

## BIOL 3020 Introduction to Evolution FALL 2019

Dr. Jennifer Cooper  
Office hours: M 9:30 - 11:00  
Th 12:15 - 1:45

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Write BIOL 3020 in the subject line!  
Check your Stan State email every day!

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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

#### Non-Biology majors:

If your catalog year is 2017-18 or earlier, this course satisfies G.E. area F1.  
If your catalog year is 2018-19 or later, this course satisfies G.E. area UD-B.

#### Biology majors:

BIOL 4400 is the Evolution course that is required for all Biology majors. Can you take BIOL 3020 as an elective?  
If your catalog year is 2017-18 or earlier, this course may **not** be used as an elective for the major.  
If your catalog year is 2018-19 or later, this course satisfies G.E. area UD-B, or it may be used as an elective for the major. 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 19. 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 10).

### PERSONAL INTEGRITY AND CLASSROOM BEHAVIOR

It is assumed that you have read and understood the university's position on academic integrity and student discipline. **Cheating and plagiarism will be dealt with as severely as university and state regulations allow.** This includes receiving an F in the course, and being reported to University Judicial Affairs.

**Do not text in my class. It is rude.** Turn your cell phones to vibrate when you arrive each day. I will not be making PowerPoint lectures available for student download. You are responsible for taking notes during lecture. Use of laptops is not allowed; take notes by hand. You may audio record the lecture.

### GRADING

Grades are determined by the points you earn during the course. I reserve the right to use +/- grades, rather than whole letter grades. Although your scores will be archived on **Blackboard**, I expect you to keep all graded scantrons for the term.

iClickers	150
Exam 1	100
Exam 2	100
Final Exam	150

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, under “External Links”.

Note: the “Lizard Evolution Virtual Lab” will be used several times, but I only provide a single link.

Week	Lecture Topic	Reading	Extra Content
8/19	Syllabus		Evolution of Baleen in Whales
8/26	Introducing Evolution	Ch 1	In-class video: Your Inner Fish In-class video: Your Inner Reptile
9/2	<b>9/2 LABOR DAY NO CLASS</b> Introducing Evolution		BB module: Fish or Mammal? BB article: Gene for Sunscreen
9/9	History of Evolutionary Biology	Ch 2	BB module: Things you may not know about evolution
9/16	<b>Sept 19 Census Date</b> Geology, Paleontology, History of Life	Ch 3	BB module: What Killed the Dinosaurs? In-class video: Great Transformations
9/23	Phylogenetics	Ch 4	BB module: Tree Diagrams BB module: Evidence for Common Ancestry BB module: Interactive Phylogenetic Tree BB module: Lizard Evolution: Module 2, Phylogeny <b>Exam 1 Friday</b>
9/30	Genes and Mutations	Ch 5	BB module: What are DNA and Genes? BB module: Transcribe and Translate a Gene BB video: The Epigenome at a Glance BB article: The Epigenome Learns from its Experiences
10/7	Genetic Drift and Natural Selection	Ch 6	BB video: The Biology of Skin Color BB module: Rock Pocket Mice BB module: Reproductive Advantage Simulation BB video: How does evolution really work?
10/14	Molecular Evolution	Ch 7	BB module: What is Mutation? BB module: Shared Genes, Shared Functions
10/21	Adaptation	Ch 8	BB module: Adaptation BB module: Lizard Evolution: Module 1, Ecomorphs BB module: Lizard Evolution: Module 3, Experimental Data
10/28	Sex, Sexual Selection and Family	Ch 9	In-class video: Why Sex? BB article: The Evolution of Motherhood
11/4	Sexual Selection cont.		<b>Exam 2 Friday</b>
11/11	<b>11/11 VETERAN'S DAY NO CLASS</b> Speciation	Ch 10	BB module: Reproductive Barriers BB module: Hawthorns to Apples BB module: Lizard Evolution: Module 4, Dewlap Colors
11/18	Macroevolution	Ch 11	BB video: Evolution in Action: Salamanders BB module: Bears, Species & DNA BB module: What is a Species?
11/25	Co-Evolution <b>11/29 THANKSGIVING NO CLASS</b>	Ch 12	In-class video: Evolutionary Arms Race
12/2	Evolution of Behavior	Ch 13	BB article: The Nurture of Nature
12/9	Human Evolution	Ch 14	BB video: Great Transitions In-class video: Your Inner Monkey
<b>12/18</b>	<b>FINAL EXAM 11:15 a.m.-1:15 p.m.</b>		

**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.