

Syllabus for Evolution (Biology 444)
Pacific University, Fall 2010, 10:30 – 11:35 a.m. MWF
Professor Stacey Halpern

“Nothing in biology makes sense except in the light of evolution.” –Theodosius Dobzhansky

Welcome to Evolution! As the quotation above suggests, the topics we’ll explore this semester are the foundation of the life sciences. That’s because evolution seeks answers to fundamental how and why questions in biology—such as why do organisms or molecules have their current form and function, and how did those forms and functions arise? By the end of this course, I hope to convince you that the processes and results of evolution are not only amazing, but also critically important in understanding other branches of biology and addressing societal issues in fields ranging from medicine to agriculture to conservation.

This course will not always run as a typical lecture course. Instead, you often will need to apply information and ideas to problems in and outside of class. I’ve designed the course this way because I’m committed to creating a class that facilitates your learning and helps you practice skills you’ll use in your life and in your career as a biologist—whether that’s in health care, teaching, research, farming, public policy, or any other application of biology. **For you and the class to succeed, you must come to each class, and you must come prepared to participate.** Preparation may include completing preliminary assignments ahead of time, and always means having a calculator with you.

The scope of this course covers the two main branches of evolution: 1) microevolution, or the causes and mechanisms of evolution; and 2) macroevolution, or reconstructing the history of organisms and life on Earth. Four ideas will recur throughout the term:

1. Evolution is not something that happened only in the past, but continues today and can occur rapidly.
2. Evolution is not always adaptive, but adaptation is a critical force of evolution.
3. Both chances of history and predictable processes affect evolutionary outcomes.
4. Evolution has important applications to current questions and problems in society.

Catalog course description

An introduction to the history, methods, and current questions in evolutionary biology. This course will examine the evidence for evolution beginning with Darwin and ending with our current understanding of the human genome. The course will cover the theory of natural selection, the basis of heredity and variation, population structures and genetics, and the mechanisms of speciation. Special topics include human evolution, molecular evolution, and the relationship of evolution to society, philosophy, and religion. (3 credits)

Goals for the course

I have designed this course to help each student achieve three goals. Use these goals to check your learning periodically during the course.

By the end of this course, students will be able to:

1. use common tools of evolutionary biology (e.g., phylogeny reconstruction, population genetics, etc.) to answer questions about why organisms’ traits occur today and how they arose.
2. apply evolutionary biology tools to understand and solve societal problems related to public health, disease treatment, conservation, and agriculture.
3. critically analyze an evolutionary study, which includes: identifying the key question(s), explicating the results, putting the results in context, critiquing the conclusions, and evaluating fundamental evolutionary hypotheses in light of the new information.

How I will reach you

I will use your Pacific e-mail address to send out occasional but important course information (for example, answers to student questions before exams). Check this account regularly or make arrangements to have messages forwarded to an account you use.

How to reach me

I enjoy talking with students and learn a lot from your questions, insights, and ideas. Please visit!

- Office location: **Strain 209**
- Office hours: **Mon & Fri 2:15-3:30 pm, Thurs 1-2 p.m., and by appointment**. If my office hours don't work for you, please schedule another time.
- e-mail: **shalpern@pacificu.edu**. This is the most reliable way to reach me.
- Mail: I have a mailbox in the division office, **Strain 102**.
- Telephone: **503-352-3109** (extension 3109 on campus).

Texts, required readings, and other important course materials/resources

Herron, Jon C. and Scott Freeman. 2007. *Evolutionary Analysis*, 4th ed. required

This is an excellent textbook—you will need to refer to often. The authors lay out ideas clearly, including calculations. They also do an excellent job of demonstrating the connections between evolution and contemporary issues.

Pechenik, Jan A. *A Short Guide to Writing About Biology*, 6th or 7th ed. highly recommended (on reserve)

This book is very helpful guide to reading, writing, and thinking in the biological sciences—it's a great reference for all your biology courses, and is a required text for capstone.

Journal articles.

We will read and analyze several recent papers from the primary literature. They will be posted to BlackBoard, and may be distributed in class.

