

Syllabus: Geoscience F315W Paleobiology & Paleontology

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Office Hours: Mon, Wed, Fri, 2:00-3:00. Or by appointment

Lectures and Discussions: Tues, Thurs 11:30-1:00 **In:** NSCI 233

Laboratory: Thurs. 5:00-8:00 **In:** NSCI 229

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Final Exam: Thursday May 11, 10:15-12:15

Required Text:

Prothero, D.R., 2004. Bringing Fossils to Life – 2nd edition. WCB/McGraw-Hill, Boston, 503 p

Introduction

In general, paleontology examines the history of life (biota). The 'biosphere', 'lithosphere', 'hydrosphere', 'atmosphere' and 'cryosphere', are all interconnected. So by studying the history of life we also learn about the history of our planet. Paleontological investigations seek to describe temporal and spatial changes in Earth's flora and fauna within the context of geological processes, stratigraphy, and evolution. Consequently, the study of paleontology requires a working knowledge of more than one discipline. One of the principal goals of this course is to demonstrate the interdependence of scientific disciplines in any investigation of large-scale patterns and events in the natural world.

The foundation of paleontology is in the examination of fossils. With an understanding of fossil identification, comes a powerful tool in many sub-disciplines of geology such as stratigraphy, paleoecology, paleoclimatology, and evolution. No practicing geologist should be without a basic knowledge of the morphology and geologic range of common invertebrate and vertebrate fossils. This course will not only provide this basic knowledge but also prepare you for further, more detailed study in paleontology.

The course roughly follows the scheme of Prothero's text, "Bringing Fossils to Life." This book is the only recent paleobiology text to include both chapters on fossil morphology and chapters that deal with paleontological methods and applications. Because labs emphasize morphology, Thursday lectures will be used to provide an overview of the fossil phylum to be studied later that day in the lab. Particular emphasis will be placed the anatomy and morphology of fossil phyla, highlighting classes or genera that are particularly useful for dating as well as the evolutionary significance of the phylum. Tuesday lectures will generally focus on applications and other trends in the fossil record. Readings will likewise alternate between chapters on fossils and chapters on methodology.

Lecture Attendance and Course Readings

University students are adults. Therefore, lecture and lab attendance is your responsibility. However, it is highly unlikely that you will be able to perform well in this course without attending all lectures and labs. As well as further explanation and emphasis of themes discussed in the text, there will be many points discussed in class that are not in the text book. I strongly recommend that you attend all class sessions.

Most of the themes in this course are discussed in the course textbook (Prothero, 2004). I suggest that you bring the text to all lectures and especially the labs. I encourage you to do the readings prior to class. In doing so, you should be able to readily comprehend the lecture material which will make note-taking easy. You have spent a lot of money enrolling in this course and buying the text- get your money's worth by going to class and reading the text!

Labs

The emphasis of the labs is biological, but the application to geological problems should not be underestimated. In order to use fossils to date rocks and interpret the depositional history and environment of the surrounding strata, a geologist needs to understand the biological requirements and limitations of the organisms. Were they sessile or mobile? Did they swim or crawl? Did they filter water for food, or were they predators? Could they survive in cold water, or did they require tropical climates? The answers to such biological and ecological questions may greatly constrain the geological interpretation. Furthermore, many new applications have been found for fossil data, from reconstructing the ecology of fossil communities to locating petroleum reservoirs. This class will highlight areas of science in which the study of fossils is gaining significance and illustrate new analytical methods.

Hands-on experience with fossils is essential to a complete understanding of the morphology and paleoenvironmental significance of the organisms discussed in class. The record of marine invertebrates is longer and more complete than that of marine vertebrates, terrestrial invertebrates, terrestrial vertebrates, or plants. Consequently, labs will focus on marine invertebrate fossils.

Each lab will begin with a brief review of the anatomy and taxonomy of the fossil group to be studied. In addition to your textbook, you should always bring plain white paper of fairly heavy weight, #3 pencils, an eraser, a ruler, and a hand lens. If you do not have a lens, you can obtain a Hamilton Bell 10x lens from the bookstore (other lenses are available but not recommended).

All lab exercises will be handed out in class the preceding Tuesday. Please do not forget to bring these labs with you on the following Thursday! If you are unable to finish the exercise during the allotted lab time, lab materials will be left out in room 229 until the end of the week. Labs will be due at the beginning of the following lab period. The grade will decrease by 5 percent for each day that the exercise is late.

Writing Sample

This is a writing intensive course (315**W**). Consequently, you will be expected to produce multiple drafts of a research paper (see below) and to explain your answers and

ideas in short written paragraphs on lab exercises and exams. Writing is a skill that becomes easier with practice (really!). Hence, the goal of these assignments is to provide you with many opportunities to stretch your writing talents. No one (faculty included) produces a flawless draft on the first attempt. Remember to focus on progress, rather than perfection, and don't be afraid to modify your first draft! In order to assess your current strengths and weaknesses behind the pen (or keyboard), you will be asked to compose a page or two. **This assignment is due on Thursday Jan. 26.** I'll provide feedback, but his writing sample will **not** be graded! At the end of the semester, you can look back and review your progress.

Research Papers

Each student will complete an original research paper on the subject of their choice. This assignment is designed to encourage you to delve into the literature in your particular area of interest. In addition to exploring a new topic, the paper gives you a chance to be graded on something other than your performance on exams and lab exercises. Because I'll be providing feedback at various stages of your research paper, you will need to select your topic by mid-February. I will be happy to help you select a topic. Please make an appointment or drop in during my office hours if you wish. I can also help you find the references that will form the basis of your paper. The final paper should not be a "book report." I expect you to compare and contrast a variety of opinions on your selected subject. In order to do this, you will need to consult at least 4 references, all of which should be research papers. None of your 4 basic references may be encyclopedias, textbooks, or websites, though these may also be consulted to flesh out your paper or to track down the primary references. Research papers must be referenced and must include a list of all referenced material. I will provide you with a format for citations and references.

Once I have read your first drafts, I will schedule a brief conference with each of you, during which we will discuss suggested changes. Revised, final drafts are due on April 26. Although your grade will be based upon the quality of your final draft, failure to turn in an outline or first draft on time will each result in a 10-point deduction from your final grade. Revisions are not intended as a penalty, but as a chance for you to get some feedback regarding the content or style of your paper so that you can improve your grade. Ultimately, revisions offer you the opportunity to correct oversights and hone your science-writing skills. However, it is important to note that revision requires additional effort. You will not raise your grade if you do not improve upon your original submission.

Grading

Grades will be weighted as follows: 50% class and 50% lab. The class grade will be determined by performance on two midterm exams, a comprehensive final exam, and a research paper. The second mid-term may include material from the first third of the course, but emphasis will be placed on the second third. The final exam will include material from the entire course, but emphasis will be placed on the latter third. The lab grades will be based upon lab exercises and a final lab practicum.

2 Midterm Exams: 10% each
Final Exam: 15%
Research Paper: 15%

Laboratory Exercises: 40%
Laboratory Practicum: 10%