Geobiology

GEOL 431/531 Course Syllabus
Lectures: T & Th 10:00–11:15 am
Labs: Th 2:00–5:00 pm
Both in room PS 218

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Paleontology, also called geobiology, is a broad and vital component of the modern geosciences. Fossils are the tangible record of past life, and their study is the only scientific way to understand ancient ecosystems and how the biosphere has influenced the Earth's development. Indeed, nearly all major discoveries in geology – just to name two, the age of the Earth and the Theory of Plate Tectonics – are deeply rooted in primary discoveries made by paleontologists.

This course will explore more than half a billion years of life on planet Earth, from the mighty sponge to the modest mouse. The utility of fossil data for geoscientists will be a major focus of this course, but I welcome your input on topics that you would like to learn more about. Please don't hesitate to ask!

Course Description: Principles of paleontology as applied to problems in geology and biology; a wide spectrum of fossil organisms will be covered in the course, but emphasis will be given to invertebrates animals. Consideration is given to morphology, classification, evolution, paleoecology, taphonomy, and biostratigraphy.

Lectures: Not just "you sit, I talk" format. The best way to learn is to be an active participant. In addition to my planned lectures, I will be encouraging you to participate in group and individual activities during class time. Your activity will be rewarded with a better understanding of the course content (always a good thing when exam-time comes!), and you will earn full credit on your participation grade.

Course Objectives: The primary mission of this course is to give you a practical new tool as a geoscientist. To meet this goal, there are three main objectives in this course, with each objective building on the previous: (1) to become familiar and to be able to recognize common organisms of the Phanerozoic fossil record; (2) to recognize the environmental and time significance of fossil groups; and (3) to understand how fossils can be used to address geological and biological problems.

What else you will gain from taking this course:

- An understanding of the advantages and limitations of various analytical methods
- Skills in critically evaluating the scientific literature
- The ability to explain evolutionary theory and the value of paleontology to anyone
- A new appreciation for the amazing diversity of life

ALWAYS CONSULT WebCT FOR THE LATEST COURSE INFORMATION
http://webct.isu.edu/isu/

Required Text:

Bringing Fossils to Life: An Introduction to Paleobiology, 2nd Ed.,
Prothero, D., Prentice Hall. ISBN # 0073661708

Grading:

Exam I	10%
Exam II	10%
Final Exam	15%
Participation	5%
Field Trip Reports (UT, NV)	15%
Term Project (paper/oral)	10%
Lab Assignments (~12)	20%
Lab Oral Exam	5%
Lab Final	10%
TOTAL	100%

I use a standard grading scale: 100-94% = A, 93-90% = A-, 89-87% = B+, 86-84% = B, 83-80% = B-, 79-77% = C+, 76-74% = C-, 69-67% = D+, 66-64% = D, 63-60% = D-, <59% = F

Term Project: Each student will be required to study an aspect of paleontology and submit a 2 page extended abstract on your topic and present a 12-minute oral report to the class. *I will give more detailed information about the term project in a separate handout.* Presentations will be in PowerPoint format. The subject of the report will require library research, using the primary literature (i.e. peer reviewed journals such as Palaios, Journal of Paleontology, Cretaceous Research, Journal of Vertebrate Paleontology, Geology, etc…) and you must pick at least 3 papers on that subject to address in your presentation. You may choose from the suggested topics below, or you may pick a topic of your own choice. If you choose a topic of your own choice, you must discuss it with me. If you need help learning to use PowerPoint, you can talk to me and get assistance at the Instructional Technology Resource Center in the basement of the Library.

Suggested Topics

- Oxygen isotope analysis on shells for paleoclimate reconstruction
- the Mesozoic Marine Revolution
- Fossil record of dinosaur soft parts (i.e. not bones!)
- Fossil record of ocean hydrothermal vent communities
- Zooxanthellae (algal symbionts) in Paleozoic corals and sponges
- Evolution of gigantism in vertebrate and invertebrate animals

The Lab: Held weekly on Thursday afternoon, the labs will be an important part of your learning in this course. There will be weekly assignments, a mid-term lab oral exam, and a lab final exam. These activities are designed to help you learn and retain the practical course skills.