Websites: The following websites may be useful. These sites and others are posted to the course BlackBoard site

- text website: http://wps.prenhall.com/esm_freeman_evol_4/0,12596,4023729-,00.html
- understanding evolution (tutorials & links to news): <http://evolution.berkeley.edu/>

My expectations for you in this course

- I assume that all students enrolled in this class are adults who take responsibility for their education. I will work hard to facilitate your learning, but ultimately only you can actually learn the material through focused time and effort. As a reminder, Pacific guidelines state that students should put in 2-3 hours outside of class for every credit; that means working at least 8–12 hours/week on this course outside of class time to pass.
- I also assume that all students in this course are interested in the topic, either because they're biology majors or because they already know how amazing evolution is. I will strive to encourage your enthusiasm for biology and for evolutionary biology.
- For each class, I expect you to come prepared; to participate cheerfully in activities; and to act in a respectful, professional, and responsible manner. In turn, you can expect the same from me. .
- Please be on time for class. Our time is valuable, and I will start promptly.
- If you know you will miss class (e.g., for an approved, scheduled event), please let me know ahead of time. College notices are not sufficient—you must discuss these absences with me before hand. If you miss class, talk to other students in the class to see what you missed and then check with me.
- As part of respectful behavior in class, please be certain to turn off all cell phones during class. Do not text during class. Also, do not leave class to answer a cell phone call. If you have a valid reason to have your cell phone on—e.g., a family emergency in progress—please let me know.

Assessment of learning and grades

I will assess your learning in this course in a variety of ways, including written papers, in-class exams, problem sets, case studies, and active participation in class including case studies, problems, and paper discussion.

Assessments: Total of 575 points for the course

1. Exams (330 points total, 57%)

Exams include a mixture of short answer, essay, data interpretation, and problem solving questions. I design tests to include both basic recall and higher order thinking skills). Homework problems are good practice for exam problems. Some end-of-chapter questions may be useful study tools; focus on the topics we cover in class and assigned readings. Please ask me for sample questions about a week before the exam.

- exam 1 & 2 (100 points each)
- final exam (130 points, semi-cumulative)

2. Homework and in-class assignments (100 points total, 17%)

There are 3 scheduled homework assignments to complete outside of class. In addition, you will work on activities nearly daily in class; some will require you to complete small assignments in between classes.

- Reconstructing trees case—15 points
- In-class activities—35 points
- Problem sets—2 @ 25 points each

3. Paper critiques, discussion questions, and participation (75 points total, 13%)

Three written critiques of class primary literature papers (25 points each). More information in a handout.

4. Independent paper critique (50 points, 9%)

You will pick a topic and paper from a list; research the topic; evaluate the primary literature paper and write a report that explains the context for the paper and critiques it. More information in a handout.

5. Participation and in-class assessments (20 points, 4%)

Participation, discussions of papers in class (4 points each paper discussion)

My expectations for participation include:

- *making a meaningful comment or raising a question about each paper*
- *coming to the discussion well-prepared—e.g., ready to summarize a section of the paper*
- *building on other people's comments to move the discussion forward productively*
- *being a good listener and allowing space for others to speak*

I keep track of who speaks during formal class discussions, and make notes at the end of these class periods for grading. You will receive feedback on your participation along with your graded critique

Seminars (4 pts each)

*You must attend at least two biology seminars or capstone presentations this semester. **The evolution seminar on October 21 is mandatory**—please put it on your calendar now and speak to me immediately if you have a conflict! Seminars are held alternate Thursdays, 4:30-5:30 p.m. (see schedule at end of syllabus). To receive credit, please ask a question in the seminar or submit one via e-mail within one week of the presentation. Additional seminars may be added later—I will announce them in class.*

General participation

I may adjust your grade up or down ½ a grade for exceptionally good or poor participation in class. The standard expectation for participation includes:

- *active engagement with in-class activities (including small-group discussions, case studies, in-class problems, and discussions of readings) and turning in individual or group assignments related to these activities on time. You cannot make-up points if you miss class.*
- *staying on task during class.*
- *working well with your classmates on projects, discussions, and other activities*
- *having a positive attitude*

Policies on assignments:

Assignments are due at the time noted in the syllabus or on the assignment handout. Some assignments may be submitted via e-mail for this course. They must be sent by the time deadline associated with the due date.

