

## PRINCIPLES OF PALEONTOLOGY (GEOL 331/BSCI 333)

**Term:** Fall 2024

**Instructors:**

**Name:** Dr. Thomas R. Holtz, Jr., Principal Lecturer, Department of Geology      Dr. John W. Merck, Jr., Principal Lecturer, Department of Geology

**Pronouns:** he/him      he/him

**Office Phone:** 301-405-5965      301-405-2808

**Email** [tholtz@umd.edu](mailto:tholtz@umd.edu)      [jmerck@umd.edu](mailto:jmerck@umd.edu)

**Office Hours** Wednesdays 2-3:30 pm, CHM 1225B      Geology 1119, Thurs 12-2 pm

**Credits:** 4

**Course Dates:** From Aug 26, 2024 – Dec 12, 2022

**Course Times:** TuTh 9:30-10:45 am (lecture); Th 2-5 pm (lab)

**Classroom:** PLS 1113 (lecture), GEO 2107 & 2117 (lab)



### 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 are incorporated into the geologic record. They will examine how paleontologists determine geologic ages and ancient environments; evolutionary history and extinctions; and the biology and behavior of extinct organisms.

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

## Learning Outcomes

After successfully completing this course, you will 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.

## Required Resources

- Course Websites: <https://elms.umd.edu> and <https://geol.umd.edu/~tholtz/G331>
- Book: Donald R. Prothero. 2013. *Bringing Fossils to Life*. 3<sup>rd</sup> Edition. Columbia University Press. 671 pp. ISBN 978-0891158930
- Additional readings will be provided on ELMS.
- The final lab is a guided tour of the Hall of Deep Time at the National Museum of Natural History. Although the museum is free, you would need to transport yourself there. The Archives/Navy Memorial Metro Station is the closest, and (like the College Park Station) is on the Green Line.
- Total Estimated costs of required course materials: \$110 (new print) textbook plus \$10 round trip Metro fare from the College Park Station to Archives/Navy Memorial Station.

## Course Structure

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

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

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.

**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.

## Policies and Resources for Undergraduate Courses

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit [www.ugst.umd.edu/courserelatedpolicies.html](http://www.ugst.umd.edu/courserelatedpolicies.html) for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

## Course Guidelines

### Names/Pronouns and Self-Identifications:

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to in this class, both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). Keep in mind that the pronouns someone uses are not necessarily indicative of their gender identity. Visit [trans.umd.edu](http://trans.umd.edu) to learn more.

Additionally, it is your choice whether to disclose how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

### Communication with Instructors:

Email: If you need to reach out and communicate with us, please email us at [tholtz@umd.edu](mailto:tholtz@umd.edu) and [jmerck@umd.edu](mailto:jmerck@umd.edu) or (preferred) using the Inbox email function of ELMS. Please DO NOT email us with questions that are easily found in the syllabus or on ELMS (i.e., When is this assignment due? How much is it worth? etc.) but please DO reach out about personal, academic, and intellectual concerns/questions.

While we will do our best to respond to emails within 24 hours, you will more likely receive email responses from us on the morning after you send an email message.

ELMS: We will send IMPORTANT announcements via ELMS messaging. You must make sure that your email & announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS so you do not miss any messages. You are responsible for checking your email and Canvas/ELMS inbox with regular frequency.

## Communication with Peers:

With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. As such, it is important that we agree to conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions. We encourage you to confidently exercise your right to free speech—bearing in mind, of course, that you will be expected to craft and defend arguments that support your position. Keep in mind, that free speech has its limit, and this course is NOT the space for hate speech, harassment, and derogatory language. We will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued.

Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert me immediately if you feel threatened, dismissed, or silenced at any point during our semester together and/or if your engagement in discussion has been in some way hindered by the learning environment.

## Major Assignments

**Midterm Exams** (15% each): Two online exams on September 26-27 and October 24-25, 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](mailto:ELMS@umd.edu) for help (and Drs. Holtz and Merck so that we are 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 11-12.**

**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.

**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.

## Grading Structure

Assignment	Percentage %
Midterm Exam 1	15%
Midterm Exam 2	15%
Final Exam	20%
Labs	25%
Lab Quizzes	10%
Homework	15%
<b>Total</b>	<b>100%</b>






### Academic Integrity

The University's Code of Academic Integrity is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the University of Maryland does not tolerate academic dishonesty. Please ensure that you fully understand this code and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of this code. All students are expected to adhere to this Code. It is your responsibility to read it and know what it says, so you can start your professional life on the right path. **As future professionals, your commitment to high ethical standards and honesty begins with your time at the University of Maryland.**

It is important to note that course assistance websites, such as CourseHero, or AI generated content (such as ChatGPT, Meta's LLaMa, and the like) are not permitted sources. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. Please note that these systems are NOT search engines and are not designed to delivery factual information: instead, they are [created to deliver a facsimile of human communication, without regards to its truth](#). Using these sources will hamper your learning process, particularly the critical thinking steps necessary for college-level assignments. The point of assignments is for you to be able to develop your skills in marshalling arguments and understanding the concepts and techniques covered in this program, not for you to simply provide us with answers we already know.

