GEOL331/BSCI333 Principles of Paleontology

Fall 2018

Instructors

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Classroom

Lecture	JMZ 1120	9:30-10:45 am	TuTh
Lab	GEO 2107	2:00-5:00	Th

Course Organization

2 lectures per week (Tuesday, Thursday); 1 lab per week.

One field trip to the National Museum of Natural History during lab time (November 15)

Lectures lost due to University late openings or cancellations or instructor absence will be made up as Panopto video recordings on the ELMS page.

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
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	20%
Labs	20%
Lab Quizzes	10%
Homework	10%

Midterm Exams (20% each): Two pen-and-paper exams on September 25 and October 30, respectively. Absence from the exams will not be excused except for those causes approved by University policy in the University of Maryland Undergraduate Catalog see http://www.ugst.umd.edu/courserelatedpolicies.html, under "Attendance, Absences, or Missed Assignments"). Only those students excused for these causes will be eligible for a make-up exam.

Final Exam (20%): A pen-and-paper final exam during the regularly scheduled exam season. It is cumulative for the entire course but focuses on the material since the second midterm. Format is similar to the mid-term exams. The preliminary date is ***THURSDAY DECEMBER 13, 8-10 am*** (to be confirmed mid-semester): please plan your end-of-semester travel accordingly!! (It that means informing your parents about this now, please do so!) Again, absence from the final will not be excused except for those causes approved by University policy in the University of Maryland Undergraduate Catalog.

Labs (20% total): 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.

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

Homework (10% total): Throughout the course a set of homework projects are assigned to examine your knowledge of the lecture material.

Extra Credit: No separate extra credit assignments as such planned for this course, although individual exams and homework assignments may have extra credit questions that add up in the final course grade.

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 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. The PowerPoints will not be provided to students, although there are detailed lecture notes online. 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.

NOTE: Attendance means more than mere presence: it means "paying attention". Please take out your ear buds and refrain from texting/web-browsing/doing homework/etc. in class.

Attendance in laboratory is required. At the beginning of each lab there will be instruction about aspects of that day's material and lab quizzes evaluating previous weeks' material. 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.

Communication

Communication in this course will primarily be by means of the ELMS Inbox email system. In cases of 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 class, after class, 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

Recent studies have shown that:

- People who take notes using pen/pencil and paper more effectively process and master the material, especially with regards to their ability to answer conceptual questions. (Also, taking notes by hand allows easier doodling, which has been shown to promote focus and memory).
- More importantly, people using laptops are likely to start multitasking (pulling up social media; watching videos; playing games; doing work for other classes; etc.) and that such multitasking is detrimental to the both the student doing it and all students within view of that screen.

Towards this end, we **very strongly encourage** you to take notes via pencil/pen and paper. It is in your academic benefit to do this.

If you choose to take notes using a computer, you are agreeing to the following conditions:

- Computer use is limited to following along with lecture notes, taking notes yourself, or searching for additional information (via Wikipedia, journal articles, and similar sites) concerning the lecture matter.
- You will refrain from using your computer from any or all of the following during classtime: doing class assignments for this or other classes; using social media, texting, email, or other electronic modes of communication; viewing any websites or apps other than those listed in the first bullet point (i.e., no checking news, entertainment, sports, shopping, etc., sites).
- Failure to restrict your computer use will mean that laptop & smartphone use by **all students** in class will be prohibited for the rest of the semester. Apologies to those students who prefer to use this method to take notes, but this is the only effective way of dealing with the bad actors.

When not in use, smartphones, tablets, laptops, and all other modes of electronic communication must be **turned off** and **stowed away** during class time. (**NOTE**: using your smartphone between your legs underneath the desk is NOT "stowed away", and you aren't and have never fooled a teacher or instructor when you try that…) If you are using the device for recording lectures, please activate them then leave them untouched for the remainder of the lecture.

That said, there may be some group activities in which we will use individual laptops/tablets/smartphones in class. Drs. Holtz & Merck will make every effort to inform you about this in advance. However, in those situations you may only use these devices for the task at hand.

Course Evaluations

CourseEvalUM will be open for students to complete their evaluations during the last two weeks of the semester. Students can access CourseEvalUM through ELMS to complete their evaluations. You will be alerted about these dates and provided more information closer to that time, and students will be alerted via their official University e-mail account.