Written or printed assignments must be turned in at the beginning of class; if you are late to class, the assignment will receive a partial late penalty. I will accept late assignments with an automatic penalty of 10% per day (24 hour period). **I will not accept assignments more than three days late without prior approval.**

Paper critiques will not be accepted late because class discussion will influence your critique, and problem sets will not be accepted after answer keys have been posted.

Obviously I can make accommodations for extraordinary situations (e.g., hospitalization, family emergency, etc.). Please let me know about emergencies in a reasonable time frame; college policy usually requires you to document these circumstances with the Dean of Students. If you have a planned, approved absence (e.g., off-campus athletic competition, performance, interview, etc.), you must let me know ahead of time and make arrangements for submitting work. E-mail notifications from coaches, advisors, etc. are insufficient—you must communicate with me directly about these absences.

Important note: You must save all returned assignments until the end of the course. If I request to see a graded assignment again and you cannot return it to me, you may receive a zero for that assignment.

Grades Final grades will be assigned based on the percentage of the total points you earn, following the table below. In addition, I may adjust your final grade up ½ grade (e.g., from B to B+) for truly outstanding participation during class or for improvement over the semester; I may adjust your final grade down ½ grade (e.g., from A- to B+) for extraordinarily poor participation during class.

Final grade	Percentage	Type of learning demonstrated
A	93% and higher	Outstanding on all assignments
A-	90-92%	Outstanding on most assignments
B+	87-89%	Very good on all assignments
B	83-86%	Very good on most assignments
B-	80-82%	Good on most assignments
C+	77-79%	Good on some assignments, Fair on others
C	73-76%	Fair on most assignments
C-	70-72%	Fair on some assignments
D+	67-69%	Fair on some assignments, Poor on others
D	63-66%	Poor on most assignments
D-	60-62%	Poor on most assignments, Failing on others
F	less than 60%	Adequate learning not demonstrated on many assignments; failing

Academic Honesty Policy

I take academic honesty very seriously, and I expect you to as well. Academic misconduct is a betrayal of the trust that I have in students, which harms the learning environment for everyone. Most often, the academic misconduct cases I see are examples of unintentional plagiarism. Lack of intent does not excuse plagiarism. Please prepare written assignments carefully, and make sure you are familiar with the different kinds of plagiarism.

In short, I expect students to know and adhere to the university's "Code of Academic Conduct" policies; please carefully read them in the College of Arts and Sciences catalog. For this course, that includes proper attribution of ideas and information in written assignments and completing all individual work on your own. Academic honesty does not preclude discussing ideas with other students, studying together for exams, working with

others on problems, or providing each other feedback on written assignments **as long as the text, ideas, and problem solutions you turn in are in your own words.**

Pacific University and I have a zero-tolerance policy for academic misconduct, including plagiarism and cheating. It is university policy that all acts of misconduct be reported to the Dean's Office. Sanctions for documented cases of misconduct range from a zero on the assignment, failing the course, and suspension or dismissal from the university. Please talk to me before you turn in assignments if you have a question about what constitutes dishonesty.

As a reminder, here are *some* examples of academic dishonesty and plagiarism:

- Copying answers for problem sets from someone else;
- Cutting and pasting phrases, sentences, or larger sections of text from textbooks, articles, or websites without proper citation;
- Re-using an assignment from another class;
- Turning in some one else's work as your own;
- Changing one or two words in a sentence from another source, or changing the order of phrases in a sentence (this is called mosaic or paraphrase plagiarism);
- Presenting someone's ideas without giving them credit, so that it appears the ideas are your own.

College resources

There are many free services available at Pacific to help you succeed in your courses. I can help connect you with these resources, including academic and non-academic support services. Some of these services are listed below, and I strongly encourage you to take advantage of any that may be helpful.