Additionally, students may naturally choose to use online forums for course-wide discussions (e.g., Group lists or chats) to discuss concepts in the course. However, collaboration on graded assignments is strictly prohibited unless otherwise stated. Examples of prohibited collaboration include: asking classmates for answers on quizzes or exams, asking for the questions on QotDs when you are absent, etc. Please visit the [Office of Undergraduate Studies' full list of campus-wide policies](#) and reach out if you have questions.

Finally, on each exam or assignment you must write out and sign the following pledge: ***"I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment."*** If you ever feel pressured to comply with someone else's academic integrity violation, please reach out to me straight away. Also, ***if you are ever unclear*** about acceptable levels of collaboration, ***please ask!*** To help you avoid unintentional violations, ***the following table*** lists levels of collaboration that are acceptable for each graded exercise. Each assignment will contain more specific information regarding acceptable levels of collaboration.

	 <b>OPEN NOTES</b>	 <b>LEARN ONLINE</b>	 <b>GATHER CONTENT With AI</b>	 <b>ASK FRIENDS</b>	 <b>WORK IN GROUPS</b>
Homework Assignments	✓	✓	---	---	---
Labs	✓	✓	---	✓	---
Lab Quizzes	✓	---	---	---	---
Midterm Exams	✓	---	---	---	---
Final Exam	✓	---	---	---	---

### Grades

All assessment scores will be posted on the course ELMS page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet and discuss.

Late work will not be accepted for course credit so please plan to have it submitted well before the scheduled deadline. (Please contact us as soon as possible if some issue came up that prevented your timely submission of an assignment.) We are happy to discuss any of your grades with you, and if we have made a mistake, we will correct it as soon as possible. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone we have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut (89.99  $\neq$  90.00). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs									
+	97.00%	+	87.00%	+	77.00%	+	67.00%	+	
A	93.00%	B	83.00%	C	73.00%	D	63.00%	F	<60.0%
-	90.00%	-	80.00%	-	70.00%	-	60.00%	-	

## Course Outline

<i>Date</i>	<i>Topic</i>
<i>Week of Aug. 26</i>	<p><b>8/27:</b> Introduction to the Course; Course Logistics</p> <p><b>8/29:</b> Taphonomy: Making a Fossil Record</p> <p><b>8/29 LAB:</b> Fossilization &amp; Taphonomy</p> <p><b>Reading:</b> Chap. 1</p>
<i>Week of Sept. 3</i>	<p><b>9/3:</b> Trace Fossils</p> <p><b>9/5:</b> Growth, Variation &amp; Fossil Individuals</p> <p><b>9/5 LAB:</b> Micropaleontology</p> <p><b>Reading:</b> Chaps. 2, 19</p> <p><b>9/6 PaleoDB Homework Due</b></p>
<i>Week of Sept. 9</i>	<p><b>9/10:</b> Fossil Species &amp; Alpha Taxonomy</p> <p><b>9/12:</b> Biostratigraphy</p> <p><b>9/12 LAB:</b> Sponges &amp; Corals</p> <p><b>9/12 Lab Quiz 1</b></p> <p><b>Reading:</b> Chaps. 3, 10</p>
<i>Week of Sept. 16</i>	<p><b>9/17:</b> Macroevolution in the Fossil Record</p> <p><b>9/19:</b> Cladistics &amp; Phylogenetic Inference</p> <p><b>9/19 LAB:</b> Bryozoans</p> <p><b>9/19 Lab Quiz 2</b></p> <p><b>Reading:</b> Chaps. 4, 5, Online readings</p> <p><b>9/20 Biostratigraphy Homework Due</b></p>
<i>Week of Sept. 23</i>	<p><b>9/24:</b> Archean Fossils &amp; Life's Origins</p> <p><b>9/26:</b> Fossil Protists &amp; Metazoan Origins I</p>

