

Syllabus: Geoscience 315W Paleobiology & Paleontology

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Office Hours: Monday 10:30 AM - 12:30 PM Thursday 1:00 – 3:00 PM Or by appointment

Lectures and Discussions: Mon, Wed, Fri 9:15-10:15 AM 233 Natural Sciences

Laboratories: Mon 2:15-5:30 PM *or* Tues 6:00-9:00 229 Natural Sciences

TA: Grant Shimer Office: 312 Natural Sciences Phone: 474-7585 E-mail: fsgts1@uaf.edu

Required Text:

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

Introduction: 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.

Due to recent advances in radiometric dating and the current demand for high-resolution time scales, paleontology has lost its place as the primary chronological tool. However, identification of fossil organisms remains critical to studies of stratigraphy, paleoecology, and paleoclimatology. No practicing geologist should be without a basic knowledge of the morphology and geologic range of common invertebrate and vertebrate fossils. To this end, Monday labs will focus on the anatomy, morphology, geological range, and habitat of fossil phyla. The emphasis of the labs is thus 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.

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, Wednesday lectures will be used to provide an overview of the fossil phylum to be studied the following Monday. Particular emphasis will be placed on the geologic range and evolutionary significance of the phylum. In preparation for lab, Friday lectures will deal with anatomy and morphology of fossil phyla, highlighting classes or genera that are particularly useful for dating. Monday lectures will generally focus on applications. Readings will likewise alternate between chapters on fossils and chapters on methodology.

Attendance: Lecture attendance is entirely your responsibility. However, I find that students who attend lectures invariably perform better on exams and lab exercises. Therefore, I strongly recommend that you attend every session. Some of you will find this to be more difficult late in the semester, when it is still dark at 9:15 AM. Please try to remain punctual!

Labs: 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 probably 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, so you will find it advantageous to be on time. 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 Wednesday. Please do not forget to bring these labs with you on the following Monday! 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 2 points for each day that the exercise is late. Permission will not be given to work on the next exercise until the late one is turned in.

Writing Sample: This is a writing intensive course (315W). 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 Wednesday, Sept. 8. I'll provide feedback, but this writing sample will not be graded, so have FUN with it! At the end of the semester, you can look back and review your progress.

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. Selection of topics is entirely up to you, but I will be happy to 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 bibliography. I will provide you with a format for citations and references. To help avoid end-of-the-semester panic, first drafts will be prior to Thanksgiving break, on or before November 12. Because of the early deadline, you will need to select your topic by the end of the second week of class. Please make an appointment or drop in during my office hours if you wish to discuss your choice or if you need help choosing a topic. 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 December 3. 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 result in a 5- or 10-point deduction from your final grade, respectively. 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.

Disabilities Services

The Office of Disability Services implements the Americans with Disabilities Act (ADA) and ensures that UAF students have equal access to the campus and course materials. I will work with the Office of Disabilities Services (474-7043) to provide reasonable accommodation to students with disabilities. Please let me know at the beginning of the course if accommodations should be provided.

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 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%