

## **BIOL 3020: Evolution, Fall 2015**

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*"Nothing in biology makes sense except in light of evolution."* -- Theodosius Dobzhansky (1973), geneticist & zoologist

The quotation above is one that is known to every biologist. Evolution is **the** central and unifying principle of modern biology and is an experimental, observational, mathematical and correlative science. In this course we will explore major concepts, hypotheses, experiments and case studies to understand and investigate mechanisms of evolutionary change (e.g., natural & sexual selection, mutation, recombination, genetic drift, gene flow).

### **COURSE REQUIREMENTS**

Satisfies G.E. area F1. Students must have a Junior standing to take this course.

**Biology Majors:** Note this class does not fulfill your undergraduate G.E. requirement, and if your catalog year is 2009 or more recent, it will not count as a Biology elective. Consult with your advisor to make sure you should be in this course.

### **REQUIRED TEXTS/MATERIALS**

- *The Tangled Bank: An Introduction to Evolution*, 2nd edition, by Carl Zimmer.

### **CENSUS DATE**

Students must attend **all** of the first three class sessions or they will be dropped from the course.

This course can be taken for a letter grade, or it can be taken on a credit/no credit basis. Students can only drop this course prior to the census date of September 21. Before the census date they can change their grading option without my permission, but after the census date it requires my signature on the "Registration Options" form to do so. I am willing to sign this form up to the last class meeting (December 11).

### **GRADING PROCEDURE**

Blackboard quizzes	200
In-class essay	50
Group poster assignment	
Participation	100
Presentation	100
Total	450 points    No +/- grading will be applied to your final grade.

### **BLACKBOARD QUIZZES**

There will be a weekly quiz over each assigned chapter, for a total of 10 quizzes. Quizzes will be timed (~30-45 minutes), and will typically consist of several multiple choice or true/false questions. Questions can come from lecture, BB items, and in-class videos.

### **IN-CLASS ESSAY**

There is a link to the NOVA special "What Darwin Never Knew" posted on the Blackboard site for this course. This is a 2-hour special aired in 2011, and it is very entertaining. It should help you understand much of the material we discuss in this course. I suggest that you watch it in the first week or two of the semester, and then return to it again in Week 7. In week 8, you will be expected to write an in-class essay about this article, responding to a specific question that I provide (you will be allowed to choose from a set of possible questions).

## **POSTER PRESENTATION (GROUP ASSIGNMENT)**

Each student in the class will select a topic relating directly to evolutionary biology, from a list of available topics provided by the instructor. Topics will be posted on Blackboard under the “Groups” tab. All students in a group will work together to search for material on this topic, and create a **single** poster to present as a group at the end of semester Poster Session. All of the posters will be pinned to the classroom walls, and some group members will stand by the poster and answer questions, while other group members walk around and evaluate the posters of other groups. Midway through the session, circulating group members will trade places, and stand by their poster for the remainder of the session while their partners take their turn to evaluate other group’s posters.

Participation points (100) can only be earned by documenting your contributions on Blackboard.

Each group member’s contribution to the poster will be documented using the following structure:

1. Every topic is complex and multi-layered. The group’s Discussion Board will be used to discuss what each group member will focus on. Every group member chooses a different aspect of the topic to research.
2. Each group member creates a new wiki page for their research focus, with a title like “Becky Ross, Genetic Drift Poster, Environmental influences”.
3. Group members will post their section summary **on their wiki**, and other group members will use the “Comments” tab to make suggestions and revisions.
4. More lengthy discussions **about poster formatting** can be documented on the group’s Discussion Board.
5. To earn full points, a group member must:
  - post their own work on their own wiki
  - make constructive comments regarding **every other** group member’s work on member wikis
  - discuss the formatting, organization, and printing of the poster on the Discussion Board

**Any contributions which are not documented in this way (emailing, texting, Google Docs, etc.) won’t be considered for credit.**

It is easy to use Microsoft PowerPoint to prepare a poster presentation, simply by adding components (text boxes, images) to a single slide. You must format the slide as a custom size and indicate how large a print you want your final poster to be. **Your poster for class must be printed on a large format printer at a professional printing service (Kinko’s, Staples, etc), and must be a minimum of 42 x 48 inches in size.** Although I provide some rough guidelines for pricing below, talk to your print shop ahead of time to find out at what size they print posters, cost, and how long it takes. **Color printing is not required, but your poster will be assessed by other students and color posters tend to achieve higher assessments.**

