

# Life During the Age of Dinosaurs (IB 33)



## Course Description

**“Life During the Age of Dinosaurs” is an introductory course focusing on Mesozoic Earth, the era preceding our current era, the Cenozoic.** The range of topics to be covered includes a brief history of paleontology and its place in science; the geologic timescale; the tree of life; fossil vertebrate diversity leading up to the Mesozoic Era; the major lineages of dinosaurs; the first mammals and the prelude of the “Age of Mammals” through the K-Pg mass extinction event.

**This course satisfies the Biological Science breadth requirement in the College of Letters & Science.** This course complements the content covered in other paleontology-themed courses in the Department of Integrative Biology such as IB113L (Paleobiological Perspective on Ecology and Evolution), IB181L (Paleobotany – The 500-Million Year History of a Greening Planet), IB183L (Vertebrate Paleontology), and IB286 (Seminars in Paleontology, aka “Fossil Coffee”).

**The course is aimed at lower division undergraduates from any major.** This course will provide a systematic look at dinosaurs and the world around them and give students a deep-time foundation for understanding and appreciating the world we live in today. We will use an easy-to-relate topic (dinosaurs) to learn about the scientific process and how we know what we know in paleontology and evolutionary biology.

**By the end of this course, students will have a working understanding of the major lineages of dinosaurs and the time periods they occurred in.** Students will also be able to explain major geologic and biotic events that marked major transitions during the Age of Dinosaurs. Lastly, students will be able to explain how phylogenies are constructed and what sources of uncertainty are often involved in phylogenetic analyses.

## Prerequisites

None. All majors are welcome.

Instructor:

Instructor Name: Jack Tseng

Contact Information: [zjt@berkeley.edu](mailto:zjt@berkeley.edu)

Instructor Office Hours: By appointment; Wednesdays 1-2 pm, Thursdays 10:30-11:30 am.

Instructor Office Hours Location: Zoom

(<https://berkeley.zoom.us/j/92189922400?pwd=cGIrNFFsOXBhcW5ZK08ya0ZhekJidz09>)

Class Q&A and Forum: via Piazza ([piazza.com/berkeley/spring2022/ib33](https://piazza.com/berkeley/spring2022/ib33))

Graduate Student Instructor Name: Tanner Frank

Contact Information: [tanner\\_frank@berkeley.edu](mailto:tanner_frank@berkeley.edu)

Graduate Student Instructor Office Hours: Mondays 10-11 am

GSI Office Hours Location: Zoom (Link TBA)

Lecture Location

2040 VLSB & Zoom

(<https://berkeley.zoom.us/j/92189922400?pwd=cGIrNFFsOXBhcW5ZK08ya0ZhekJidz09>).

Lectures will be synchronous with recordings for asynchronous viewing option.

Student Learning Objectives

**Deep time thinking:** you will learn about biodiversity and organismal evolution from the perspective of a particular time period (Mesozoic) using a particular group of organisms (dinosaurs and their relatives). However, you will be able to critically evaluate information (news stories, popular scientific articles, scientific publications) about any extinct organism and geologic time period using the tools you gain from this course.

**Tree thinking:** you will learn the basics of phylogenetic systematics and analysis, used in estimating the tree of life. You will be able to organize comparisons of biological features of species (both living and extinct) within a phylogenetic context and appreciate the influence of phylogenetic relatedness on the defining traits of different groups of organisms.

**Paleobiological thinking:** you will learn about conventional analyses of the fossil record using the study of fossilized hard parts and traces of vertebrate organisms. However, you will also learn about the incorporation of additional sources of data such as soft tissue preservation and reconstruction, molecular paleontology, and paleoecology that ‘flesh out’ extinct organisms as living and breathing individuals, just from a different time on Earth. You will be able to discuss extinct organisms not only in a paleontological context, but a paleobiological context as well.

**Faces behind paleontology:** although the earliest paleontological research was done by a community of paleontologists representing only a small portion of our diverse society, today’s paleobiological research community is more diverse (and continues to diversify). Through guest lectures and highlights of recent work done by scientists from different walks of life, you will be able to name the scientists who are breaking barriers on behalf of their communities and summarize the cutting-edge research work they are doing in their labs and field sites.

