# GEOL104 DINOSAURS: A NATURAL HISTORY

FALL 2019

## INSTRUCTOR

Dr. Thomas R. Holtz, Jr., Principal Lecturer, Department of Geology

Office: GEO 4106 Office Hours: Th 8:30-11 am or by Appointment

Contact: ELMS (preferred) or tholtz@umd.edu Phone: 301-405-6965

## CLASSROOM

| | | | |
|---|---|---|---|
| Lecture | PLS 1130 | 10:00-10:50 am | MWF |

## COURSE ORGANIZATION

3 lectures per week (Monday, Wednesday, Friday).

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

There is no textbook for this course: instead, there are extensive online lecture notes (http://www.geol.umd.edu/~tholtz/G104/104Syl.html). There may be some occasions when some extra lecture material will be presented as Panopto videos on ELMS; please watch these by the date announced.

# 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.

**NOTE**: Online quizzes, the Smithsonian Field Trip project, and the Pre- and Post-Course surveys cannot be completed for a grade after their regularly assigned due date passes.

## GRADE COMPONENTS

| ITEM | PERCENTAGE |
|---|---|
| **Midterm Exam 1** | 25% |
| **Midterm Exam 2** | 25% |
| **Final Exam** | 25% |
| **Online Quizzes** | 14% |
| **Smithsonian Self-Guided Field Trip** | 10% |
| **Pre-/Post-Course Survey** | 1% |

**Midterm Exams** (25% each): Two pen-and-paper exams on September 27 and November 4, 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** (25%): 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 ***TUESDAY DECEMBER 17, 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.

**Online Quizzes** (14% total): There will be a series of online quizzes, administered through ELMS, throughout the course. For each of these you will have between 11 am two days before they are due until 11:55 pm the day they are due in which to complete them. These quizzes will be open-note, but they ARE subject to the Honor Pledge: you may not seek help from other people in doing these. The order in which the questions are asked, and the order of the answers are randomized, so no two student's quizzes will be identical. The lowest quiz grade will be automatically dropped; if you miss a quiz for any reason, it will be accommodated in this fashion. However, only one quiz at most will be dropped.

**Smithsonian Self-Guided Field Trip Report** (10%): To take advantage of our proximity to the Smithsonian Institution National Museum of Natural History and its excellent display of fossil materials, there is a small assignment requiring you to go to that museum and answer a series of questions based on your observations. There is no single formal field trip; you may go on your own or in small groups. The project is due online **NOVEMBER 11**.

**Pre-/ Post-Course Survey** (1% total): In order to effectively assess the learning in the course, an online pre-course survey will be administered in the first week of class, followed by a post-course survey during the last week. You will not be graded on the specific answers on these surveys, but you will be graded for participating in the survey.

**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

Dinosaurs, their evolution, and our understanding of their fossil record. Students will examine the geologic record and the tools used by paleontologists to determine: geologic ages and ancient environments; evolutionary history and extinctions; dinosaurian biology and behavior; and their survival as birds. Mechanisms of global change ranging from plate tectonics to asteroid impact will be discussed.

## LEARNING OUTCOMES

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

- Identify the major clades of dinosaurs and their primary attributes (anatomy, behavior, stratigraphic and geographic distribution, etc.)
- Interpret cladograms in determining evolutionary relationships and distribution of specializations

- Assess claims of inferred dinosaurian behavior, physiology, and extinction patterns from fossil evidence

### COURSE THEMES

This course examines how scientists study the age, environments, evolution, origin, biology, behavior, and extinction of dinosaurs and the other inhabitants of their world. 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
- What an understanding of dinosaurian biology, behavior, ecology, and extinction can reveal about modern environmental conditions

## 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.

### 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. Dr. Holtz 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 Dr. Holtz (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, I **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. Dr. Holtz 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.

