
GEOL331/BSCI333 *Principles of Paleontology*

Fall 2022

Instructors

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Classroom

Lecture	PLS 1111	9:30-10:45 am	TuTh
Lab	GEO 2107 & 2117	2:00-5:00	Th

Course Organization

Two lectures each week. 1 lab meeting per week.

Texts

Lecture Text: Donald R. Prothero. 2013. *Bringing Fossils to Life*. 3rd Edition. Columbia University Press. 671 pp. ISBN 978-0891158930.

Additional online readings are linked to on ELMS

Course Grades

Grade Scale

The numbers given represent the thresholds that must be passed in order to reach that grade (for example, A+ is 97.000... and any number greater). There is no rounding for letter grades; the thresholds must be passed. F is any grade below D-. Thresholds: 97, A+; 93, A; 90, A-; 87, B+; 83, B; 80, B-; 77, C+; 73, C; 70, C-; 67, D+; 63, D; 60, D-; < 60, F.

The Final Grade is the algebraic sum based on the numerical grades.

Grade Components

ITEM	PERCENTAGE
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Midterm Exam 1	15%
Midterm Exam 2	15%
Final Exam	15%
Labs	25%
Lab Quizzes	10%
Homework	15%
Student-Generated Questions	5%

Midterm Exams (15% each): Two online exams on September 27-29 and October 27-29, respectively. For each of these there will be a section comprised of true/false, matching, multiple choice, and similar type questions, as well as a few short answer questions and an essay. These exams are open-note but timed, and are subject to the University's Honor Pledge; you may not seek help from students or other people in doing these. If you encounter a technical problem, please contact ELMS@umd.edu for help (and Dr. Holtz so that he is aware of your situation.)

Final Exam (20%): Another online final exam, cumulative for the entire course but focuses on the material since the second midterm. Format is similar to the mid-term exams. The exam will be available **DECEMBER 14-16.**

Labs (25%): Essentially every week there will be a lab. Labs are due the week after they are assigned, allowing students time to examine specimens over the course of the week if they wish. These will be turned in as ELMS quizzes. The final "lab" is actually a field trip to the Deep Time paleontology halls of the National Museum of Natural History; more information to come.

Lab Quizzes (10%): In order to evaluate your understanding of the anatomy and identity of fossil material, a series of lab quizzes starting in the third week of the course. These will be done on ELMS and will be due on ELMS prior to the beginning of lab time. The lowest lab quiz grade will be automatically dropped.

Homework (15%): Throughout the course a set of homework projects are assigned to examine your knowledge of the lecture material. These will be provided on ELMS and will be entered as ELMS quizzes.

Student-Generated Questions (5%): Every week we will ask you to provide a question, its answer (and in the case of a matching or multiple-choice question, additional incorrect options) from each of the two lectures presented the next week. Creating your own question is an effective way of better understanding the material. These questions will be made available to all. A selection of these will be used in the midterm and final exams.

Course Overview

Course Description

Life of the geologic past as revealed by the fossil record. Students will examine how the physical remains of organisms and traces of their behavior in incorporated into the geologic record. They will examine how paleontologists to determine geologic ages and ancient environments; evolutionary history and extinctions; and the biology and behavior of extinct organisms.

Learning Outcomes

By the end of the semester, every student should be able to:

- Identify major groups of fossilizing organisms and their distinctive anatomical traits from hand samples.

- Interpret standard paleontological charts and plots (e.g., biostratigraphic range charts; phylogenies and cladograms; diversity analyses; etc.).
- Critically evaluate paleontological analyses in the technical literature.

Course Themes

This course examines how scientists study the age, environments, evolution, origin, biology, behavior, and extinction of fossil organisms. Over this time, we will explore several big themes:

- The scale of geologic and evolutionary time
- Biological evolution and the origin, evolution, and diversification (and occasional extinction) of branches of the Tree of Life
- The nature of scientific knowledge, and how diverse lines of evidence are used to reconstruct events of the ancient past

EXPECTATIONS & POLICIES

Expectations & Attendance

Attendance in lecture is expected. If you cannot make a certain lecture, try and find another student who might lend you their notes. (In fact, establishing a study group early in the course has proven useful for many students in the past). If you want to achieve a good grade in the course, the time to start working towards that is from the very beginning! Keep up with the material as it is presented rather than “cramming” to study it right before exams.

