

BIOL 3020 Introduction to Evolution SPRING 2020

Dr. Jennifer Cooper
Office hours: M 10:00 - 12:00
Th 12:30 - 1:30
Class meeting in Naraghi 101

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

"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.
- iClicker handheld remote voting device. The Reef phone app cannot be used.

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 February 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 (May 15).

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 (although I may post images used in lectures). 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

ICLICKERS

In every class period, you will use your hand-held iClicker remote to answer questions. Questions will test your comprehension of material discussed in class or material you have previously engaged with in the online learning modules. **The points you earn will reward you for attending class and keeping up with the online learning modules. Your engagement with these lower-stakes iClicker questions will prepare you for the larger-stakes exams.**

You will **register** the unique ID number of your iClicker remote on Blackboard in the BIOL 3020 course, using a link that I provide on the Information & Syllabus page. You are responsible for bringing your remote to class, and carrying fresh batteries, so that you are prepared to answer questions the moment you walk in the door. I will begin or end every class period with an iClicker question. Students who forget their remote, or who come to class late or leave class early, will not be allowed to make up the questions that are missed. If you miss a lecture, you cannot make up the iClicker points you may have missed, except in the case of an excused absence (see Attendance Policy below).

EXAMS

The **midterm exams** will focus on material covered in lecture since the previous exam; these exams are not cumulative. The **final exam** will be cumulative, focusing on material covered throughout the entire semester.

All exam questions will be given in a multiple choice format, and answers will be recorded on **882-E** Scantron forms. Erase thoroughly...**if the machine reads your erased answer as incorrect, the automatic score is the grade I record.** When recording your answer, don't mark outside of the bubble. The machine may count your answer as wrong.

Students who arrive after the first exam of the day has been turned in will not be allowed to take the exam. If you must leave the room for personal reasons, you will not be allowed to finish the in-class exam. If you miss an exam for any reason, you must take an alternate exam **before** the in-class exam is scheduled to take place. If you miss an exam, and do not have documentation of a legitimate reason for doing so, you will receive a 0 grade for the missed exam.

ATTENDANCE POLICY

Good performance is tied to good attendance: students who attend lectures regularly tend to perform better than students who skip class. Do not enroll in this class if you have conflicts or other commitments during your lecture period. If you miss class because of an illness, or a legitimate and unavoidable conflict, I **may** excuse your absence. In the case of an excused absence, I will adjust your final grade calculation by the total iClicker points you missed, but you must organize for me to do so. Excused absences include:

1. illness **documented** by a physician (personal illness or a child's illness), or emergencies due to pregnancy
2. **documented** jury duty or military duty, or job-related training sessions
3. CSU Stanislaus athletics games (**documented** by coach; doesn't include team practice)

If you are absent from class for any other reason and have documentation of some sort, then discuss the matter with me. I will not promise to excuse your absence, but if your argument is compelling, I might be persuaded.

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.

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
1/27	Syllabus Introducing Evolution	Ch 1	Evolution of Baleen in Whales In-class video: Your Inner Fish In-class video: Your Inner Reptile
2/3	Introducing Evolution		BB module: Fish or Mammal? BB article: Gene for Sunscreen
2/10	History of Evolutionary Biology	Ch 2	BB module: Things you may not know about evolution
2/17	Geology, Paleontology, History of Life February 21 Census Date	Ch 3	BB module: What Killed the Dinosaurs? In-class video: Great Transformations
2/24	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 Exam 1 Friday
3/2	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
3/9	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?
3/16	Molecular Evolution	Ch 7	BB module: What is Mutation? BB module: Shared Genes, Shared Functions
3/23	SPRING BREAK NO CLASS		
3/30	Adaptation	Ch 8	BB module: Adaptation BB module: Lizard Evolution: Module 1, Ecomorphs BB module: Lizard Evolution: Module 3, Experimental Data
4/6	Sex, Sexual Selection and Family	Ch 9	In-class video: Why Sex? BB article: The Evolution of Motherhood Exam 2 Friday
4/13	Speciation	Ch 10	BB module: Reproductive Barriers BB module: Hawthorns to Apples BB module: Lizard Evolution: Module 4, Dewlap Colors
4/20	Macroevolution	Ch 11	BB video: Evolution in Action: Salamanders BB module: Bears, Species & DNA BB module: What is a Species?
4/27	Co-Evolution	Ch 12	In-class video: Evolutionary Arms Race
5/4	Evolution of Behavior	Ch 13	BB article: The Nurture of Nature
5/11	Human Evolution	Ch 14	BB video: Great Transitions In-class video: Your Inner Monkey
5/20	CUMULATIVE FINAL EXAM 8:30 a.m.-10:30 a.m.		

GENERAL EDUCATION OBJECTIVES

This course satisfies the GE requirement B-UD. It is designed to help students achieve Learning Goal 3: *to develop abilities to integrate knowledge, make informed ethical decisions, and accept civic responsibility*. One core learning outcome has been identified as integral to this course (**3.1**). Students attaining the third learning goal will be able to integrate and combine knowledge and abilities developed in several fields to analyze and critically evaluate specific problems, issues, or topics.

Two additional learning outcomes have been identified as integral to this course, in Learning Goal 2: *to develop broad knowledge of biological and physical sciences, humanities and creative arts, and social sciences*. Students attaining these outcomes will be able to explain and apply basic scientific methods (**2.1**) and demonstrate an understanding of the living and non-living physical world (**2.2**).

Specific learning modules which promote these outcomes are listed below. Daily in-class iClicker questions, mid-term exams and the final exam will allow your instructor to assess your mastery of these core outcomes.

Learning modules	GE Learning Outcome achieved		
	3.1	2.2	2.1
Evolution of Baleen in Whales	•		•
In-class video: Your Inner Fish	•	•	•
In-class video: Your Inner Reptile	•	•	•
BB module: Fish or Mammal?	•	•	•
BB article: Gene for Sunscreen		•	
BB module: Things you may not know about evolution	•		•
BB module: What Killed the Dinosaurs?	•	•	•
In-class video: Great Transformations	•	•	•
BB module: Tree Diagrams		•	•
BB module: Evidence for Common Ancestry	•	•	•
BB module: Interactive Phylogenetic Tree		•	•
BB module: Lizard Evolution: Module 2, Phylogeny	•	•	•
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			•
BB video: The Biology of Skin Color	•		•
BB module: Rock Pocket Mice		•	•
BB module: Reproductive Advantage Simulation		•	•
BB video: How does evolution really work?		•	•
BB module: What is Mutation?		•	
BB module: Shared Genes, Shared Functions	•	•	•
BB module: Adaptation	•	•	•
BB module: Lizard Evolution: Module 1, Ecomorphs	•	•	•
BB module: Lizard Evolution: Module 3, Experimental Data	•	•	•
In-class video: Why Sex?	•	•	•
BB article: The Evolution of Motherhood		•	
BB module: Reproductive Barriers		•	•
BB module: Hawthorns to Apples		•	•
BB module: Lizard Evolution: Module 4, Dewlap Colors		•	•
BB video: Evolution in Action: Salamanders		•	•
BB module: Bears, Species & DNA		•	
BB module: What is a Species?		•	
In-class video: Evolutionary Arms Race	•	•	•
BB article: The Nurture of Nature	•	•	
BB video: Great Transitions	•	•	•
In-class video: Your Inner Monkey	•	•	•