- The main goal of a poster is to relate the main points of your topic with as little effort as possible on the part of the audience to read, interpret, and understand. Clearly explain the ideas with very short, concise sentences. **Use bullet points instead of paragraphs when you can.**
- Use a large enough font size (to test this, print your poster on a single letter size sheet and hold at arm’s length...can you read it?)
- Sections should have appropriate labels.
- Include a Title, and the list of student authors.
- Graphics are required (figures, special equations, photos). Do not include figures unless they are needed to convey or explain data...don’t include pictures just because they add “pizzazz”. Make sure your figures aren’t fuzzy and pixelated when they are magnified to poster-size.
- Include a short list of the sources you used (the Ebstein *et al* paper, OMIM, NCBI, Center for Evolutionary Psychology, new media) on a separate sheet of paper, to post up next to your poster.
- **Do NOT plagiarize sources. Re-write everything in your own words. Plagiarism is very easy to detect using Google and specialized software, and if I detect plagiarism in your work I will regretfully give you an F in the course.**

## **PERSONAL INTEGRITY**

It is assumed that you have read and understood the university's position on academic integrity and student discipline. Students are expected to conduct themselves responsibly and will treat instructors, their fellow students, the facilities, and course materials with courtesy and respect. Inappropriate behavior (including, but not limited to, cheating and/or plagiarism) will be dealt with as severely as university and state regulations allow.

Turn your cell phones to vibrate when you arrive each day, and **do not text in class. It is rude.**

Use of laptops to take notes is forbidden; take notes by hand. I will not be making PowerPoint lectures available for student download. You are responsible for taking notes during lecture.

## **STUDENT LEARNING OBJECTIVES:**

1. Students will be able to distinguish between different processes that lead to evolutionary change in organisms (i.e., natural selection, mutation, recombination, gene flow, genetic drift, sexual selection).
2. Students will be able to communicate examples of evidence for evolution from genetics, biogeography, paleontology, comparative anatomy, biochemistry, molecular biology & physical anthropology.
3. Students will be able to construct an historical timeline of people, places & events that shaped understanding & development of the modern theory of evolution & its processes.
4. Students will be able to demonstrate knowledge of relationships between evolution & biological diversity through scientific understanding of common ancestors & phylogenetic relationships of fossils & living organisms (i.e., "tree thinking") and speciation events.
5. Students will have enhanced understanding of the peer-reviewed literature in science, its decentralized, cumulative, self-correcting, & hypothesis-testing features, & be able to distinguish it from pseudoscience, such as "creation science" & intelligent design.

## LECTURE OUTLINE

Reading assignments listed on the course outline are for *The Tangled Bank* by Zimmer.

Extra content: Links to “BB” items can be found on the BIOL 3020 Blackboard site.

Day	Lecture and (Presentations)	Reading	Extra Content
Week 1 Aug 24-28	Introducing Evolution	Ch 1	In-class video: Understanding Evolution BB video: How do we know evolution happens?
Week 2 Aug 31-Sept 4	History of Evolutionary Biology	Ch 2	BB module: Science and Faith
Week 3 Sept 7-11	Geology, Paleontology, History of Life	Ch 3	<b>Monday: Labor Day Holiday</b> In-class video: Great Transformations BB module: What Killed the Dinosaurs?
Week 4 Sept 14-18	Phylogenetics	Ch 4	BB module: Who's Who in Human Evolution
Week 5 Sept 21-25	Genes and Mutations	Ch 5	<b>Monday: Census Date</b> BB video: Epigenetics
Week 6 Sep 28-Oct 2	Genes and Mutations cont.		<b>Friday: Deadline to join poster group</b>
Week 7 Oct 5-9	Genetic Drift and Natural Selection	Ch 6	BB video: How does evolution really work?
Week 8 Oct 12-16	Molecular Evolution	Ch 7	<b>Friday: In-class essay</b>
Week 9 Oct 19-23	Adaptation	Ch 8	BB Poll: Is Intelligent Life Inevitable?
Week 10 Oct 26-30	Sex, Sexual Selection and Family	Ch 9	In-class video: Why Sex?
Week 11 Nov 2-6	Sexual Selection cont.		BB article: The Evolution of Motherhood
Week 12 Nov 9-13	Speciation	Ch 10	BB video: Evolution in Action: Salamanders <b>Wednesday: Veteran's Day Holiday</b>
Week 13 Nov 16-20	Macroevolution	Ch 11	<b>Friday: In-class poster draft review</b>
Week 14 Nov 23-27	Co-Evolution	Ch 12	In-class video: Evolutionary Arms Race <b>Thursday-Friday: Thanksgiving Holiday</b>
Week 15 Nov 30-Dec 4	Evolution of Behavior	Ch 13	BB article: The Nurture of Nature
Week 16 Dec 7-11	Human Evolution	Ch 14	BB video: Did humans evolve? BB Poll: Babies by Design
Week 17 Dec 14-18	<b>Poster Session</b> Friday, December 18 11:15 am-1:15 pm in regular classroom		