### Course Materials

Required: Brusatte, Steve. “The Rise and Fall of the Dinosaurs: The Untold Story of a Lost World”. (2018).

NOTE: A single e-copy of the required text has been provided by UC Libraries; the electronic copy can be checked out for 2 hours at a time at this link:

[https://ucbears.lib.berkeley.edu/991045964289706532\\_C118337982/view](https://ucbears.lib.berkeley.edu/991045964289706532_C118337982/view)

Please be mindful of other students’ time and return the e-copy promptly when you are done with each reading.

Optional paper copy of Hildebrand, Milton, George E. Goslow, and Viola Hildebrand. "Analysis of vertebrate structure." (1995). (Required chapter readings will be provided electronically)

### bCourses Site

I will use our bCourses site to post any course materials for you to read/go over prior to coming to our meetings, in the form of an updated syllabus with links (see below), and/or additional document uploads.

We will use Piazza ([piazza.com/berkeley/spring2022/ib33](https://piazza.com/berkeley/spring2022/ib33)) for discussion board and chats.

### Requirements

Point breakdown: 8 quizzes (10 points each, only the 6 top quiz scores count toward course grade) totaling 60 points; final poster presentation: 40 pts; four written peer reviews of other poster presentations (5 points each) totaling 20 points. 5 points for completing the course evaluation survey. **Total of 125 points.**

Quizzes in this course will serve as checkpoints for us to highlight subject areas you are doing well in, as well as those that you may want to know more about or reinforce during office hours or in our class forum. There are 8 scheduled quizzes, but you will be able to take the top 6 scores

out of the 8 to count towards your course grade (the lowest two scores will be dropped). There are no midterm exams.

In lieu of a final exam, you will work in groups of 4 or 5 to design, create, and present a literature research poster on a topic of interest related to life during the age of dinosaurs. The assessment breakdown for the research poster effort (40 points total) will include: informative title, full list of co-authors, and acknowledgment of contributions from outside sources (5 pts); clarity of the introduction/background (5 pts), methods (5 pts), results (5 pts), and discussion (5 pts) sections; proper use of text citations from peer-reviewed scientific sources (5 pts); proper citations for plots and artwork used (5 pts); overall visual organization and flow of information (5 pts). A rubric for point breakdown in each of the categories will be provided by the instructor. The poster symposium will either take place in person (Public health situation permitting) on campus or virtually via Behance (information to be provided by instructor).

In addition, an important part of scientific exchange is providing feedback to other researchers. Each poster group will be responsible for providing constructive feedback for posters made by four other groups. For each of the posters your group evaluates, your effort will be assessed by: feedback on overall visual organization and information flow (1 pt), feedback on use of citations in text and graphics (1 pt), feedback on organization and clarity of the introduction, methods, results, and discussion sections (1 pt), feedback on the verbal presentation of the poster (1 pt), and finally, asking a question about the poster (1 pt). You will evaluate a total of four groups and your reviews will count for 20 points. You may choose to have each group member be responsible for evaluating one of the assigned posters or evaluate the posters as a group.

### How to Succeed in This Course

You are expected to be prepared prior to coming to each class session by reading/watching the assigned materials related to each week's topic. Use the periodic quizzes as self-checks for your comprehension of course material and reach out to the instructor or GSI early and frequently if you have questions or need support with keeping up with course material. Learn to collaborate and communicate with other students on your final poster project and make an earnest effort to provide constructive comments to other groups in your peer reviews.

### Grading

Grades will be assigned based on a total of 125 possible points, using the following scale. For students taking this P/NP: a P is equivalent to a C- or better

%	Grade
≥ 97.5	A+
≥ 92.5	A
≥ 90.0	A-
≥ 87.5	B+

≥ 82.5	B
≥ 80.0	B-
≥ 77.5	C+
≥ 72.5	C
≥ 70.0	C-
≥ 67.5	D+
≥ 62.5	D
≥ 60.0	D-
< 60.0	F

### Policies

All reading materials assigned in the course are copyrighted unless otherwise indicated, for student use only. The distribution of course items to public websites such as Course Hero (<https://www.coursehero.com/>) or similar sites is prohibited. All should aim to attend our weekly lectures and if needed, the optional discussion section for more in-depth discussion. Everyone should be treated with respect. I will do my best to ensure a safe and comfortable learning environment for everyone in the class.

