BBIO 466: Evolution
Science and Technology Program
University of Washington, Bothell, Winter 2010
3:30 – 5:30 Tu (UW1-030) and Th (UW1-121)

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Office Hours:
Th 1:30 – 3:30 and
by appointment

Description

Evolution frames all biological thinking; by the end of this course, you will understand why. We will begin by comparing microevolutionary and macroevolutionary processes, continue by exploring the different mechanisms that can quickly change the genetic makeup of populations, and continue by designing our own simulation experiments to test hypotheses about how organisms will evolve. You'll read lots of primary literature that presents new and exciting discoveries in evolutionary research, including the treatment of HIV, health and crop management. These activities will teach you how to depict and decipher evolutionary relationships.

Skills and Outcomes

- Compare microevolutionary and macroevolutionary processes, forming an argument about whether the difference between them is mechanistic.
- Interpret and critically evaluate graphs and tables that present evolutionary data.
- Apply simulation as way to explore evolution and to conduct mini-experiments.
- Present the results of your learning in informal and formal discussions.
- Find and evaluate primary articles about evolutionary research.
- Develop foundational knowledge that would allow you to pursue research in evolution.

Readings and Websites

Selected articles, assignments, notes, documents, etc. are present through links on the course website on Blackboard. This website contains links to ERes (where you'll find selected readings), assignments, the gradebook and other resources. Blackboard functions best when you use Internet Explorer as your web browser.

Your primary text is the multimedia series of lessons written by SimBio virtual labs called EvoBeaker. Please bring the SimBio workbooks *and* CD with you to class. I will only accept original workbooks, not photocopies. SimBio keeps their software affordable by guaranteeing that all students need to purchase it. We will complete seven labs:

Flowers and Trees
Hardy, Weinberg and Kuru
Sickle-Cell Alleles
Domesticating Dogs
Darwinian Snails
How the Guppy Got Its Spots
Evolutionary Evidence

We are also reading Neil Shubin's *Your Inner Fish: A Journey into the 3.5-Billion-Year History of the Human Body* (2008, Pantheon), an award-winning popular science book that explores the exciting new field of evo-devo. Shubin's research truly combines micro- and macroevolutionary studies. He is a developmental biologist and paleontologist.

The following text is on reserves at the library for your reference: Freeman and Herron, 2007, *Evolutionary analysis* ed 4. Upper Saddle River, NJ : Pearson Prentice Hall, c2007.

Other excellent resources for additional background information are

- Understanding Evolution, http://evolution.berkeley.edu/
- The National Evolutionary Synthesis Center, NESCent: http://www.nescent.org/

Prerequisites

BES 180 or equivalent, or instructor's permission.

Assumptions

Because this is a 400-level course, there's a certain amount of knowledge that I expect you already have. I assume that you

- have a basic knowledge of evolutionary principles and genetics (as would be gained from an introductory biology course).
- are comfortable calculating simple probabilities (for example to solve Hardy-Weinberg equations).
- know how to use the library to find scholarly articles, and that you are familiar with the Web of Science database.
- know and can emulate the format of a scientific paper.
- will revise your work many times before you turn it in.

How to Succeed

- Attend class. Arrive on time.
- Participate. Read the course material, enter into discussions, ask questions when you are confused and help your classmates master the material.
- Be courteous. Don't use cell phones in class. Be quiet when others are talking.
- Use your computer in class to help you complete your course work. If you are using your computer inappropriately (e.g., email, facebook, browsing on unrelated topics), I will ask you to stop so that you aren't distracting other students; in extreme cases, I will ask you to leave.
- Your classmates depend on you to complete your work on time. All of your assignments—except the workbooks—are due electronically, so even if you have to miss class, you can still complete your work. If you know ahead of time that you won't be able to complete an assignment, email and speak to me *at least one week prior* to the scheduled due date to request accommodation; I will decide whether to grant your request. Otherwise, I do not accept late work.