Writing Resource Center The WRC provides a friendly, non-judgmental environment where students can receive free one-on-one help with their written assignments. In a writing session with one of our consultants, students may discuss their papers at any point in the writing process from brainstorming ideas or clarifying the points within their essays to finding strategies for improving organization, grammar, and punctuation.
<http://www.pacificu.edu/wrc/index.cfm>, consultants available Sun-Thurs 12-3 p.m., 7-10 p.m. in UC 104

Student Counseling Center The counseling center offers individual counseling, crisis services, referrals, and workshops. They also have information on-line or in their office about issues such as stress management and sleep. 503-352-2191, Mon-Fri 9 a.m. – 5 p.m., <http://www.pacificu.edu/studentlife/counselingcenter/>

Reasonable accommodations for students with documented disabilities

I request that any students with disabilities or special needs that affect their capacity to participate in this class or to meet class requirements bring this to my attention. Pacific University has resources available, and I can make reasonable adjustments to accommodate documented needs. It is the responsibility of each student with a disability to contact and work with the office of Learning Support Services (LSS). Students who wish to document needs should contact Edna K. Gehring, Director of LSS, at extension 2107 (503-352-2107 from off campus) or gehringe@pacificu.edu. She will meet with such students, review the documentation of their disabilities, and discuss the services Pacific offers and any required ADA accommodations for specific courses.

To receive accommodation, you must make arrangements with me at least 1 week prior to the due date or exam.

Creating an effective learning environment

I strive to create a comfortable, interesting learning environment for everyone, and I welcome feedback on my teaching and the course at any time.

Topics and Readings

The schedule below summarizes readings and major assignments for the course. It is subject to change as the course unfolds. I will announce any adjustments to readings and assignments in class. If you are absent from class for any reason, you are responsible for checking with other students or me to get changes announced that day. Assignments are due at the beginning of class. **Be aware:** if you are late to class, you will receive the late penalty on the assignment.

Note: Unless I tell you otherwise in class, I recommend skimming the reading before class and only reading carefully after class so you know what to focus on.

Wk	Dates	Topic/Class activities	Readings	Assignments due
Part 1: Foundations				
1	Aug 30	Introduction	Ch. 1 Pechenik p. 23-28 (reading data)	
	Sept 1	Evidence for evolution	Ch. 2	
	Sept 3	Tree thinking	p. 50-53, Ch. 4 through 4.2 (p. 111-130) reading handed out in class Wed	Tree reconstruction case study parts 1 & 2
2	Sept 6	No class—Labor Day		
	Sept 8	Tree thinking		
Part 2: Microevolution—principles & applications				
	Sept 10	Darwin's postulates	Ch. 3 through 3.4, 3.6 (p. 73-90, 94-97) Section 5.4 (p. 160-66), Box 3.1 (p. 84), Sect. 9.1 & 9.3 (p. 319-324, 333-338)	
3	Sept 13	Mutation	Ch. 5 through 5.3 (p. 143-160) p. 210-212	
	Sept 15	Mutation		Tree case study report
	Sept 17	Hardy-Weinberg equilibrium	Ch. 6.1 (p. 169-182), Box 6.5, Box 10.1	
4	Sept 20	Selection—qualitative traits	Ch. 3.5 (90-94) Ch. 6.2 – 6.4 (p. 182-218)	
	Sept 22	Selection—qualitative traits		
	Sept 24	Selection—qualitative traits		Problem set #1
5	Sept 27	EXAM 1	through selection—qualitative traits	
	Sept 29	Selection—quantitative traits	Ch. 9.4-9.5, 9.7 (p. 338-346, 350-355)	
	Oct 1	Selection—quantitative traits	review 9.1 and 9.3 if needed	
6	Oct 4	Drift, gene flow, & non-random mating	Ch. 7 except 7.3 (continued for next week)	
	Oct 6	Paper discussion	Reale et al. 2003. Genetic and plastic responses of a northern mammal to climate change. Proc. Roy Soc London 270: 591-596	Paper critique #1
	Oct 8	No class—midterm break		
7	Oct 11	Drift, gene flow, and non-random mating		
	Oct 13	Drift, gene flow, and non-random mating		
	Oct 15	Drift, gene flow, and non-random mating		
8	Oct 18	Linkage and QTLs	Ch.. 8.1 (281-295), 9.2 (324-333)	
	Oct 20	Detecting selection	Ch. 7.3, 15.3	
Part 3: Adaptation—the evolution of complex and sometimes costly traits				
	Oct 22	Adaptation	Ch. 10 through 10.4, 10.8 (p. 363-380, 395-396)	
9	Oct 25	Paper discussion	Borderia et al. 2007. Selection promotes organ compartmentalization in HIV-1: Evidence from <i>gag</i> and <i>pol</i> . Evolution 61:272-279.	Paper critique #2
	Oct 27	Kin selection & altruism	Ch. 12	Problem set #2
	Oct 29	Kin selection & altruism		

