

Welcome to Honors Biology III: Evolution and Ecology

About the Course

Instructor: Brendan Bohannon
Office: 309 Pacific Hall
Phone: 346-4883
Email: bohannon@uoregon.edu
Class hours and room: MWF 10:00 – 10:50AM, PSC 040.
Office Hours: Mondays from 11:00 – 12:00PM, and by appointment, in 309 Pacific Hall.

Laboratory instructor: Laurel Pfeifer-Meister (lpfeifel@uoregon.edu).
Laurel's office hours will be posted on our course website.

Graduate Teaching Assistants (GEs):
Anya Hopple (ahopple@uoregon.edu)
and Andrew Morris (amorris3@uoregon.edu). Office hours will be posted on our course website.

Biology Undergraduate Lab Assistants (BULAs): Elisabeth Bryan (ebryan4@uoregon.edu), Erica Pledger (epledger@uoregon.edu), and Alex Miller (amiller9@uoregon.edu). Office hours will be posted on our course website.

Prerequisite: BI 282H is required.

Web Site: Our web site is accessible via the UO Canvas server. Login requires your UO Information Services (Computing Center) email address and the corresponding password.

How I will contact you: All of my communication to you outside of class and office hours will take place via email. Specifically, I will use the email registered to you by the University of Oregon. If you use another ISP for your email, make sure you arrange to have

your UO email forwarded to it, or arrange to change your registered email address with UO.

Required readings: There is a required textbook for this course: "Biological Science, volume 2" by Scott Freeman et al. (fifth edition, Pearson). This is available at the UO Bookstore.

I will occasionally assign supplementary reading from other sources. Some of the supplementary reading assignments will be available for download from the course website as pdf files. To read these you will need Adobe Acrobat Reader, free software that is installed on UO computers and can be downloaded from the following website:

<https://get.adobe.com/reader/>

Homework assignments: I will assign homework in addition to the reading. The homework will be posted on the course website at least 48 hours before it is due.

Course Goals

I have three goals for this course:

Help you learn the central ideas in the sciences of evolutionary biology and ecology — This course is not a panoramic overview of ecology and evolution. These are very broad and integrative sciences. In a 10 week course an overview could only be cursory. I feel strongly that as honors students you will learn more if we take the time to explore in detail some of the central ideas, major controversies and hot topics in ecology and evolution.

Help you become a more sophisticated consumer of science — I would be very happy if all of you went on to become professional biologists. However, this is unlikely to happen. Although most of you will go on to some other occupation, you will all be consumers of science, including biological science. One of my goals this quarter is to provide you with the experience necessary to be a better consumer of science, to know when you are being hoodwinked by the misuse of the scientific method. We will regularly discuss recent scientific studies and ongoing scientific controversies.

Help you continue your transition from student to scholar — A scholar is someone who can think critically, argue logically, write clearly, and read effectively. Most importantly, a scholar understands how to organize and use knowledge, and takes responsibility for their own learning. My goal is to provide you with opportunities to practice all of these skills.

Our Strategy for Achieving these Goals

By now, most of your education has likely been structured around hour-long lectures. Lectures are good tools for downloading information. They require a particular dynamic. This dynamic, bluntly stated, is “professor professes, student writes it down”. Lectures, however, are pretty lousy ways to learn new skills, promote thought or challenge attitudes. And studies have shown that on average, students begin to lose attention after 15 - 20 minutes of lecture. Therefore, our class time together will be a mix of short “mini-lectures”, discussion and in-class exercises. The goals of the class will be met through a combination of the following activities:

Reading — There will be a reading assignment for each class. I expect you **read the assignment BEFORE each class**. I cannot stress this enough. Your learning will be much more effective if you come to class prepared. To reinforce this behavior, I will assign homework questions for each reading and I may have in-class mini-quizzes on the reading material.

Mini-lectures — During each class, I will give mini-lectures building on the concepts presented in the reading assignments.

In-class discussion and exercises — We will have an opportunity during each class period for discussion of the reading and information presented in class. We will also occasionally have in-class exercises, such as problem sets, small group work, or in-class writing assignments.

Laboratory exercises — You will have the opportunity to gather real biological data and apply the concepts learned in class through laboratory exercises. Some of these exercises will be guided; others will be inquiry-based and will model the way biologists ask questions about ecology and evolution. You will receive more information about the laboratory exercises from the laboratory instructor during your first lab class meeting.

Field Trips — You will have the opportunity to expand on your knowledge of biology through field trips. Some of these field trips will occur during your laboratory class periods. However there is one all-day field trips: to the Oregon Institute of Marine Biology (on **Saturday, May 19th**), and an evening “field trip” to see a presentation by renown evolutionary biologists Peter and Rosemary Grant (**Thursday May 3rd at 7pm** in Straub 156).

