Geological Sciences 126
The History of Life on Earth: A View from the Museum

Professor:
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Office hours: Mondays 1-3, by appointment, or e-mail me at any time.

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Required Reading: Your Inner Fish (Shubin)

Optional Reading: History of Life (Cowen) (see lecture schedule for reading assignments).

Course Description and Goals: Topically-driven exploration of evolution, environmental change, and the history of life on Earth via the fossil record with the Natural History Museums of Los Angeles as a laboratory. How the changing Earth and life co-evolved through time.

After you take this class you should:

1. Understand the fundamental science and **evidence** behind evolution.
2. Understand the major events in evolution and Earth history, including environmental change, atmospheric change, and mass extinctions.
3. Appreciate how all life on Earth as we know it is linked via the genetic code.
4. Appreciate how the fossil record can inform our understanding of the history of life.
5. Appreciate the importance of museums as archives of scientific data and thought.

Grading:

Midterm 1:	20% February 13th
Midterm 2:	20% March 26th
Final Exam (cumulative):	20% May 12th (same time, room)
Lab:	20%
Class Project:	15% Due week of April 20th
Top Hat Participation:	5% (see below, all or nothing)

Lab: Attendance is mandatory. In addition to the labs in Zumberge Hall, we will make extensive use of the Natural History Museum across the street (admission is free with USC ID). Lab materials are set up for one week and then put away, so we are not able to provide "make up" labs. Some of the labs take place in the museums across the street in Expo Park or at the La Brea Tar Pits, and the museum hours of operation do not coincide with all of the labs. Thus, museum-based labs are designed to be self-guided and turned in during the subsequent lab period. **If you have more than two unexcused lab absences, you will automatically fail the course.**

Class Project: A 5-10 minute presentation is required for this class on your favorite fossil from the museum. The details will be introduced in lab during week 3—thus, you have plenty of time to work on the project. The project is worth 15% of your grade. Advice: do not wait until the last minute to do your project. There will be graded milestones along the way to help you finish on time.

Blackboard: This course will make extensive use of the Blackboard online system where class notes, the syllabus, labs, and other useful materials will be available. Check it frequently.

Top Hat: We will use Top Hat, an online participation system during class. Top Hat will count for 5% of your total class grade. To receive the full credit (all or nothing), you must participate in 80% of the Top Hat exercises that are given during the lecture time. This is all or nothing…you must participate 80% of the time (or greater) to get the credit. It is not prorated. If you have less than 80% participation, you will receive 0%.

Statement on Academic Conduct and Support Systems:
Discrimination, sexual assault, intimate partner violence, stalking, and harassment are prohibited by the university. You are encouraged to report incidents, and a good place to start is the recently-implemented Office of the Ombuds (https://ombuds.usc.edu). The USC Office of the Ombuds will provide a safe place on both campuses for faculty, students, and staff to navigate policies, issues, concerns, and conflicts without fear of reprisal or judgement. In doing so, the Office will promote and embody an ethical, empathetic, and engaged university culture committed to problem-solving, dispute resolution, and workplace wellness.
Furthermore, you may go directly to the *Office of Equity and Diversity*/*Title IX Office* http://equity.usc.edu and/or to the *Department of Public Safety* http://dps.usc.edu. This is important for the health and safety of the whole USC community. Faculty and staff must report any information regarding an incident to the Title IX Coordinator who will provide outreach and information to the affected party. The sexual assault resource center webpage http://sarc.usc.edu fully describes reporting options.

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, "Behavior Violating University Standards" https://policy.usc.edu/scampus-part-b/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Support Systems: A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://ali.usc.edu, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://dsp.usc.edu provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of Blackboard, teleconferencing, and other technology.

Readings	Your Inner Fish: **YIF** (Shubin-Required), Numbers = Cowen Chapters (optional)		Lab topic	Lab location
	Jan. 14	What is science (and why you don't actually hate science)	No Lab	*Up to you*
	Jan. 16	The Earth we live on (minerals, rocks, and the rock cycle)		
	Jan. 21	Plate Tectonics, life, and how the Earth recycles	Discussion of Obs/Interp, Intro to Earth Materials	*Lab room*
	Jan. 23	Evolution Toolkit I: The record of ancient environments		
	Jan. 28	Evolution Toolkit II: What is a fossil and how did it get that way?	Minerals at the museum	*Museum*
1	Jan. 30	How to tell geologic time		
	Feb. 4	Evolution Toolkit III: Taxonomy vs. phylogeny and cladistics	Living organisms as future fossils	*California* Science Center
YIF p. 1-80 3	Feb. 6	Evolution Toolkit IV: DNA, genes, and the genetic code		
	Feb. 11	The E Word: Darwinian Evolution and the modern synthesis	Fossils as the remnants of once-living organisms and sedimentary rocks as indicators of past environs	*Lab room*
	Feb. 13	**Midterm 1**		
	Feb. 18	Exploring evidence for evolution: DNA, doggies, and fossils	Patterns in Nature	*Lab room*
YIF p. 148-157	Feb. 20	Do eyeballs contradict evoution? Evolution of complex structures		
	Feb. 25	Darwin's dilemma: The Cambrian Explosion	Building Trees	*Lab room*
2, 4, 5	Feb. 27	Life, the Great Oxidation Event and the evolution of the atmosphere		
	Mar. 3	Evolution of seafood (Evol. of Animals I)	Taphonomy Game: who makes it into the fossil record?	*Lab room*
YIF p. 81-147 6, 7, 8	Mar. 5	Leaving the water--your inner fish (Evol. of Animals II)		
	Mar. 10	No, really…Birds are Dinosaurs (Evol. of Animals III)	Got no backbone (intro to invertebrates)	*Lab room*
9, 10	Mar. 12	Your cousins and you (Evol. of Animals IV)		
	Mar. 14-22	Spring Break (no class)	No lab	Your choice

11, 12, 15 **YIF p. 158-210** 19, 20	Mar. 24 Mar. 26	Evolution of plants I **Midterm 2**	Dinosaurs!	*Museum*
21	Mar. 31 Apr. 2	Evolution of plants II Co-evolution	Mammals!	*Museum*
	Apr. 7 Apr. 9	Climate Change Intro: How to read climate proxies through time Climate Change and Evolution	La Brea Tar pits	*The Tar Pits*
16	Apr. 14 Apr. 16	Snapshots from Deep Time and the Grand Canyon What is a Mass Extinction and why should we care?	Reading the climate record	*Lab room*
13	Apr. 21 Apr. 23	Giant space rocks killing things When the Earth tries to kill itself	**Project Presentations I**	*Lab room*
	Apr. 28 Apr. 30	Are we in the 6th mass extinction (and what we can do about it)? The Science (or not) of Jurassic Park	**Project Presentations II, review session for final**	*Lab room*