Wk	Dates	Topic/Class activities	Readings	Assignments due
10	Nov 1	Exam 2	through kin selection	
	Nov 3	Sexual selection	Ch. 11	
	Nov 5	Sexual selection		Final paper bibliography
11	Nov 8	Sexual selection		
	Nov 10	Origin of life	Ch. 17	
	Nov 12	Paper discussion	Paczolt & Jones 2010. Post-copulatory sexual selection and sexual conflict in the evolution of male pregnancy. Nature 464: 401-404	Paper critique #3
Part 4: Macroevolution—history of life on Earth				
12	Nov 15	Origin of multicellularity		
	Nov 17	Origin of animals	Ch. 18 through 18.2	
	Nov 19	Origin of innovations— evolutionary development	Ch. 19	
13	Nov 22	Origin of species	Ch. 16.2-16.4, 18.3	
	Nov 24	No class—Thanksgiving		
	Nov 26	No class—Thanksgiving		
14	Nov 29	Extinction	Ch. 18.4	
	Dec 1	Human evolution	Ch. 20	
	Dec 3	Evolutionary medicine	Ch. 14.1	Final paper
15	Dec 6	Evolution & society		
	Dec 15	FINAL EXAM, 8:30-11 a.m.		

Biology Seminar Series, Fall Semester

All seminars are held in Strain 121. Cookies will be available at 4:15 p.m., seminar will start at 4:30.

Date	Speaker	Title or topic of talk
Thursday, Sept 9	Dr. Mary Bricker , Biology Department, Pacific University	Seed predation by mice alters the population dynamics of native plants in Montana prairies
Thursday, Sept 23	Dr. Anne Krutchen , Biology Department, Linfield College	Tentative title: Molecular basis of metastasis in bone cancer
Thursday, October 21	Dr. Greta Binford , Biology Department, Lewis & Clark College	Why are brown recluse venoms so toxic? Answers based on comparative evolutionary analyses
Thursday, Nov 4	Dr. Cynthia Cooper , School of Molecular Biosciences, Washington State University, Vancouver	What zebrafish stripes can tell us about human pigmentation and disease
Thursday, Nov 18	Dr. Susan Hormann , Portland Forensic Laboratory	The Past, Present and Future of Forensic DNA Analysis

Evolution Contract of Understanding, Fall 2010 Turn in Sept 1

I have read the syllabus completely and understand course requirements. I also understand the course policies, including those regarding academic honesty, late assignments, and keeping all graded work. I recognize that it is my responsibility to seek clarification regarding any aspect of the syllabus, the course requirements, or the grading policies if they are unclear to me.

Signature: _____ Date: _____

Name (printed): _____

Student Information This information helps me tailor the course to your backgrounds.

e-mail address: _____ Year So Jr Sr

Major: _____ Minor (if you have one): _____

Your height: _____ Height of each biological parent (if known): _____

Height of any full siblings (same biological mom & dad): _____

Other courses this semester (names, please)

Previous upper division biology/science courses—check ones you’ve taken

- Research methods
- Evolution
- Principles of Development
- Cell Biology
- Immunology
- Biochemistry
- Junior Seminar
- Galapagos
- Plant Biology
- Cancer Biology
- Conservation Biology
- Other: list
- Animal Behavior
- Tropical Rainforest
- Animal Physiology
- Genetics
- Toxicology
- Marine Biology
- Vertebrate Zoology
- Microbiology
- Molecular Biology
- Organic Chemistry

Previous college math & computer science classes—circle the classes you have taken:

statistics (which one?) _____ linear algebra _____ calculus (what level?) _____
computer science, software tools _____ other(s) _____

Please circle any of the following library/database tools that you feel comfortable using:

JStor Biosis Web of Science ILL (interlibrary loan) Summit

Extracurricular activities this term

One reason you’re taking this course, or one way this course fits into your major or career plans

Do you have any concerns about this course? If so, how can I help you overcome them?