How I Will Evaluate Your Learning

Preparation (10%) – Your preparation will be evaluated through homework and in-class quizzes.

Participation (10%) – Your participation in in-class discussion, in-class exercises, and during the field trips will be evaluated.

Examinations (45%) – midterms (10% each) and final (25%). Exam questions may include questions previously used for homework. The exams will cover material from the reading, the class meetings, and the field trips.

Laboratory assignments (35%) – A handout outlining the expectations for laboratory assignments will be provided.

Important Deadlines

Midterm I: Wed. April 25 (at 7PM).

Lecture by Peter and Rosemary Grant: Thurs. May 3 (at 7pm in Straub 156).

Midterm II: Wed. May 16 (at 7PM).

OIMB Field Trip: Sat. May 19 (all day).

Final exam: Tuesday June 12 (at 10:15AM).

My Expectations

Responsibility. I expect every one of you to take responsibility for your learning. This means coming to class prepared, working hard on class assignments both in and outside of class, and asking questions regularly.

Courtesy. I expect each of you to arrive to class on time, and to respect the views of others.

Honesty. I expect every one of you to abide by the University's policy on academic misconduct, described at

<https://studentlife.uoregon.edu/conduct>

Plagiarism, cheating and other acts of academic dishonesty are serious offenses and will be dealt with accordingly.

About Me

I joined the University of Oregon faculty in September of 2006, after 8 years on the faculty at Stanford University. My research group studies the ecology and evolution of microorganisms, in environments ranging from rainforests to the human body. I am particularly fascinated with the diversity of microbial life and much of my research is focused on understanding the causes and consequences of microbial biodiversity.

Tentative course schedule

The topics on the tentative outline below are subject to change. The time schedule is just a guess -- we will take as long as needed on each subject.

Week	Date	Topic	Reading*
Generation of biological variation			
1	4/2	Introduction to course & topic	
1	4/4	Introduction to evolution	25.1 – 25.2
1	4/6	Natural selection	25.3 – 25.5
2	4/9	Evolutionary processes I	26.1 – 26.3
2	4/11	Evolutionary processes II	26.4 – 26.6
2	4/13	Speciation	27.1 – 27.4
3	4/16	Phylogenetics I	28.1 – 28.2
3	4/18	Phylogenetics II	28.3 – 28.4
3	4/20	Evolution in human medicine	TBA
Maintenance of biological variation			
4	4/23	Introduction to ecology	52.1 – 52.3
4	4/25**	Behavioral ecology	53.1, 53.2, 53.6
4	4/27	Populations I	54.1 – 54.2
5	4/30	Populations II	54.3 – 54.4
5	5/2	Populations III	54.5 – 54.6
5	5/4	NO CLASS	
6	5/7	Communities I	55.1 – 55.2
6	5/9	Communities II	55.3
6	5/11	Communities III	55.4
7	5/14	Ecology in human medicine	TBA
Classification of biological variation			
7	5/16**	Bacteria/Archaea	29.1 – 29.3
7	5/18	Protists	30.1 – 30.3
8	5/21	Plants	31.1 – 31.3
8	5/23	Fungi	32.1 – 32.3
8	5/25	Animals	33.1 – 33.3
Consequences of biological variation			
9	5/28	Memorial Day Holiday	
9	5/30	Energy flow/nutrient cycling	56.1 – 56.2
9	6/1	Global change biology	56.3
10	6/4	Biodiversity	57.1 – 57.2
10	6/6	Ecosystem function	57.3 – 57.4
10	6/8	Humans as ecosystems	TBA

*Numbered readings refer to sections in Freeman, *Biological Science (5th)*, vol 2 *Evolution Diversity and Ecology*, Pearson; TBA = to be assigned. TBA readings will be posted on the class website.

Midterm exam dates/times: **7 PM Wednesday April 25 and Wednesday May 16;
Final Exam date/time: **10:15AM Tuesday June 12**.



BI 283H Ecology and Evolution

Spring 2018 Lab Syllabus and Schedule, University of Oregon

“Biodiversity starts in the distant past and it points toward the future.”—Frans Lanting

Course Information

See lecture syllabus for lecture & exam schedule.