### Schedule

#	Date	Topic	Reading
1	1/18	Course introduction and overview.	NONE
2	1/20	A (not so) brief history of time	Understanding Geologic Time: <a href="https://ucmp.berkeley.edu/education/explorations/tours/geotime/index.html">https://ucmp.berkeley.edu/education/explorations/tours/geotime/index.html</a>
3	1/25	Who gets to be a fossil?	Fossils: Window to the past:

		Quiz 1	<a href="https://ucmp.berkeley.edu/paleo/fossils/">https://ucmp.berkeley.edu/paleo/fossils/</a>
4	1/27	The Tree of Life I: Evolutionary theory, systematics, classification.	Evolutionary trees: A primer: <a href="https://evolution.berkeley.edu/evolibrary/article/0_0_0/%3C?%20echo%20\$baseURL;%20?%3E/evotrees_primer_01">https://evolution.berkeley.edu/evolibrary/article/0_0_0/%3C?%20echo%20\$baseURL;%20?%3E/evotrees_primer_01</a>  Journey into Phylogenetic Systematics:  <a href="https://ucmp.berkeley.edu/clad/clad1.html">https://ucmp.berkeley.edu/clad/clad1.html</a>
5	2/1	The Tree of Life II: Vertebrata	Vertebrata – Animals with backbones:  <a href="http://tolweb.org/vertebrata">http://tolweb.org/vertebrata</a>
6	2/3	“Our Inner Fish”: Introduction to vertebrate functional anatomy  Quiz 2	<u>Ch. 21, Structural elements of the body</u> in Hildebrand’s Analysis of Vertebrate Structure (see Bcourses for PDF copy)
7	2/8	Life alongside dinosaurs I: Aquatic vertebrates (minus fish)	TBA (see Bcourses for updates)
8	2/10	Life alongside dinosaurs II: Fish (Guest Lecture by Dr. Juan Liu)	TBA (see Bcourses for updates)

9	2/15	Life alongside dinosaurs III: Pterosaurs (Guest Lecture by Dr. Kevin Padian)  Quiz 3	TBA (see Bcourses for updates)
10	2/17	What is a dinosaur?	B:13-45
11	2/22	Ornithischia I: Armors and Clubs	B:50-81
12	2/24	Ornithischia II: Block Heads  Quiz 4	B:50-81
13	3/1	Ornithischia III: Prehistoric “Met Gala” (horns, frills, and other ornamentations)	B:85-117
14	3/3	Ornithischia IV: Duck Face	B:85-117
15	3/8	Saurischia I: The Giants of Old  Quiz 5	B:161-191
16	3/10	Saurischia II: The OG carnivores	B:229-266
17	3/15	Saurischia III: Bite Club	B:229-266

18	3/17	Saurischia IV: The King Quiz 6	B:195-225
	3/21-3/25 Spring Recess		
19	3/29	Growing Dinosaurs (Guest Lecture by Dr. Mark Goodwin)	TBA (see Bcourses for updates)
20	3/31	Intro to Literature Research Tools Submit research project topics	Scientific Literature (a guide from UC Berkeley Libraries)  <a href="https://guides.lib.berkeley.edu/cw161">https://guides.lib.berkeley.edu/cw161</a>
21	4/5	Fossilized soft tissues and molecular paleontology	Yanhong Pan, Molecular paleontology as an exciting, challenging and controversial field, National Science Review, Volume 7, Issue 4, April 2020, Page 823, <a href="https://doi.org/10.1093/nsr/nwaa001">https://doi.org/10.1093/nsr/nwaa001</a>
22	4/7	Paleobiogeography of dinosaurs Quiz 7	B:121-157
23	4/12	The Mesozoic terrestrial environment (Guest Lecture by Dr. Cindy Looy)	TBA (see Bcourses for updates)



