

BIOL 4400: Evolution, Spring 2015

Professor: Dr. Jennifer Cooper
Office: N256
Office hours: Monday and Friday 2-3
Thursday 11-12
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Prerequisites: BIOL 3350 (Genetics) with a grade of D or better

"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

Because BIOL 3350 (Introductory Genetics) is a pre-requisite for this class (and the freshmen biology sequence is a pre-requisite for genetics), you have been given a handout that reviews terms and topics that were covered in that class (basic knowledge of cells, DNA, genetics, taxonomy, and arithmetic). Because I will not review them again here, it is your responsibility to review/recall them, and exam questions will assume your familiarity with that material.

An integral goal of this course is your continued development of critical thinking, written and verbal communication, and quantitative reasoning. Lectures, assignments and videos will guide you in the development of these skills. **I will assume you have read the associated material listed in the schedule prior to coming to class and I may call on you to answer questions and participate in discussions.**

The rigors of this course demand regular attendance, commitment and hard work on the readings and assignments. **If you are not willing to devote 15 hours a week outside the classroom to this course, you should reconsider your enrollment.**

REQUIRED TEXTS/MATERIALS

Evolution, by D.J. Futuyma. You may use either the 2nd or the 3rd edition, but homework questions are based on the 3rd. Use of a laptop to take lecture notes is forbidden...take notes by hand. I will not be making PowerPoint lectures available for student download.

CENSUS DATE

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

This course cannot be taken for credit. It can only be taken for a letter grade. Students can only drop this course prior to the census date of February 23.

PERSONAL BEHAVIOR

It is assumed that you have read and understood the university's position on academic integrity and student discipline. Inappropriate behavior (including, but not limited to, cheating and/or plagiarism) will be dealt with as severely as university and state regulations allow.

Do not text in my class. It is rude. Believe it or not, I can see you.

GRADING

In-class exams (100 points each)	300 points
In-class write and share (4, 15 points each)	60 points
Study group activities:	
Article summaries (4, points variable)	70 points
Online exercises (4, points variable)	70 points
Poster (participation 75 pts, presentation 25 pts)	100 points
<hr/> Total	<hr/> 600 points

No +/- grading will be applied to your final grade.

EXAMS

The exams will be given in a mixed format (multiple choice/short answer/essay, graph interpretation). The 3rd exam is not cumulative. I do not recycle exam questions. **Do not make the mistake of underestimating the difficulty of exams.**

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. Your partially finished exam will be graded as it stands. 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 unexpectedly, and do not have documentation of a legitimate reason for doing so, you will not be allowed to take the alternate exam, and your total exam points will be based on the average of your other in-class exams.

WRITE AND SHARE

I provide a question for you to answer in a short essay. You will then be allowed to chat briefly with a partner, and quickly revise your essay before turning it in. Questions will be based on lecture or videos from the previous week.

STUDY GROUPS

You will be assigned to a study group at the beginning of the semester. Study groups will consist of 4 students. You will work very closely with your study group members throughout the semester... you will sit as a group in lecture, and you will work as a team to write article summaries, perform data analysis homework assignments, and create a scientific poster. Part of your grade is dependent on your teamwork, thus every group member must do their share of the work! To ensure that each group member is contributing, I will be using online submission platforms and co-authorship grading (see the relevant sections below).

ARTICLE SUMMARIES (SUBMITTED VIA TURN-IT-IN ON BB)

I will email pdf's of the articles to the class several days before the assignment is due. Each group member will take a turn at being lead author on an article (40 points), with the other group members being co-authors (10 points). Late submissions will have 20% deducted for each day the assignment is overdue.

Lead authors will write a rough draft summary of each section of the article **in their own words**, for a total of 2-3 pages. This summary will be posted to BlackBoard at least 48 hours before the assignment due date, using the Wiki specific to your assigned study group. Co-authors will then provide **very explicit instructions** on how to improve the summary, focusing on conceptual and analytical aspects (not just editorial aspects). Co-author comments are due 24 hours before the assignment due date. The lead author will then submit the final draft via TurnItIn on BB. Be very careful to avoid plagiarism, because the TurnItIn software is very good at detecting even a single plagiarized sentence. You may be tempted to lift phrases directly out of the article...resist this temptation, because such phrases are highlighted by the software, and **if there are more than 10 phrases (6-8 words in a row) used verbatim within a single summary, I will award every group member 0 points for the assignment.**

ONLINE EXERCISES (SUBMITTED VIA EMAIL AS AN MS WORD DOCUMENT)

The 3rd edition Futuyma textbook has a set of online simulations and data analysis exercises associated with it. You will complete the online assignments by the date indicated on the course schedule. Each group member will take a turn at being lead author on an online assignment (40 points each), with the other group members being co-authors (10 points). Late submissions will have 20% deducted for each day the assignment is overdue.