Lab Instructor: Dr. **Laurel** Pfeifer-Meister, 541-346-1549, lpfeife1@uoregon.edu
Office Hour: Friday 1:00 — 2:00 pm or by appointment, room 111 Huestis

GEs: **Anya** Hopple, ahopple@uoregon.edu
Office Hour: Wednesday 9:00 — 10:00 am, room 111 Huestis
Andrew Morris, amorris3@uoregon.edu
Office Hour: Wednesday 11 — 12:00 pm, room 111 Huestis

BULAs: **Elizabeth** Bryan, ebryan4@uoregon.edu
Office Hour: Tues. 1-2:00 pm, 111 Huestis
Alex Miller, amiller9@uoregon.edu
Office Hour: Thur. 12-1:00pm, 111 Huestis
Erica Pledger, epledger@uoregon.edu
Office Hour: Mon. 12-1:00 pm, 111 Huestis

Field Trip: Mandatory “Going Coastal” Field trip Sat. May 19th Depart 6:00 am Onyx parking lot, Return 6:30 pm, lunch provided

Lab Description

In this lab course, you will explore the key principles of evolution and ecology. Our hope is that you will gain a better understanding of the lecture material by encountering it from a different, and often “hands on,”

perspective. We are not trying to train you in research techniques, though you will be introduced to some. Rather, the material presented in lecture will be reinforced and elaborated upon through the manipulation of biological materials and models. You will get the most out of all of the activities if you approach them with questions in mind. Thus, the labs include many questions designed to prompt additional questions from you. This process of posing questions and finding solutions is an important part of the scientific method. So, when you are working on the labs, remember that it is much more important to try to understand what you are doing, while you are doing it, than to mindlessly collect data.

Learning Outcomes

Upon successful completion of the lab portion of this course, you should:

- Reinforce your understanding of the fundamental processes involved in the generation, maintenance, classification, and consequences of biological variation introduced during lecture.
- Understand some common techniques used in studying plant and animal species, phylogenetics, communities, and ecological interactions.
- Apply quantitative reasoning and analysis to biological science problems.
- Be able to read and critically evaluate primary literature in the fields of evolution and ecology.
- Ask questions, test hypotheses, and write reports in the format of a scientific journal.

Lab Format

Though the exercises in this manual are called “labs,” they involve not only measurements and analyses of biological materials, but models, computer simulations, computer-based problem analysis, and hypothetical data. In this way, some of the sessions will be “tutorials.” Lab handouts describe the exercises for each week, give some conceptual background relevant to the exercises, and pose questions pertaining to the problems being addressed. We expect that you will have read and have tried to understand the material in the lab handout when you arrive at your session each week. Short pre-lab homework assignments are designed to motivate you to read and think about the lab exercises for that day. Following a 20-minute quiz (see below) the laboratory will be introduced, and key concepts and practical issues will be stressed. Students will then perform the activities with assistance from the faculty, GEs and BULAs. Generally, students work together in pairs, but collaborations involving larger groups sometimes occur.

How to succeed in this class

- Attend and participate actively in all labs and field trips.
- Ask questions and seek help when you need it (that’s what we are here for).
- Prior to coming to lab, read the lab handout in its entirety (as well as any other assigned reading). Don’t try to answer the pre-lab questions 5-minutes before class starts.
- As you proceed with the exercises, complete the written questions as you go. This is advantageous for two reasons: you’ll understand what you are doing, as you do it, and your lab report will be nearly complete when you finish the session. The idea is to avoid having to reconstruct the important concepts from a bunch of incomprehensible data the night before the lab report is due.
- Get together in small study groups regularly to go over key concepts (this will also help with you with the midterms and final). Try to do this without referring to the lab, book or your notes. This will let you know where the gaps in your knowledge are. There is no better way to learn than teaching others.
- Don’t get bogged down in the details, but instead ask yourself what is the big picture and how can I apply these concepts.

Assignments, Grading Policy, and Academic Integrity

Lab exercises, most of which include a pre-lab assignment, a lab report, and a quiz based upon the exercises and concepts of the previous week will account for 35% of your overall BI 283H grade; the remaining 65% comes from pre-lecture quizzes, participation, midterms and the final exam. **Pre-labs** are worth 50 points each (2.5% of overall grade) and are due at the beginning of your lab session. These will not be accepted late. **Lab reports** vary from 150-200 points in value (13.5% of overall grade) and are usually due at the beginning of the lab session the following week. See the Lab schedule for those deadlines. Reports must be complete, legible, and written in your own words. Even though lab reports are graded and submitted individually, we expect and encourage you to cooperate with your partner and colleagues in preparing your reports. In addition, you should consult with your instructors during the lab session and at office hours if you have questions. 10% will be deducted each day an assignment is late, except in cases of approved emergencies. **Lab quizzes** are worth 150 points each and are graded on a continuous scale (6% of your grade). The lowest quiz score will be dropped. You will also get the opportunity to hone your scientific writing skills by submitting two **reports in the format of a scientific journal**. Your first report which will be the culmination of several experiments using *E. coli* to understand mutation, population growth and competition, will only include the results and discussion sections (3.5% of your grade). Your second report will include all sections from the introduction through discussion on the data we collect during our coast field trip (9.5% of your grade). A late first draft of the field report or peer review will not be accepted. Point values (note this class is out of 10,000 points) and due dates are listed in the Lab Schedule table for each assignment.