Students who complete evaluations for all of their courses in the previous semester (excluding summer), can access the posted results via Testudo's CourseEvalUM Reporting link for any course on campus that has at least a 70% response rate. You can find more information, including periodic updates, at the IRPA course evaluation website:

https://www.irpa.umd.edu/Assessment/CourseEval/fac_faq.shtml

The expectation is that all students will complete these. This is YOUR chance to anonymously evaluate this class: please use this opportunity!

course materials, from selling lecture notes, and from being paid to take lecture notes without the express written permission of the professor teaching this course. Violations of this prohibition will be treated as violations of the University Honors Code and reported and dealt with accordingly.

Lecture Schedule

Date	**Topic**
Aug. 28	Introduction to the Course: What Good is the Fossil Record? **Reading:** Chap. 1
Aug. 30	Taphonomy: Making a Fossil Record **Reading:** Chap. 1 **LAB**: Fossilization & Taphonomy
Sept. 4	Biostratigraphy **Reading:** Chap. 10
Sept. 6	Trace Fossils **Reading:** Chap. 19 **LAB:** Micropaleontology
Sept. 11	Variation & Fossil Individuals **Reading:** Chap. 2 **PaleoDB Homework Due**
Sept. 13	Fossil Species & Alpha Taxonomy **Reading**: Chap. 3 **LAB:** Sponges & Corals **Lab Quiz 1**
Sept. 18	Macroevolution in the Fossil Record **Reading:** Chap. 5 **Biostratigraphy Homework Due**
Sept. 20	Cladistics & Phylogenetic Inference **Reading:** Chap. 4 **LAB:** Bryozoans **Lab Quiz 2**
Sept. 25	**MIDTERM EXAM 1**
Sept. 27	Archean Fossils & Life's Origins **Reading:** Chap. 8 **Alpha Taxonomy Homework Due**

	LAB: Brachiopods **Lab Quiz 3**
Oct. 2	Fossil Protists & Metazoan Origins I **Reading:** Chap. 12
Oct. 4	Metazoan Origins II; Sponges **Reading:** Chap. 13 **LAB:** Gastropods & Cephalopods **Lab Quiz 4**
Oct. 9	Overview of Animal Phylogeny & Cnidarians **Reading:** Chap. 14 **Phylogenetic Analysis Homework Due**
Oct. 11	Ediacaran Metazoans & the Cambrian Explosion **LAB:** Bivalves **Lab Quiz 5**
Oct. 16	**PANOPTO LECTURE ONLINE (Do Not Meet In Class):** Mollusca I **Reading:** Chap. 16
Oct. 18	**PANOPTO LECTURE ONLINE (Do Not Meet In Class):** Mollusca II **Reading:** Chap. 16 **LAB:** No lab this week
Oct. 23	Animals with Lophophores: Bryozoans & Brachiopods **Reading:** Chap. 14
Oct. 25	Basal Panarthropoda **Reading:** Chap. 15 **LAB:** Arthropods **Lab Quiz 6**
Oct. 30	**MIDTERM EXAM II**
Nov. 1	Arthropoda I **Reading:** Chap. 15 **LAB:** "Pelmatozoans" **Lab Quiz 7**
Nov. 6	Arthropoda II **Reading:** Chap. 15 **Phylogenetic Inferences Homework Due**

	MIDTERM ELECTIONS: Are you registered to vote? Do you need to vote with an absentee ballot? Get ready in advance: check with https://www.vote.org or your local voting commission
Nov. 8	Basal Deuterostomes; Echinodermata I **Reading:** Chap. 17 **LAB:** Eleutherozoans, Hemichordates (incl. Graptolithina) **Lab Quiz 8**
Nov. 13	Echinodermata II **Reading:** Chap. 17
Nov. 15	Chordates & Vertebrate Paleontology **Reading:** Chap. 18 **Paleoecology Homework Due** **LAB:** Field trip to the National Museum of Natural History
Nov. 20	Paleobotany **Reading:** Chap. 20
Nov. 21-23	**THANKSGIVING RECESS: Enjoy your roasted dinosaur**
Nov. 27	Biomechanics and Morphometrics **Reading:** Chap. 7
Nov. 29	Paleoecology and Paleoenvironments **Reading:** Chap. 8 **Paleontology Potpourri Homework Due** **LAB:** Vertebrate Paleontology **Lab Quiz 9**
Dec. 4	Macroecological Patterns: Large-Scale Phenomena of the Fossil Record **Reading:** Chap. 6
Dec. 6	The Future of Paleontology **LAB:** Paleobotany **Lab Quiz 10**
Dec. 13	**FINAL EXAM 8-10 am**