24	4/14	Mesozoic Mammals	Transformation and diversification in early mammal evolution  <a href="https://luo-lab.uchicago.edu/pdfs/Luo%202007%20(Mesozoic%20mammal%20review).pdf">https://luo-lab.uchicago.edu/pdfs/Luo%202007%20(Mesozoic%20mammal%20review).pdf</a>
25	4/19	The K-Pg Extinction (Guest Lecture by Dr. Patricia Holroyd)  Quiz 8	B:309-339
26	4/21	The aftermath and the beginning of the Age of Mammals	B:343-349
27	4/26	The evolution of dinosaurian flight and the rise of modern birds (Guest Lecture by Dr. Jingmai O'Connor)	TBA (see Bcourses for updates)
28	4/28	In-class time to complete course evaluations  [work on science posters]	Tips for creating a great poster:  www.ncsu.edu/project/posters/index.html  https://guides.nyu.edu/posters  <a href="https://urc.ucdavis.edu/sites/g/files/dgvnsk3561/f">https://urc.ucdavis.edu/sites/g/files/dgvnsk3561/f</a>

			<a href="https://www.birmingham.ac.uk/schools/metallurgy-materials/about/cases/tips-advice/poster.aspx">iles/local_resources/documents/pdf_documents/How_To_Make_an_Effective_Poster2.pdf</a>  <a href="https://www.birmingham.ac.uk/schools/metallurgy-materials/about/cases/tips-advice/poster.aspx">https://www.birmingham.ac.uk/schools/metallurgy-materials/about/cases/tips-advice/poster.aspx</a>
	TBA	ALTERNATIVE FINAL EXAM:  The Age of Dinosaurs Symposium  Peer review service: 20 pts  Poster presentation: 40 pts	

## Resources

**Tips for Success:** Stay on top of the material! We will be taking a broad survey of not only dinosaurs, but the environments and other critters present alongside them. Use the quizzes to gauge your understanding of the material and reach out early to the instructor or GSI for help if you need support with class material.

**Glossary of Terms:** Here are some terms you might come across in your readings and in our classroom discussions: <https://www.pbs.org/wgbh/evolution/library/glossary/index.html> (courtesy of the PBS Evolutionary Library)

**Links to Supplemental Material or Study Guides:** <https://ucmp.berkeley.edu/> (see the “Understanding...” series)

**Volunteer Research Experience:** The Department of Integrative Biology has nearly 40 faculty members with broad research interests and diverse laboratories. The Valley Life Sciences Building is also home to several museums in the Berkeley Natural History Museums system (for example, the Museum of Paleontology). If you are interested in getting involved with cutting-edge research in my laboratory or others, let’s talk!

## Accommodations

If you need class accommodations because of disability, sports conflicts, or religious needs, please contact me early in the semester for anticipated schedule conflicts and accommodations.

My course policies regarding scheduling conflicts with academic requirements follow those of UC Berkeley Academic Senate rules, available at <https://academic-senate.berkeley.edu/sites/default/files/guide-acad-sched-conflicts-final-2014.pdf>.

Please notify me in writing by the second week of the term about any known or potential extracurricular conflicts (such as religious observances or team activities). I will try my best to help you with making accommodations but cannot promise them in all cases. In the event there is no mutually workable solution, I will work with you to discuss your academic plan for the semester and the possibility that you may be over-extended in your curriculum.

### Students with Disabilities

UC Berkeley is committed to creating a learning environment that meets the needs of its diverse student body including students with disabilities. If you anticipate or experience any barriers to learning in this course, please feel welcome to discuss your concerns with me.

If you have a disability, or think you may have a disability, you can work with the Disabled Students' Program (DSP) to request an official accommodation. The Disabled Students' Program (DSP) is the campus office responsible for authorizing disability-related academic accommodations, in cooperation with the students themselves and their instructors. You can find more information about DSP, including contact information and the application process at <https://dsp.berkeley.edu/>. If you have already been approved for accommodations through DSP, please meet with me so we can develop an implementation plan together.

### Academic Integrity and Ethics

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 are that you will honor this code.

Collaboration and Independence: Reviewing course materials and discussing them can be enjoyable and enriching things to do with fellow students. This is recommended.

Plagiarism: To copy text or ideas from another source without appropriate reference is plagiarism. 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>

More information about Academic Integrity can be found at <https://sa.berkeley.edu/conduct/integrity>.

### Closing Words

I am excited that you are interested in taking this journey through the Mesozoic with me. Although this will be a large class in terms of number of students, I encourage you to reach out and attend Office Hours with the Instructor and GSI if you think you need additional support in

going through the course material. My hope is that through this course you will gain a greater appreciation for the lost worlds of the past that still inform us of the organisms that live with us today.

Go Bears!

Jack