Attendance in laboratory is required. Prior to each lab there will be instruction about aspects of that day’s material provided on Panopto and lab quizzes evaluating previous weeks’ material on ELMS. The specimens will often be accessible during the week if you wish to revisit them before turning in your assignment; however, due to loss of specimens in the past some individual fossils might only be made available during lab time.

Mask Policy: The University's policy is that masks will no longer be required while indoors in most situations, including classrooms. However, the University also reminds us that masks are a significant defense against the spread of COVID-19 and other respiratory viruses (including the cold and flu). Therefore, they recommend wearing a KN95 mask while indoors for added protection. So please feel free to mask up if you feel safer, and we ***STRONGLY*** encourage masking if the cold or flu is spreading on campus.

Communication

Communication in this course will primarily be by means of the ELMS Inbox email system. Even given its online nature, there is the possibility that due to unusual inclement weather or other unexpected emergencies, the University may close. Please consult the University main webpage (<http://www.umd.edu>) or call 301-405-7669 (SNOW) to confirm such cancellations. Drs Holtz & Merck will contact students via ELMS in order to inform them concerning delays of due dates for projects to be handed in or for exams: typically, these will be shifted until the next available class date.

Memorization

As part of the nature of the course, there will be a lot of memorization (less than a foreign language class, but more than that found in more mathematically-oriented introductory science classes). This will include lots of anatomical, geological, and paleontological terms, as well as evolutionary and temporal relationships. If you have difficulty memorizing, this may not be the class for you. Also, if there are words or concepts with which

you are not familiar, feel free to ask Drs. Holtz or Merck (in discussion, at office hours, over email, etc.) for an explanation or clarification.

General Policies

The University has provided a page on Academic policies at <http://www.ugst.umd.edu/courserelatedpolicies.html>. Each student is responsible for reviewing this page with regards to issues of Academic Integrity; the Code of Student Conduct; Sexual Misconduct; Discrimination; Accessibility; Attendance, Absences, or Missed Assignments; Student Rights Regarding Undergraduate Courses; Official UMD Communication; Mid-Term Grades; Complaints About Course Final Grades; Copyright and Intellectual Property; Final Exams and Course Evaluations; and Campus Resources.

Laptop/Smartphone/Tablet Use

Given the reliance on technology this semester, please make certain that you have access to appropriate hardware, software, and Internet connections. If you are concerned about your ability to connect remotely for this course, please consult the following information about solutions provided by the Division of Information Technology:

- General Technology Information, including laptop loaner requests: <https://it.umd.edu/tech-resources>
- Network Resources: <https://it.umd.edu/tech-resources#network>

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Lecture Schedule

<i>Date</i>	Topic
<i>Week of</i> <i>Aug. 29</i>	8/30: Introduction to the Course; Course Logistics 9/2: Taphonomy: Making a Fossil Record 9/2 LAB: Fossilization & Taphonomy Reading: Chap. 1
<i>Week of</i> <i>Sept. 5</i>	9/6: Trace Fossils 9/8: Growth, Variation & Fossil Individuals 9/8 LAB: Micropaleontology Reading: Chaps. 2, 19 9/9 PaleoDB Homework Due
<i>Week of</i> <i>Sept. 12</i>	9/13: Fossil Species & Alpha Taxonomy 9/15: Biostratigraphy 9/15 LAB: Sponges & Corals 9/15 Lab Quiz 1