**9/26 LAB: Brachiopods**

**9/26 Lab Quiz 3**

**Reading:** Chaps. 8, 12

**9/26-9/27 MIDTERM EXAM 1**

*Week of  
Sept. 30*

**10/1: Metazoan Origins II; Sponges**

**10/3: Overview of Animal Phylogeny & Cnidarians**

**10/3 LAB: Gastropods & Cephalopods**

**10/3 Lab Quiz 4**

**Reading:** Chaps. 13, 14, Online readings

**10/4 Alpha Taxonomy Homework Due**

*Week of  
Oct. 7*

**10/8: Ediacaran Metazoans & the Cambrian Explosion**

**10/10: Animals with Lophophores: Bryozoans & Brachiopods**

**10/10 LAB: Bivalves**

**10/10 Lab Quiz 5**

**Reading:** Chap. 14

**10/11 Phylogenetic Analysis Homework Due**

*Week of  
Oct. 14*

**10/15: Mollusca I**

**10/17: Mollusca II**

**10/17 LAB: Arthropods**

**10/17 Lab Quiz 6**

**Reading:** Chap. 16

*Week of  
Oct. 21*

**10/22: Basal Panarthropoda**



**10/24:** Arthropoda I

**10/24 LAB:** Pelmatozoans

**10/24 Lab Quiz 7**

**Reading:** Chap. 15

**10/24-25 MIDTERM EXAM II**

*Week of  
Oct. 28*

**10/29:** Arthropoda II

**10/31:** Basal Deuterostomes; Echinodermata I

**10/31 LAB:** Eleutherozoans

**10/31 Lab Quiz 8**

**Reading:** Chaps. 15, 17

**11/1 Phylogenetic Inferences Homework Due**

*Week of  
Nov. 4*

**11/5:** Echinodermata II

**11/5 is ELECTION DAY! U.S. citizens, make sure to exercise your responsibility and vote in your local, state, and national elections!**

**11/7:** Chordates & Paleoichthyology

**11/7 LAB:** Hemichordates (incl. Graptolithina), Basal Chordates, Paleoichthyology

**11/7 Lab Quiz 9**

**Reading:** Chaps. 17, 18

**11/8 Paleoecology Homework Due**

*Week of  
Nov. 11*

**11/12:** Tetrapod Paleontology

**11/14:** Paleobotany

**11/14 LAB:** Terrestrial Vertebrates

**11/14 Lab Quiz 10**

	<b>Reading:</b> Chaps. 18, 20
<i>Week of Nov. 18</i>	<b>11/19:</b> Biomechanics & Functional Morphology <b>11/21:</b> Morphometrics <b>11/21 LAB:</b> Paleobotany <b>11/21 Lab Quiz 11</b> <b>Reading:</b> Chap. 7 <b>11/22 Paleontology Potpourri Homework Due</b>
<i>Week of Nov. 25</i>	<b>11/26:</b> Paleoecology and Paleoenvironments <b>Reading:</b> Chap. 8 <b>11/27-29 THANKSGIVING RECESS: Enjoy your roasted dinosaur</b>
<i>Week of Dec. 2</i>	<b>12/3:</b> Macroecological Patterns: Large-Scale Phenomena of the Fossil Record <b>12/5:</b> The Future of Paleontology <b>12/5 LAB:</b> Hall of Deep Time, National Museum of Natural History field trip <b>Reading:</b> Chap. 6
<i>Dec. 11- 12</i>	<b>FINAL EXAM</b>

Note: This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

## Resources & Accommodations

### Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The [Accessibility & Disability Service \(ADS\)](#) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at [adsfrontdesk@umd.edu](mailto:adsfrontdesk@umd.edu). Information about [sharing your accommodations with instructors, note taking assistance](#) and more is available from the [Counseling Center](#).

### Student Resources and Services

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit [UMD's Student Academic Support Services website](#) to learn more about the wide range of campus resources available to you.

In particular, everyone can use some help sharpening their communication skills (and improving their grade) by visiting [UMD's Writing Center](#) and schedule an appointment with the campus Writing Center.

You should also know there are a wide range of resources to support you with whatever you might need ([UMD's Student Resources and Services website](#) may help). If you feel it would be helpful to have someone to talk to, visit [UMD's Counseling Center](#) or [one of the many other mental health resources on campus](#).

### Notice of Mandatory Reporting

Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking: As a faculty member, I am designated as a "Responsible University Employee," and I must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to UMD's Title IX Coordinator per University Policy on Sexual Harassment and Other Sexual Misconduct.

If you wish to speak with someone confidentially, please contact one of UMD's confidential resources, such as [CARE to Stop Violence](#) (located on the Ground Floor of the Health Center) at 301-741-3442 or the [Counseling Center](#) (located at the Shoemaker Building) at 301-314-7651.

You may also seek assistance or supportive measures from UMD's Title IX Coordinator, Angela Nastase, by calling 301-405-1142, or emailing [titleIXcoordinator@umd.edu](mailto:titleIXcoordinator@umd.edu).

To view further information on the above, please visit the [Office of Civil Rights and Sexual Misconduct's](#) website at [ocrsm.umd.edu](http://ocrsm.umd.edu).

### **Basic Needs Security**

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit [UMD's Division of Student Affairs website](#) for information about resources the campus offers you and let me know if I can help in any way.

### **Veteran Resources**

UMD provides some additional supports to our student veterans. You can access those resources at the office of [Veteran Student life](#) and the [Counseling Center](#). Veterans and active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor.

### **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 & Merck (in class, after class, over email, etc.) for an explanation or clarification.

### **Course Evaluation**

Please submit a course evaluation through Student Feedback on Course Experiences in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to Course Experiences is confidential. Campus will notify you when Student Feedback on Course Experiences is open for you to complete your evaluations at the end of the semester. Please go directly to the [Student Feedback on Course Experiences](#) to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing through Testudo the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

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