GEL 107 — Earth History: Paleobiology

Spring 2021 MWF 12:10 - 1:00 pm asynchronous, by Zoom
Notes and links to lecture recordings in Files on Canvas

Instructor: Sandy Carlson, ~~Rm. 2123 Earth & Physical Sciences Bldg; Telephone: 752-0350 or -2834~~
email: sjcarlson@ucdavis.edu **Office hours:** MWF 11:00 am -12:00 noon, by Zoom, or by email.
Teaching Assistant: Steven Mendonca (email: semendonca@ucdavis.edu)
Text (required): Introduction to Paleobiology and the Fossil Record, Second edition
by Michael J. Benton and David A. T. Harper, 2020, Wiley-Blackwell. (Available UCD Bookstore).
Text is *required* for both GEL 107 and GEL 107L (to take advantage of the EA option).
Requirements: Take-home exams: Midterm I (25%); Midterm II (25%). Essay/research paper (25%).
Final exam (25%) is optional. Percentages will be adjusted if student opts out of final exam.

DATE	LECTURE	READING
March 29	A1. What is paleobiology? And why should we care?	Ch. 1
March 31	A2. What is the fossil record? How can data be biased?	Ch. 3
April 2	B1. Geology and geological time	Ch. 3
April 5	B2. Biomineralization and paleobiogeochemistry	Ch. 2
April 7	B3. Taphonomy and fossil preservation	Ch. 2, 3
April 9	C1. Individuals, ontogeny, and populations	Ch. 5, 20
April 12	C2. Species, speciation, and phylogeny reconstruction	Ch. 5, 20
April 14	C3. The tree of life, the fossil record of life, and classification	Ch. 5, 20
April 16	D1. Adaptation and functional morphology	Ch. 6
April 19	**MIDTERM EXAM I** (on lectures A-C)	———
April 21	D2. Biomechanics: the physics of biology	Ch. 6
April 23	D3. Evolutionary functional morphology	Ch. 6
April 26	E1. Ecology and paleoecology	Ch. 4, 19
April 28	E2. Inferring paleoecology	Ch. 4
April 30	E3. Evolutionary paleoecology. **QUESTION DUE**	Ch. 4
May 3	F1. Biogeography and plate tectonics	Ch. 2
May 5	F2. Evolutionary paleobiogeography	Ch. 2
May 7	G1. Biostratigraphy and the stratigraphic record	Ch. 2
May 10	G2. Evolutionary biostratigraphy	Ch. 2
May 12	H1. Macroevolution: what is it?	Ch. 5
May 14	**MIDTERM EXAM II** (mainly on lectures D-G)	———
May 17	H2. Rates of evolution and adaptive radiations	Ch. 20
May 19	H3. Origination and diversification	Ch. 8, 20
May 21	H4. Developmental biology and the fossil record	Ch. 6
May 24	Memorial Day – NO LECTURE	———
May 26	H5. Extinctions as perturbations.	Ch. 7
May 28	H6. Mass extinctions and recoveries	Ch. 7
May 31	H7. Macroevolutionary trends and patterns **ESSAY DUE**	Ch. 5, 20
June 2	H8. Big issues in paleobiology, and the future of the field	———
June 10	**FINAL EXAM**: will be offered, but is optional	

Logistics

Goals for the course: My primary goal is to further the development of your critical thinking skills in paleobiology, and how this can lead to a better appreciation for the world we live in today. What is the history and evolution of life as revealed by the fossil record through "deep time," and how is it relevant to life today?

Class format: The class is organized around a standard lecture format, but I strongly encourage you to send me questions or comments on any lecture material that is unclear. I plan to record and post my lectures (audio and slides) before each scheduled lecture time; they will be available via a link at the end of each lecture's notes that I post under Files on Canvas. You may download them if you wish or access them on the Cloud at all times. I plan to hold real-time office hours by Zoom on MWF 11-12 noon; I will send a Zoom link to you all before 3/29.

