6 & Labs 1-3)** Field trip to Fall Creek (10:00-4:00)	 **Lab 3** Plant diversity (Bring your textbook to lab today) *** Annotated bibliography due** **Lab 4** Phylogenetics & plant diversity Plan for field trip
3	**8/26**	L8: Population ecology II - regulation, human populations	

	8/27 **8/28** **8/29**	* Presentation plan due by 10 a.m. L9: Community ecology I - introduction, species interactions *** Homework #3 due at beginning of lecture** L10: Community ecology II - keystone species, ecological succession L11: Community ecology III - biodiversity, conservation biology	**Lab 5** Honey Bee Behavior Prepare presentations **Lab 6a** Project presentations
4	**9/2** **9/3** **9/4** **9/5**	L12: Ecosystems I - introduction, productivity L13: Ecosystems II - energy flow, introduction to nutrient cycles *** Homework #4 due at beginning of lecture** L14: Ecosystems III - nutrient cycles, global change Final exam at (cumulative)	 **Lab 6b** Project presentations **END OF TERM** Enjoy your break!

Course Materials

Textbook
The text, Biological Science, by S. Freeman, 3rd, 4th or 5th edition, should be used as a general reference. The readings (see below) include background material useful for preparing 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. See the 'Preface to Students' right before Chapter 1 for a good introduction to using the text.

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 blackboard.

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. NO CELL PHONES.

Accessible Education Center
The University of Oregon is working to create inclusive learning environments (more info at http://aec.uoregon.edu). Please notify us if there are any aspects of the instruction or design of this course that result in barriers to your participation. If you have a documented disability and anticipate needing accommodations in this course, please talk to your instructors during the first 2 days of classes. Please request that the Accessible Education Center Counselor send a letter verifying your need.

Readings

Week	Lecture	Readings (pg. #s are for 3rd ed. #'s for 4th and 5th to follow shortly)
1	1 2 3 4	Ch 24: pgs. 481-484, 489-500 (evolution and natural selection) article by Rennie: 15 common misconceptions about evolution Ch 25: pgs. 503-520 (population genetics, forces of evolution) Ch16: pgs. 347-348; Ch29: pgs. 595-596 (sickle-cell anemia & malaria) Ch 26: pgs. 526-531 (species concepts); pgs. 531-535 (speciation); 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) 6 7	Ch 27: pgs. 550-557 (life's time line); 560-564 (extinction episodes) Ch 34: pgs. 762-767 (hominin radiation) Ch 30: pgs. 630-648, 653-661 (evolution of land plants) article by Leslie: On the origin of photosynthesis article by Pollard: What makes us human? Ch 51: pgs. 1149-1150, 1167-1170 (intro to behavioral ecology & altruism) Ch 51: pgs. 1161-1166 (communication in bees & honest vs. deceitful communication) article by Dugatkin (just read sections on reciprocal altruism and kin selection) Ch 52: pgs. 1173-1180 (population growth models)
3	8 9 10 11	Ch 52: pgs 1181-1183 (regulation of population growth) Ch 52: pgs 1187-1190 (human population growth) Ch 53: pgs. 1196-1209 (species interactions) Ch 53: pgs. 1211-1212 (keystone species) Ch 53: pgs. 1209-1211, 1212-1216 (succession) Ch 53: pgs. 1217-1219 (biodiversity and biogeography) Ch 55: pgs. 1244-1254 (conservation) article by Worldwatch Institute: The plight of birds

4	12 13 14	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) Ch 54: pgs. 1230-1237 (biogeochemical cycles; focus on nitrogen & carbon cycle) Ch 54: pgs. 1238-1241 (human impacts on ecosystems) Ch 50: pgs. 1142-1143 (how global warming affects ecosystems) 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.

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.

Conservation Biology
Worldwatch Institute. 2002. The Plight of Birds. Available at: http://www.worldwatch.org/node/518

Ecosystems
Environmental Protection Agency. 2009. Frequency asked questions about global warming and climate change: back to basics. Available at: http://www.epa.gov/climatechange/Downloads/ghgemissions/Climate_Basics.pdf.
IPCC (Intergovernmental Panel on Climate Change). 2007. IPCC Fourth Assessment Report (AR4). Sections 1-5 of 'Summary for Policymakers'. Available at: http://www.ipcc.ch/publications_and_data/ar4/syr/en/spm.html

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 to lab and lecture on time and stay until class is over without making unnecessary noise that could distract your classmates. **Please do not use and put away your personal computers, cell phones, tablets 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.

Cheating devalues the reputation of our institution, its faculty, its students, and your academic degree. Academic misconduct is particularly unfair for students who do their work with integrity and honor. The University Student Conduct Code (available at (http://uodos.uoregon.edu/StudentConductandCommunityStandards/tabid/68/Default.aspx) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students' obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at http://library.uoregon.edu/guides/plagiarism/students/index.html.

We want you to learn and to do well in the course, but we will not tolerate academic dishonesty. Sanctions for academic dishonesty will be a lowering of the final grade or failure. 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 (541) 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.

Non-discrimination Policy

The University of Oregon affirms the right of all individuals to equal opportunity in education and employment, without regard to race, color, religion, sex, gender, age, handicap, national origin, sexual orientation, or any other extraneous consideration not directly and substantively related to effective performance.