- Practice academic integrity. In particular, don't plagiarize. See the UWB General Catalog and the policy statements at www.uwb.edu/academic/policies/academic-conduct for crucial information regarding campus-wide policies about academic integrity. You are responsible for knowing what constitutes a violation of the University of Washington Student Code, and you will be held responsible for any such violations even if they were not intentional. The campus has compiled

two extremely useful website with resources about avoiding plagiarism: www.uwb.edu/library/guides/research/plagiarism.html and www.uwb.edu/learningtech/plagiarism.

- When you have questions, use class time, office hours, and email to obtain answers. I do my best to answer email messages within 24 hours during the work week, although I tend not to check email over the weekend. I encourage attending offices hours or scheduling an appointment to receive one-on-one help or to discuss any topic in greater depth. I will answer questions pertinent to a particular assignment up until 5 pm the day before it is due.
- Additional support services are available to help you succeed:

Library	library.uwb.edu/	425-352-5340
Writing Center	www.uwb.edu/WritingCenter/	425-352-5253
Quantitative Skills Center	www.uwb.edu/qsc	425-352-3170
Student Success and Career Services	www.uwb.edu/studentservices/success-services	425-352-3776
Student Counseling Services	www.uwb.edu/studentservices/counseling	425-352-3183

- I encourage students with disabilities who would like academic accommodations to contact Disability Support Services at (425) 352-5307 (phone), (425) 352-5303 (TDD), (425) 352-3581 (FAX), or dss@uwb.edu. They will be happy to provide assistance. You will need to provide documentation of your disability as part of the review process that determines what accommodations to offer you. See www.uwb.edu/students/services/dss/index.xhtml for more information.

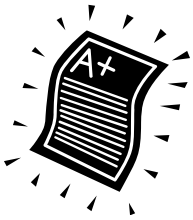
Inclement Weather

The campus may be closed due to inclement weather. Check the status of campus operations from the website or by calling the Campus Information Hotline (425) 352-3333. You may also sign up with an alert system that will contact you via email or text message if classes are canceled (www.uwb.edu/alert). Class activities will be rescheduled as needed.

Assignments

Please note that I do not accept quotations in ANY written assignments. I want you to practice paraphrasing scholarly writing. For every quotation that you use, I will deduct 5% from your grade.

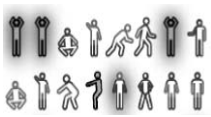
Quizzes



Quizzes will be multiple choice, short answer or a combination of both. The quizzes are based on the SimBio workbooks and the discussion questions that you will receive in class. Generally, the quizzes will take place right at the beginning of class, and they will be administered through Blackboard. Thus, if you can't make it to class that day, you can still take the quiz, so long as you begin it when class starts. The quiz will close when all of the students in the classroom have finished it.

Occasionally, you'll have a take-home quiz. Take-home quizzes are, of course, open-book.

Performance based on Hardy-Weinberg conditions

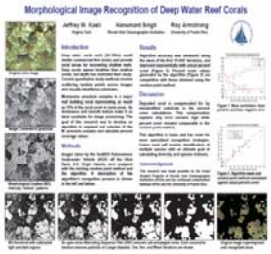


In this course we are studying the power of simulating evolution. We'll explore natural selection through a role-play simulation, an opportunity to literally move through the process of natural selection. You'll work in groups to develop similar

performances that explore the other Hardy-Weinberg conditions.

Poster Based on Darwinian Snails

We will practice making posters throughout the quarter, but most of these will be quick sketches that you draw in class. You final project provides the opportunity to construct an excellent poster, the kind that takes multiple drafts and is built with professional illustration software like Adobe Illustrator (or even with MS PowerPoint). You will design a poster to present the novel research experiment you conduct with the Darwinian Snails simulation. You'll have all the traditional components of a scientific paper (Abstract, Introduction, Materials and Methods, Results, and Discussion), which will give you the chance to articulate the hypotheses that you test, to explain the experimental design that you developed, to analyze your data and to interpret it in the context of the scientific literature. To avoid the expense of printing your poster, you will submit it electronically via Blackboard.



Workbooks and Homework

Come to class prepared—readings read, workbooks finished, homework completed—and ready to work with your groups. I will collect workbooks the day of the quiz and grade some of the questions.

