

GEL 107 – Earth History: Paleobiology

Spring 2022

MWF 12:10 - 1:00 pm

1322 Storer Hall

Instructor: Sandy Carlson, Rm. 2123 Earth & Physical Sciences Bldg; Telephone: 752-2834

email: sjcarlson@ucdavis.edu **Office hours:** MWF 10:30 am -11:30 am, by Zoom or in person.

Teaching Assistant: Rylan Dievert (email: rkdievert@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: Midterm I (25%); Midterm II (25%). Essay/research paper (25%). Final exam (25%).

<u>DATE</u>	<u>LECTURE</u>	<u>READING</u>
March 28	A1. What is paleobiology? And why should we care?	Ch. 1
March 30	A2. What is the fossil record? How can data be biased?	Ch. 3
April 1	B1. Geology and geological time	Ch. 3
April 4	B2. Biomineralization and paleobiogeochemistry	Ch. 2
April 6	B3. Taphonomy and fossil preservation	Ch. 2, 3
April 8	C1. Individuals, ontogeny, and populations	Ch. 5, 20
April 11	C2. Species, speciation, and phylogeny reconstruction	Ch. 5, 20
April 13	C3. The tree of life, the fossil record of life, and classification	Ch. 5, 20
April 15	D1. Adaptation and functional morphology	Ch. 6
April 18	MIDTERM EXAM I (on lectures A-C)	---
April 20	D2. Biomechanics: the physics of biology	Ch. 6
April 22	D3. Evolutionary functional morphology	Ch. 6
April 25	E1. Ecology and paleoecology	Ch. 4, 19
April 27	E2. Inferring paleoecology	Ch. 4
April 29	E3. Evolutionary paleoecology. ESSAY QUESTION DUE	Ch. 4
May 2	F1. Biogeography and plate tectonics	Ch. 2
May 4	F2. Evolutionary paleobiogeography	Ch. 2
May 6	G1. Biostratigraphy and the stratigraphic record	Ch. 2
May 9	G2. Evolutionary biostratigraphy	Ch. 2
May 11	H1. Macroevolution: what is it?	Ch. 5
May 13	MIDTERM EXAM II (mainly on lectures D-G)	---
May 16	H2. Rates of evolution and adaptive radiations	Ch. 20
May 18	H3. Origination and diversification	Ch. 8, 20
May 20	H4. Developmental biology and the fossil record	Ch. 6
May 23	H5. Extinctions as perturbations.	Ch. 7
May 25	H6. Mass extinctions and recoveries.	Ch. 7
May 27	H7. Macroevolutionary trends and patterns. ESSAY DUE	Ch. 5, 20
May 30	Memorial Day – NO LECTURE	---
June 1	H8. Big issues in paleobiology, and the future of the field	---
June 8	FINAL EXAM: 1:00 to 3:00 pm in 1322 Storer	

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. My lectures will be recorded through campus Lecture Capture and will be automatically posted in Media Gallery in the Canvas site for the class. I will also post lecture notes and slides before each scheduled lecture time. I plan to hold office hours in person and by Zoom on MWF 10:30-11:30 am; I will send a Zoom link through an Announcement soon.

Reading: The book is available through the UCD Bookstore (and through online bookstores) and through EA. The textbook for the class is recommended reading; I *do* recommend that you complete the reading assigned (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 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 in-class midterms, one essay, and the final exam; 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. 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 several references. I will provide more information and guidance on the exams, essay, and my grading policy soon.

Study habits: I strongly recommend that you view the lectures, read the book, and take notes. The notes and slides I post in Files on Canvas for each lecture can’t take the place of your own notes. 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 review session before each exam. I will be happy to review your completed and scored exams with you during my office hours. If you have questions, please visit in office hours 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 classroom and office hours you represent 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: <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. Nick Thurber 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 hands-on study of major clades with a fossil record, with exercises relating to concepts we cover in GEL 107 lecture.

“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