

BIOL 4400: EVOLUTION, SPRING 2017

Professor: Dr. Jennifer Cooper
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Write BIOL 4400 in the subject line of all emails to me.

"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).

PREREQUISITES

BIOL 3350 (Introductory Genetics) with a grade of D or better. Effective Fall 2017, the pre-requisite grade in BIOL 3350 will be C- or better.

Because Introductory Genetics is a pre-requisite for this class, you are expected to be very familiar with the concepts and facts presented therein. My lectures and exam questions will add to this foundational knowledge. I strongly suggest that you spend the first week of class reviewing BIOL 3350 material, even if you took recently.

COURSE REQUIREMENTS

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, 3rd ed. ISBN: 978-1-60535-164-3

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. You are welcome to voice record my lecture.

CENSUS DATE

Students must attend the first 3 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 22.

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. **This includes receiving an F in the course, and being reported to University Judicial Affairs.**

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

GRADING

In-class exams	
Exam 1	175 points
Exam 2	225 points
Exam 3	250 points
Study group activities:	
Article summaries (4, points variable)	100 points
Homework assignments (4, points variable)	100 points
Poster (participation 50 pts, presentation 100 pts)	150 points
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Total	1000 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). Exams 2 and 3 will assume deep understanding of material from earlier exams. I do not recycle exam questions. **Do not make the mistake of underestimating the difficulty of exams.** As you progress through the course, your study skills and work ethic will likely improve, which is why I have allotted an increasing number of points to be earned through each exam.

Students who arrive after the first exam of the day has been turned in will not be allowed to take the exam, and will receive a zero grade for 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 plan to 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, you must provide documentation of a legitimate reason for doing so; otherwise, you will not be allowed to take the alternate exam, and you will receive a zero grade for the missed exam.

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). **You will also evaluate your group members at the end of the semester.**

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 (55 points), with the other group members being co-authors (15 points). **There are 4 article summary assignments, so the total points you can earn sums to 100.** 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 4-5 single-spaced pages. **Include all article headers and sub-headers in your summary.** 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-authors must offer at least 3 substantive conceptual/analytical comments to receive full credit. 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 a few phrases (6-8 words in a row) used verbatim within a single summary, I will award every group member 0 points for the assignment (co-authors will not be penalized if they warned the lead author about specific examples of plagiarism in the rough draft).**

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

The 3rd edition Futuyama textbook has a set of end-of-chapter questions sets associated with it, which I may assign as homework. Alternatively, I may write a set of new questions for some assignments. You will complete the homework assignments by the date indicated on the course schedule. Each group member will take a turn at being lead author on a homework assignment (55 points each), with the other group members being co-authors (15 points). **There are 4 homework assignments, so the total points you can earn sums to 100.** Late submissions will have 20% deducted for each day the assignment is overdue.

All group members will complete the homework 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-authors must offer at least 3 substantive conceptual/analytical comments to receive full credit. 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 topic relevant to evolutionary biology, and perform a small literature review which includes **exactly** 4 recent (no older than 2011) primary literature articles. One of the 4 articles will be a "review" article (clearly labeled by the authors as a literature review, usually right by the title of the article).

Each student will focus on reading one of these 4 articles, become intimately familiar with the work, and incorporate the most important aspects of the article within the larger, conceptual poster. The poster will be presented in the Poster Session (during the Final Exam period).

Participation points (50) 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. Each group member chooses an article to summarize.
2. Each group member creates a new wiki page for their poster contribution, with a title like "Poster, Betsy Ross,".
3. Group members will post their on their wiki, and other group members will use the "Comments" tab to make suggestions and revisions.
4. More lengthy discussions can be documented on the group's Discussion Board (use the Board only for the poster project, please...don't use it for homework assignments, etc.).
5. To earn full points, a group member must:
 - a. post their own work on their own wiki
 - b. make constructive comments regarding **every other** group member's work on member wikis

Any contributions which are documented in other ways (texting, Google Docs, etc.) won't be considered for credit.

To find primary literature articles relevant for your topic:

- 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 4 article PDFs 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. 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 32 x 48 inches in size.** It must be printed on a large format printer at a professional

printing service (Kinko's, Staples, etc) on a single flexible sheet of paper (don't stick it on a tri-fold board). 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.
- Use a suitable font size (can be read from about four feet away).
- Include a Title and a list of student presenters. The Literature Cited section can be on a separate letter-sized sheet next to the poster.
- Graphics are required (figures, special equations, photos). Graphics should be high resolution, and should convey the most important ideas in the poster. Don't add images just for "pizzazz".
- 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.
- Specific facts, data or images taken from the 4 articles must be cited within the poster text, using APA format.

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 of	Lecture topic	Reading	Assignments
Jan 23	Introduction	Ch 1	
Feb 6	Patterns of Evolution NOVA video: Great Transformations	Ch 3	
Feb 13	The Fossil Record	Ch 4	EXAM 1 Friday Feb 17
Feb 20	Geography of Evolution	Ch 6	CENSUS DATE Feb 22
Feb 27	Mutation	Ch 8	Article summary 1 due Feb 27
Mar 6	Phenotypic Variation	Ch 9	HW1 due Mar 6
Mar 13	Natural Selection & Adaptation	Ch 11, 12, 13	Article summary 2 due Mar 15 Choose poster topic by Mar 17
Mar 20	SPRING BREAK		
Mar 27	Phylogenetics	Ch 2	EXAM 2 Monday Mar 27
Apr 3	Genetic Drift	Ch 10	HW2 due Apr 3
Apr 10	Sex and Reproductive Success	Ch 15	Article summary 3 due Apr 10
Apr 17	Sex and Reproductive Success cont.		HW3 due Apr 17
Apr 24	Species and speciation	Ch 17, 18	Article summary 4 due Apr 24
May 1	Conflict & Cooperation	Ch 16	
May 8	Coevolution	Ch 19	HW4 due May 12
May 15	Co-evolution cont.		EXAM 3 Wednesday May 17
May 24	POSTER SESSION	11:15 a.m.-1:15 p.m.	