All group members will complete the online exercises, either together or on their own. Lead authors will write a rough draft summary of each component of the simulation exercise, including any relevant data or screenshots of graphs and results. Focus on describing the concept or process that was being explored each component of the simulation, and discuss what you learned. Within the summaries, refer directly to specific components of your graph images or results tables, using dots and stars or by circling an area or number. (I.e. "You can see in the graph of allele frequency changes that the frequency of the q allele begins to decline at the 10th generation [star], but the frequency of heterozygotes remains above 40% until the 100th generation [circled].") This summary will be posted to BlackBoard 48 hours before the assignment due date, using the Wiki specific to your assigned study group. Co-authors will then provide **very explicit instructions** on how to improve the summary, **focusing on conceptual and analytical aspects (not just editorial aspects)**. Co-author comments are due 24 hours before the assignment due date. The lead author will then submit the final draft via email.

POSTER PRESENTATION

Poster presentations will be created using the Wiki specific to your assigned study group. Each study group will select a recent (no older than 2008) primary literature article (hint: must have a methodology section) relating directly to evolution. Each student will pretend to be a co-author on the paper, get intimately familiar with the work, and present it at the end of semester Poster Session (during the Final Exam).

To find an article:

- Go to the CSU Stanislaus library website (link on University homepage).
- Choose "Find Books and Articles", then choose "Databases A-Z", then choose "Biological Abstracts."
- Search on a combination of terms to find articles about the topic your group finds most interesting. Read the abstracts, and choose the article that the entire group feels is interesting and understandable.
- Click the "FIND IT!" link to access the full-text PDF. **Email me the PDF for my approval.**

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 must be a minimum of 42 x 48 inches in size.** It must be printed on a large format printer at a professional printing service (Kinko's, Staples, etc).

On campus, the ASI Marketing Department also prints posters, and their color printing service is often much cheaper than off-campus. However, their turn-around time may be longer. 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 paper with as little effort as possible on the part of the audience to read, interpret, and understand. Only present the main points.
- Use a suitable font size (can be read from about four feet away).
- Include a Title, Authors, Introduction, Methods, Results & Discussion, list of student presenters.
- Graphics are required (figures, special equations, photos). Graphics should be high resolution, and should convey the most important ideas in the paper.
- Only include Literature Cited if you use a major secondary source in the body of the poster.
- Clearly explain the ideas with short, concise sentences. **Use bullet points instead of paragraphs when you can.**
- For each figure, use an explanatory caption. You can outline each figures with a colored box, and outline the relevant paragraph/list in the Results or Discussion with the same color...this will help readers associate figures with text.

STUDENT LEARNING OBJECTIVES:

1. Students will be able to distinguish between different processes (with evidence and examples of these 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 the relevance of evolution to health, agriculture, forensic science, conservation, human origins, & even thoughtful consumerism.
3. Students will be able to communicate examples of evidence for evolution from genetics, biogeography, paleontology, comparative anatomy, biochemistry, molecular biology & physical anthropology.
4. 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.
5. 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.
6. 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.

Week	Lecture and (Presentations)	Reading	Homework
1/26 - 1/30	Introduction Phylogenetics	Ch 1 Ch 2	
2/2 - 2/6	Patterns of Evolution	Ch 3	Online exercise 3.1 #1-6, due 2/13
2/9 - 2/13	NOVA video: Great Transformations The Fossil Record	Ch 4	Write and share 1
2/16 - 2/20	Geography of Evolution	Ch 6	Reading summary 1, due 2/23
2/23 - 2/27	<i>Census date February 23</i> Mutation	Ch 8	Online exercise 8.1, # 1-7, due 3/6
3/2- 3/6	Exam 1 on 3/4 Phenotypic & Genetic Variation	Ch 9	
3/9 - 3/13	Genetic Drift	Ch 10	Write and share 2
3/16 - 3/20	Natural Selection & Adaptation	Ch 11	Online exercise 11.1, 1-10, due 3/27
3/23 - 3/27	Genetical Theory of Natural Selection	Ch 12	Reading summary 2 due 3/30
3/30 – 4/3	Sex and Reproductive Success NOVA video clip: Why Sex?	Ch 15	Online exercise 15.1, # 1-8, due 4/13
4/6 - 4/10	SPRING BREAK		
4/13 - 4/17	Exam 2 on 4/13 Conflict & Cooperation	Ch 16	Reading summary 3, due 4/24
4/20 - 4/24	NOVA video: Evolutionary Arms Race Choose poster journal article by 4/20		Write and share 3
4/27 - 5/1	Species and speciation	Ch 17 Ch 18	Reading summary 4 due 5/8
5/4 - 5/8	Coevolution	Ch 19	Extra credit: 4 lead-authors Online exercise 19.2, # 1-7 due 5/13
5/11 - 5/15	Evo-Devo Exam 3 on 5/15	Ch 21	Write and share 4
5/22	POSTER SESSION 11:15 a.m.-1:15 p.m. in the regular classroom		