Field Trips: Students need to attend two field trips as they will form the basis for field trip reports worth a significant part of your grade. Each student will write a field trip report, due ~three weeks after the field trip. More specific details on the reports will follow.

1. **Utah Field Trip: October 7–8.** Leave early morning Saturday Oct. 7 and return early evening Sunday Oct. 8. This trip will examine both marine and terrestrial Mesozoic deposits of the San Rafael Swell area of eastern Utah.

2. **Nevada Field Trip: November 10–13.** Leave morning of Friday Nov. 10 and return evening of Monday Nov. 13. This sed-strat-paleo trip will examine the Middle Paleozoic marine deposits of SE Nevada including the results of the Alamo Impact Event.

Academic Honesty Policy: I take academic honesty very seriously. Students are expected to do their own work on all course assignments, and dishonest or unethical behavior will not be tolerated. Examples of academic dishonesty include, but are not limited to, cheating on an exam, copying a lab assignment, or using material from a book or internet site without properly acknowledging the source. Cheating, copying or plagiarism in this course may result in a failing grade on the assignment and/or a failing grade in the course, and appropriate authorities within the University will be notified of the infraction.

Course Schedule

Week	Dates	Topic	Readings
1	Aug. 22 Aug. 24 Lab 1	Introduction: What is Paleontology? Principles of Taxonomy & Review of Major Fossils PRACTICAL CLASSIFICATION OF FOSSILS	Ch. 1, 4
2	Aug. 29 Aug. 31 Lab 2	Principles of Evolution: Fact and Theory Microfossils; Sponges and Archaeocyathids METHODS OF FOSSILIZATION & MICROFOSSILS	Ch. 3, 5, 11, 12
3	Sept. 5 Sept. 7 Lab 3	Cnidarians: Corals and the Fossil Record of Reefs Principles of Taphonomy INTRO FOSSILPLOT; SPONGES & CORALS **TOPICS DUE**	Ch. 12
4	Sept. 12 Sept. 14 Lab 4	Brachiopods and Bryozoans Principles of Paleoecology BRACHIOPODS & BRYOZOANS	Ch. 13, 8
5	Sept. 19 Sept. 21 Lab 5	Arthropods: Trilobites Arthropods: Insects; Chelicerates; Crustaceans TRILOBITES & OTHER ARTHROPODS	Ch. 14
6	Sept. 26 Sept. 28 Lab 6	Biostratigraphy **Exam 1: in class** BIOSTRATIGRAPHY	Ch. 10
7	Oct. 3 Oct. 5 Lab 7	Molluscs: Gastropods Molluscs: Bivalves GASTROPODS & BIVALVES	Ch. 15

***	***	**Utah Field Trip: Oct. 7-8, meet Saturday at 6:00 am**	***
8	Oct. 10 Oct. 12 Lab 8	Molluscs: Cephalopods Extinctions: Events & Theories CEPHALOPODS	Ch. 15, 6
9	Oct. 17 Oct. 19 Lab 9	Principles of Ichnology Echinoderms **Lab Oral Exam; +** ECHINODERMS	Ch. 18, 16
10	**Oct. 24** **Oct. 26** No lab	**Exam 2: take home…** **email answers to tapaleif@isu.edu** **by 5:00 pm on October 24.**	
11	Oct. 31 Nov. 2 Lab 10	Vascular Plants Principles of Paleobiogeography PALEOBOTANY	Ch. 19, 9
12	Nov. 7 Nov. 9 Lab 11	**STUDENT PRESENTATIONS** Fish and Amphibians OSTEOLOGY & VERTEBRATES	Ch. 17
***	***	**Nevada Field Trip: Nov. 10-13, meet Friday at 9:30 am**	***
13	Nov. 14 Nov. 16 Lab 12	Primitive Reptiles & Dinosaurs Mammals TAPHONOMY	Ch. 17
14	**Nov. 20–24**	*THANKSGIVING HOLIDAY: NO CLASS*	
15	Nov. 28 Nov. 30 Lab	Mammals Catch-up **Lab Final**	Ch. 17
16	Dec. 5 Dec. 7	Catch-up & My research REVIEW	
17	Dec. 14	**Final Exam: Thurs., December 14: 10:00 am – noon**	

*** dates in bold = no class that day**