## LECTURE SCHEDULE

| *Date* | **Topic** |
|---|---|
| *Aug. 26* | Introduction to the Course: What are Dinosaurs (version 1.0)? |
| *Aug. 28* | The Science of Uncovering the Past & the Meaning of Fossils |
| *Aug. 30* | The History of Prehistory: The Great Exhibition through Great Expeditions<br><br>**Pre-Course Survey Due** |
| *Sept. 2* | **LABOR DAY:** No class today |
| *Sept. 4* | Pages in the Book of Time: Sedimentary Rocks |
| *Sept. 6* | Bones in the Stones: Fossils & Fossilization<br><br>**Quiz 1 due** |
| *Sept. 9* | Deep Time: How Old is that Fossil? |
| *Sept. 11* | Fossils from the Field to the Museum |
| *Sept. 13* | The Living Earth: Plate Tectonics & Ecology |
| *Sept. 16* | Our Bodies, Our Selves: Introduction to Vertebrate Osteology<br><br>**Quiz 2 due** |
| *Sept. 18* | Taxonomy & Species |
| *Sept. 20* | Evolution I: Descent with Modification |
| *Sept. 23* | Evolution II: Patterns & Processes; Systematics I: The Tree of Life |
| *Sept. 25* | Systematics II: Tree-Based Thinking<br><br>**Quiz 3 due** |
| *Sept. 27* | **MIDTERM EXAM I** |
| *Sept. 30* | Eggs Conquer the Land: Amniote Life Before the Dinosaurs |

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| *Oct. 2* | Triassic Transitions & the Age of Reptiles |
| *Oct. 4* | The Rise of the Dinosaurs: What is a Dinosaur (version 2.0)? |
| *Oct. 7* | Thyreophora: Defense! Defense! Defense!<br><br>**Quiz 4 due** |
| *Oct. 9* | Neornithischia I, Thescelosauridae & Ornithopoda: Beaks, Bills & Crests |
| *Oct. 11* | Neornithischia II, Marginocephalia: That's Using Your Head! |
| *Oct. 14* | Sauropodomorpha I: Dawn of the Thunder |
| *Oct. 16* | Sauropodomorpha II, Neosauropoda: Size Matters!; Theropoda I: Basal Theropods<br><br>**Quiz 5 due** |
| *Oct. 18* | Theropoda II: Dinosaurs Red in Tooth and Claw |
| *Oct. 21* | Theropoda III, Coelurosauria: Tyrant Kings and Lesser Royals |
| *Oct. 23* | Theropoda IV, Maniraptora: The Feathered Dinosaurs |
| *Oct. 25* | Theropoda V: Rise of Birds<br><br>**Quiz 6 due** |
| *Oct. 28* | Theropoda VI: Dinosaurs Take Flight |
| *Oct. 30* | The Worlds of the Dinosaurs; Dinosaurs Without Bones: Trace Fossil Analysis |
| *Nov. 1* | Dinosaur Olympics: Locomotion and Dinosaurs in the World of Physics<br><br>**Quiz 7 due** |
| *Nov. 4* | **MIDTERM EXAM II** |
| *Nov. 6* | Through the Eyes of a Dinosaur: Dinosaur Brains & Senses |
| *Nov. 8* | *Tyrannosaurus* Sex: Dinosaur Social Behavior |
| *Nov. 11* | Bringing Up Baby: Dinosaur Families and Growth |

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| | **Smithsonian Self-Guided Field Trip Project due online** |
| *Nov. 13* | Giants in the Earth: Dinosaur Size |
| *Nov. 15* | The Hot-Blooded Dinosaurs<br><br>**Quiz 8 due** |
| *Nov. 18* | So You Want to Be An Endotherm? |
| *Nov. 20* | Dinosaur Physiology Roundup |
| *Nov. 22* | Dragons of the Sea & Air<br><br>**Quiz 9 due** |
| *Nov. 25* | In the Shadow of the Dinosaurs: Mesozoic Mammals and Plants |
| *Nov. 27-29* | **THANKSGIVING RECESS: Enjoy your roasted maniraptoran** |
| *Dec. 2* | The Cretaceous/Paleogene Extinction I: All Good Things… |
| *Dec. 4* | The Cretaceous/Paleogene Extinction II: One REALLY Bad Day! |
| *Dec. 6* | The Cretaceous/Paleogene Extinction III: End of an Era |
| *Dec. 9* | Legacy of the Dinosaurs<br>**Quiz 10 due**<br><br>**Post-Course Survey due** |
| *Dec. 17* | **FINAL EXAM 8-10 am** |