

**Syllabus – IB 167 Evolution and Earth History: From Genes to Fossils**  
**Integrative Biology Department**  
**Instructors: TBD**

**Lectures:**

MWF 10-11 AM Moffitt Library 101

**Discussion sections:**

101 – F 11-12PM Wheeler 108

102 – F 12-1PM Wheeler 20

104 – W 9-10AM VLSB 3083

(no discussion sessions on the first Friday of the course)

**Office hours: TBD**

**Course Summary:** The staggering diversity of life on Earth is the product of evolutionary changes that have played out over billions of years. Much of what we know about patterns and mechanisms of evolution comes from two sources: the fossil record, which tells us about morphological evolution, origination, extinction, and the distribution of life in time and space, and the molecular record, which tells us not only about the evolutionary relationships among extant species, but also the raw material upon which selection can act to generate diversity from genotype to phenotype. Both of these records have strengths and weaknesses, and tell us about different but often complementary aspects of the evolutionary process and the history of life on Earth. This course will integrate fossil and molecular data to consider some of the outstanding questions in the study of evolution. Major topics covered include the (1) origin and early evolution of life, (2) the evolutionary relationships among major groups, (3) the history of life on Earth and the expansion of the biosphere through time, (4) ontogeny, development, and the origins of evolutionary novelty, (5) the generation of variation and the mechanisms of natural selection, (6) mechanisms of speciation, (7) the role of extinction in the evolutionary process, (8) genetics and genomic evolution, and (9) the relationships between microevolutionary and macroevolutionary patterns and processes. Three hours of lecture and one hour of discussion per week. Prerequisite is Bio 1A and 1B or equivalent. 4 units. Enrollment limit of 100.

**Grading:** Midterm #1 (100 pts) Midterm #2 (100 pts) Final Exam (200 pts) Discussion section performance (100 pts) which will include writing one paper on a topic in evolutionary biology (details on paper will be provided in discussion sections).

**Optional Text:**

Barton, N.H., Briggs, D.E.G., Eisen, J.A., Goldstein, D.B., and Patel, N.H. 2007. *Evolution*. Cold Spring Harbor Press, New York.

Note: this textbook provides a rather advanced treatment of some topics. The readings are intended to reinforce lectures, but material covered in lecture and discussion sections will be emphasized on the exams. Additional material will be provided via the <https://bcourses.berkeley.edu> website.

**The student community at UC Berkeley has adopted the following Honor Code:** “As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others.” The hope and expectation is that you will adhere to this code.

**Collaboration and Independence:** Reviewing lecture and reading materials and studying for exams can be enjoyable and enriching things to do with fellow students. This is recommended. However, unless otherwise instructed, homework assignments are to be completed independently and materials submitted as homework should be the result of one’s own independent work.

**Cheating:** A good lifetime strategy is always to act in such a way that no one would ever imagine that you would even consider cheating. Anyone caught cheating on a quiz or exam in this course will receive a failing grade in the course and will also be reported to the University Center for Student Conduct. In order to guarantee that you are not suspected of cheating, please keep your eyes on your own materials and do not converse with others during the quizzes and exams.

**Plagiarism:** To copy text or ideas from another source without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. For additional information on plagiarism and how to avoid it, see, for example: <http://www.lib.berkeley.edu/instruct/guides/citations.html#Plagiarism>  
<http://gsi.berkeley.edu/teachingguide/misconduct/prevent-plag.html>

**Academic Integrity and Ethics:** Cheating on exams and plagiarism are two common examples of dishonest, unethical behavior. Honesty and integrity are of great importance in all facets of life. They help to build a sense of self-confidence, and are key to building trust within relationships, whether personal or professional. There is no tolerance for dishonesty in the academic world, for it undermines what we are dedicated to doing – furthering knowledge for the benefit of humanity.

Your experience as a student at UC Berkeley is hopefully fueled by passion for learning and replete with fulfilling activities. And we also appreciate that being a student can be stressful. There may be times when there is temptation to engage in some kind of cheating in order to improve a grade or otherwise advance your career. This could be as blatant as having someone else sit for you in an exam, or submitting a written assignment that has been copied from another source. And it could be as subtle as glancing at a fellow student’s exam when you are unsure of an answer to a question and are looking for some confirmation. One might do any of these things and potentially not get caught. However, if you cheat, no matter how much you may have learned in this class, you have failed to learn perhaps the most important lesson of all.