Crisis happen. If you are having problems that are interfering with your ability to do the work in this class, please let me know promptly. I am willing to make special arrangements when the need is real and when you have done your best to deal with the situation in a timely manner. If you must miss a lab session and cannot attend a different section for that week (valid reasons include medical emergencies, essential travel, or family emergencies), you may arrange to use data from another student in the class to complete the pre-lab and lab report on your own. Indicate in your lab report whose data you are using. Make this request in writing to me (lpfeife1@uoregon.edu).

Academic integrity and Diversity. We expect

students to complete assignments and exams in a manner consistent with academic integrity. Students must produce original work and cite all relevant sources for ideas, quotations, etc. Academic dishonesty is a serious offense and will be treated according to the guidelines in the Student Conduct Code. Moreover, we expect students to adhere to the University's commitment to freedom of thought and expression of all its members by encouraging open inquiry and respecting a diversity of opinions in this course. Please refer to the Student Conduct Code for more information on the University's Academic Dishonesty Policy and Diversity Education: <http://uodos.uoregon.edu/>

Lab Schedule

Week 1	(4/3, 4) Begin Evolution by Artificial Selection (ongoing throughout the term). Introduction to PCR and a human polymorphism: collect and prepare cheek cell DNA for PCR amplification of the <i>Alu</i> repeat in Chromosome 16.	Week 5	(5/1, 2) Cemetery Demography We will be outside during a portion of the lab, dress accordingly. Artificial selection: Remove plants from water. <i>E. coli</i> Part 2: Population Growth
	Due: Nothing.		Due: Pre-lab questions (50 pts.) Lab Report 4 (200 pts.) Quiz on lab 4 (150 pts.)
Week 2	(4/10, 11) Hardy Weinberg Equilibrium and Population Genetics Artificial Selection: Pollinate selected P_0 plants with bee sticks <i>E. coli</i> Part 1: Evolve resistance in the absence of selective pressure	Thursday	(5/3) Seminar by Drs. Peter and Rosemary Grant "40 years of evolution of Darwin's finches in the Galápagos". 7 pm , Straub 156. (Prelab for week 6– 50 pts.)
	Due: Pre-lab questions (50 pts.) Lab Report 1–Paper summary (150 pts.) NO quiz this week, instead discussion of posted paper.	Week 6	(5/8, 9) <i>E. coli</i> Part 3: Competition Artificial selection: Plant F_1 seeds.
Week 3	(4/17, 18) Genetic Drift, Natural Selection and Sickle Cell Alleles Artificial Selection: Assess "hairiness" of P_0 plants, make selection		Due: Pre-lab (Grants-see earlier) Lab Report 5 (200 pts.) Quiz on lab 5 (150 pts.)
	Due: Pre-lab questions (50 pts.) Lab report 7 (200 pts.) Quiz on Lab 7 and field trip (Replace low score). Rough draft Intertidal Report online 5/25 (200 pts.)	Week 7:	(5/15,16) Barnacle Zone
Week 4	(4/24, 25) Primate Phylogenetics: Reconstructing Evolutionary History Using Morphology and Amino Acid Sequences to Determine Phylogeny		Due: Results and Discussion Section for <i>E. coli</i> experiments 5/18 (350 pts.) NO Quiz or pre-lab this week.
	Due: Pre-lab questions (50 pts.) Lab Report 3 (200 pts.) Quiz on lab 3 (150 pts.)	Saturday	(5/19) Going Coastal: field trip to OIMB. Depart 6 am . Lunch provided (300 pts.)
		Week 8	(5/22, 23) Factors that influence Biodiversity in the Intertidal Zone (OIMB cont.) Introduction to R and Statistics Artificial selection: Assess hairiness of F_1 generation.
			Due: No pre-lab
		Week 9	(5/29, 30) Visit to Global Change Biology research site (leave campus)
			Due: Lab Report 8 (200 pts.) Peer Review online 5/30 (100 pts.) NO Quiz or prelab this week.
		Week 10	(6/5, 6) Final Review session. Due: Final draft of Intertidal Report (online and hardcopy) (350 pts.) NO Quiz or pre-lab this week.