	Reading: Chaps. 3, 10
<i>Week of</i> <i>Sept. 19</i>	9/20: Macroevolution in the Fossil Record 9/22: Cladistics & Phylogenetic Inference 9/22 LAB: Bryozoans 9/22 Lab Quiz 2 Reading: Chaps. 4, 5, Online readings 9/23 Biostratigraphy Homework Due
<i>Week of</i> <i>Sept. 26</i>	9/27-9/29 MIDTERM EXAM 1 9/27: Archean Fossils & Life's Origins 9/29: Fossil Protists & Metazoan Origins I 9/29 LAB: Brachiopods 9/29 Lab Quiz 3 Reading: Chaps. 8, 12 9/30 Alpha Taxonomy Homework Due
<i>Week of</i> <i>Oct. 3</i>	10/4: Metazoan Origins II; Sponges 10/6: Overview of Animal Phylogeny & Cnidarians 10/6 LAB: Gastropods & Cephalopods 10/6 Lab Quiz 4 Reading: Chaps. 13, 14, Online readings 10/7 Phylogenetic Analysis Homework Due
<i>Week of</i> <i>Oct. 10</i>	10/11: Ediacaran Metazoans & the Cambrian Explosion 10/13: Animals with Lophophores: Bryozoans & Brachiopods 10/13 LAB: Bivalves 10/13 Lab Quiz 5 Reading: Chap. 14
<i>Week of</i> <i>Oct. 17</i>	10/18: Mollusca I 10/20: Mollusca II 10/20 LAB: Arthropods 10/20 Lab Quiz 6 Reading: Chap. 16
<i>Week of</i> <i>Oct. 24</i>	10/25: Basal Panarthropoda 10/27: Arthropoda I 10/27 LAB: Pelmatozoans 10/27 Lab Quiz 7

	<p>Reading: Chap. 15</p> <p>10/27-29 MIDTERM EXAM II</p>
<p><i>Week of</i> <i>Oct. 31</i></p>	<p>11/1: Arthropoda II</p> <p>11/3: Basal Deuterostomes; Echinodermata I</p> <p>11/3 LAB: Eleutherozoans</p> <p>11/3 Lab Quiz 8</p> <p>Reading: Chaps. 15, 17</p> <p>11/4 Phylogenetic Inferences Homework Due</p>
<p><i>Week of</i> <i>Nov. 7</i></p>	<p>11/8: Echinodermata II</p> <p>11/10: Chordates & Paleoichthyology</p> <p>11/10 LAB: Hemichordates (incl. Graptolithina), Basal Chordates, Paleoichthyology</p> <p>11/10 Lab Quiz 9</p> <p>Reading: Chaps. 17, 18</p> <p>11/11 Paleoecology Homework Due</p>
<p><i>Week of</i> <i>Nov. 14</i></p>	<p>11/15: Tetrapod Paleontology</p> <p>11/17: Paleobotany</p> <p>11/17 LAB: Terrestrial Vertebrates</p> <p>11/17 Lab Quiz 10</p> <p>Reading: Chaps. 18, 20</p>
<p><i>Week of</i> <i>Nov. 21</i></p>	<p>11/22: Biomechanics & Functional Morphology</p> <p>Reading: Chap. 7</p> <p>11/23-27 THANKSGIVING RECESS: Enjoy your roasted dinosaur</p>
<p><i>Week of</i> <i>Nov. 28</i></p>	<p>11/29: Morphometrics</p> <p>12/1: Paleoecology and Paleoenvironments</p> <p>12/1 LAB: Paleobotany</p> <p>12/1 Lab Quiz 11</p> <p>Reading: Chaps. 7, 8</p> <p>12/2 Paleontology Potpourri Homework Due</p>
<p><i>Week of</i> <i>Dec. 5</i></p>	<p>12/6: Macroecological Patterns: Large-Scale Phenomena of the Fossil Record</p> <p>12/8: The Future of Paleontology</p> <p>12/10 LAB: Hall of Deep Time, National Museum of Natural History field trip</p> <p>Reading: Chap. 6</p>
<p><i>Dec. 14-16</i></p>	<p>FINAL EXAM</p>