### **Safe, Supportive, and Inclusive Environment**

Whenever a faculty member, staff member, post-doc, or GSI is responsible for the supervision of a student, a personal relationship between them of a romantic or sexual nature, even if consensual, is against university policy. Any such relationship jeopardizes the integrity of the educational process.

Although faculty and staff can act as excellent resources for students, you should be aware that they are required to report any violations of this campus policy. If you wish to have a confidential discussion on matters related to this policy, you may contact the Confidential Care Advocates on campus for support related to counseling or sensitive issues. Appointments can be made by calling (510) 642-1988.

The classroom, lab, and work place should be safe and inclusive environments for everyone. The Office for the Prevention of Harassment and Discrimination (OPHD) is responsible for ensuring the University provides an environment for faculty, staff and students that is free from discrimination and harassment on the basis of categories including race, color, national origin, age, sex, gender, gender identity, and sexual orientation. Questions or concerns? Call (510) 643-7985, email [ask\\_ophd@berkeley.edu](mailto:ask_ophd@berkeley.edu), or go to <http://survivorsupport.berkeley.edu/>.

## LECTURE SYLLABUS for Spring 2018

Background readings listed [in blue](#). If NOT from Barton et al., readings will be posted as pdfs in a folder accompanying the lecture.

### Week 1

Jan 17 W: Introduction I: the fossil record (SF)

Jan 19 F: Introduction II (NP)

### Week 2

Jan 22 M: The Long View: Introduction to Earth history & Principles of Historical Geology (SF); [Stanley Chapter 1 pp. 1-14](#)

Jan 24 W: The Nature of the Fossil Record (SF); [Foote and Miller Chapter 1](#)

Jan 26 F: Assembling the Tree of Life (SF); [Barton et al. Chapter 5](#)

### Week 3

Jan 29 M: Generating Variation (SF); [Barton et al. Chapters 12-14](#)

Jan 31 W: Selection (SF); [Barton et al. Chapter 17](#)

Feb 2 F: Drift and its Consequences (SF); [Barton et al. Chapter 15](#)

### Week 4

Feb 5 M: Mechanisms of Speciation (SF); [Barton et al. Chapter 22](#)

Feb 7 W: Principles of Development (NP)

Feb 9 F: Hox I (NP)

### Week 5

Feb 12 M: Hox II (NP)

Feb 14 W: Hox III (NP)

Feb 16 F: Cis regulatory evolution (NP)

### Week 6

Feb 19 M: **HOLIDAY**

Feb 21 W: Midterm I

Feb 23 F: Evolutionary Rates and Modes (SF)

### Week 7

Feb 26 M: Stickleback I (NP)

Feb 28 W: Stickleback II (NP)

Mar 2 F: Dogs (NP)

Week 8 Mar 5 M: Microbial Evolution and the Oxygenation of Earth (SF)  
Mar 7 W: The origin of Eukaryotes and Metazoans (SF)  
Mar 9 F: The Ediacaran-Cambrian Explosion (SF)

Week 9

Mar 12 M: Beach & grasshopper mice (NP)  
Mar 14 W: Icefish (NP)  
Mar 16 F: Speciation Genetics (NP or guest)

Week 10

Mar 19 M: Butterfly Evolution I (NP)  
Mar 21 W: Butterfly Evolution II (NP)  
Mar 23 F: Butterfly Evolution III (NP)

Mar 26-30 Spring Break

Week 11

Apr 2 M: Human evolution – altitude (NP)  
Apr 4 W: Human evolution - diet (NP)  
Apr 6 F: Midterm II

Week 12

Apr 9 M: Evolution of Plants and the Invasion of Land (SF or guest)  
Apr 11 W: Causes of Mass Extinctions (SF)  
Apr 13 F: Consequences of Mass Extinctions (SF)

Week 13

Apr 16 M: The Evolution Origins of the Modern Biota (SF)  
Apr 18 W: The Late Pleistocene Mass Extinction (SF)  
Apr 20 F: Evolution in the Anthropocene (SF)

Week 14

Apr 23 M: Human evolution – hair & skin (NP)  
Apr 25 W: Human evolution – speech & medicine (NP)  
Apr 27 F: Human evolution – engineering (NP)

Week 15

April 30 – May 4 (R&R Week)

May 8<sup>th</sup> 3-6 PM Final Exam