Participation & Surveys

You will periodically take surveys so that your professor can check in with you to see how well you, as a class, understand the material being presented. These surveys will be administered online, and you will receive full credit just for taking them. Please do your best, so that I have an accurate representation of you understanding. Your final participation grade will also be determined by the dedication you show during in-class and out-of-class activities.

Incompletes

I The University states that "an incomplete is given only when the student has been in attendance and has done satisfactory work until within two weeks at the end of the quarter and has furnished proof satisfactory to the instructor that the work cannot be completed because of illness or other circumstances beyond the student's control."

Evaluation

Assignment	Percentage
Quizzes (drop lowest grade)	20
Performance based on Hardy-Weinberg conditions	20
Poster Based on Darwinian Snails	20
Workbooks and Homework	30
Participation & Surveys	10
Total	**100**

Use the table below to convert your points to a grade. Note that the bins in this table overlap, affording me some flexibility in how I determine your grade. Thus, if your performance improves drastically, or if

I feel that your assignments do not reflect your clear and innovative thinking, I will boost your grade. However, once grades are assigned, I will not change them!

Your points	94 – 100 %	90 – 94%	86 – 90%	82 – 86%	78 – 82%	74 – 78%
Grade	3.9-4.0	3.6-3.9	3.2-3.6	2.8-3.2	2.4-2.8	2.0-2.4
Your points	70 – 74%	66 – 70%	62 – 66%	60 – 62%	<60%	
Grade	1.6-2.0	1.2-1.6	0.8-1.2	0.7	0.0	

Proposed Outline

Do this to prepare for class…	**in…**	**on .**	**We'll discuss**
		Tu 1/4	Class canceled
		Th 1/6	Introductions
I. Microevolution and macroevolution – are they the same?			
Skull lab, Shubin (1-80)		Tu 1/11	Skull Lab
SimBio: Flower and Trees **Syllabus Quiz** **Plagiarism Quiz (requires 100%)**		Th 1/13	Flowers and Trees Questions Skull lab Questions Deep time
Shubin (81 – 147) **Tree thinking survey**		Tu 1/18	Shubin
Shubin (finish) **Flowers and Trees workbook due** **Study for quiz**		Th 1/20	No face-to-face meeting Skull Lab, Flowers and Trees Quiz Shubin Discussion Board
Watch "What Darwin Never New" http://www.pbs.org/wgbh/nova/evolution/darwin-never-knew.html; identify a section to research **Macroevolution survey**		Tu 1/25	Natural selection
II. Hardy-Weinberg Conditions			
SimBio: Kuru		Th 1/27	Questions about Kuru
Natural selection questions		Tu 2/1	Review natural selection questions Performances – work day

SimBio: Sickle Cell **Kuru workbook due** **Study for quiz**		Th 2/3	Kuru Quiz Questions about Sickle Cell
Human health literature search HIV reading		Tu 2/8	Evolution and human health Evolution of HIV
SimBio: Dogs **Sickle cell workbook due** **Study for quiz**		Th 2/10	Sickle cell quiz Questions about Dogs
Performances – DUE		Tu 2/15	Performances
Review Hardy-Weinberg **Dogs workbook due** **Study for quiz**		Th 2/17	Hardy Weinberg & Dogs Quiz Testing adaptation
Testing adaptation worksheet		Tu 2/22	Testing adaptation, cont'd
III. Experimental Design			
SimBio: Darwinian Snails **Study for quiz**		Th 2/24	Testing adaptation Quiz Questions about Darwinian Snails
Tree-thinking survey Darwinian snails: experimental design		Tu 3/1	Darwinian snails
SimBio: Guppies **Darwinian Snails workbook due** **Study for quiz**		Th 3/3	Darwinian Snails Quiz Questions about guppies
		Tu 3/8	Research in Progress talk
SimBio: Evolutionary Evidence **Guppies workbook due** **Study for quiz** Questions about RIP		Th 3/10	Guppies Quiz Questions about Evolutionary Evidence
Poster		**Tu 3/15**	**Due at 3:30 sharp on Blackboard.**

 UW1-030,  UW1-121,  professor at conference