Reading: The book is available through the UCD Bookstore (and through online bookstores) and on reserve (https://www.library.ucdavis.edu/service/course-reserves/). The textbook for the class is recommended reading; I *do* recommend that you complete the reading assigned, and have indicated that it is required only to make it possible for participants in the EA program to access it easily. My lectures will not cover exactly the same material as what is in the book; there are many topics in the book that I will not cover and will not expect you to know, while other topics that I cover in lecture are not in the book at all. I may include course material from other sources in lectures as appropriate, so viewing lectures regularly will ensure that you do not miss any relevant information. Check the course Canvas site often for brief lecture notes and videos of me delivering the full lectures, for announcements, and any other information that I would like you to know.

Grading: Your final grade will be based on your scores on the two take-home midterms, one essay, and, if you decide to take it, the final assignment; I do not require that a certain percentage of you receive a certain grade, and you are not competing with anyone else in the class for the grade you receive. The exams will focus on material that I cover in lecture and will consist of essay questions. The exams will be cumulative but will emphasize more the material covered since the previous exam. For the essay assignment, you will send me a question of your own interest, related to paleobiology, and will then write a short essay/research paper of no more than five double-spaced pages researching your question, citing three references. I will provide more information and guidance on the essay after the first midterm exam.

Study habits: I strongly recommend that you view the lectures, read the book, and take notes. I will post some notes and links to lecture videos in Files on Canvas for each lecture, but they can't take the place of your own notes. You can view these whenever it is convenient for you, as many times as you wish. **PLEASE LET ME KNOW IF YOU HAVE DIFFICULTY ACCESSING THESE FILES.** The material we cover in this class cannot be understood fully by rote memorization alone; it requires both analysis and synthesis of information. If desired, I will schedule a Zoom review session before each exam. I will be happy to review your exam with you during my office hours. If you have questions, please Zoom in to my office hours (link in Announcement sent on 3/27/21) or send me an e-mail message. I will make every effort to answer your emails as soon as I can.

Diversity Statement: The importance of diversity in biology, evolution, and science cannot be overstated. I intend this course to serve students from all backgrounds and for the diversity that students bring to this class be viewed as a resource, strength, and benefit. I intend to present materials and activities respectful of diversity: gender, sexuality, disability, age, socioeconomic status, race, ethnicity, and culture. Please let me know ways to improve the effectiveness of this course for you or for other students. I value and encourage your suggestions.

Sexual Harassment Policy: Please remember that in the synchronous office hours setting you are still a representative of the university and are expected to conduct yourself professionally and to be considerate of others. Harassment of any form will not be tolerated. If you are a victim of sexual harassment or violence there are many confidential (i.e., CARE) and non-confidential (i.e., HDAPP) resources available to support you at: https://sexualviolence.ucdavis.edu/get-support

GEL 107L: GEL 107L is a separate 2-unit laboratory course that can be taken concurrently with GEL 107. Ben Faulkner is the Teaching Assistant for GEL 107L. The lab is required only for Geology majors, but taking it, no matter what your major, will very likely improve your understanding of the course material in GEL 107 and enrich your knowledge of the fossil record. GEL 107L meets twice a week for 3 hours each and emphasizes the (remotely!) hands-on study of major clades with a fossil record, with exercises relating to concepts we cover in GEL 107 lecture. Ben will be sending you more information on the revised lab format, if you are currently enrolled in GEL 107L.

“*Nothing in biology makes sense except in the light of evolution.”* Theodosius Dobzhansky

“The most important scientific revolutions all include, as their only common feature, the dethronement of human arrogance from one pedestal after another of previous convictions about our centrality in the cosmos.” Stephen Jay Gould

“Why has not anyone seen that fossils alone gave birth to a theory about the formation of the earth, that without them, no one would have ever dreamed that there were successive epochs in the formation of the globe.” Georges Cuvier

“I want to find a voracious, small-minded [extinct] predator and name it after the IRS.” Robert Bakker