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# GEOL104 DINOSAURS: A NATURAL HISTORY

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FALL 2022



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## INSTRUCTOR

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

Office: CHEM 1225B

Office Hours: Th 11:30 am-1 pm or by Appointment

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## CLASSROOM

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Lecture      CCC 1100      10:00-10:50 am      MWF

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## COURSE ORGANIZATION

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3 lectures per week (Monday, Wednesday, Friday). 1 online homework (or exam) per week. 1 required self-guided Smithsonian exhibit assignment

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

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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

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### GRADE SCALE

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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 homework, 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

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ITEM	PERCENTAGE
Midterm Exam 1	25%
Midterm Exam 2	25%
Final Exam	25%
Online Weekly Homework	12%
Smithsonian Self-Guided Field Trip	12%
Pre-/Post-Course Survey	1%

**Midterm Exams** (25% each): Two online exams on ***October 6-8*** and ***November 3-5***, 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. These exams are open note but timed (60 minutes) 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 Dr. Holtz so that he is aware of your situation).

**Final Exam** (25%): A online 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 and rules are the same as the mid-term exams, but you have 120 minutes in which to complete it. The exam will be held ***December 18-20***.

**Online Weekly Homework** (12% total): There will be a series of online homework assignments (generally one per week in which there is not also an exam), administered through ELMS. These homework assignments are open-note, but they **ARE** subject

to the Honor Pledge: you may not seek help from other people in doing these. Questions asked include true/false, matching, multiple choice, short answers, and in some cases longer answers. In some cases you may be asked to upload an image for your answer. The exact questions asked are randomized, so that no two student's quizzes will be identical. The lowest homework grade will be automatically dropped; if you miss a homework for any reason, it will be accommodated in this fashion. However, only one homework at most will be dropped.

Homework assignments are normally due at 11:59 pm on Fridays. However, please give yourself sufficient time in which to complete the assignment.

**Smithsonian Self-Guided Field Trip Report (12%):** To take advantage of our proximity to the Smithsonian Institution National Museum of Natural History and its excellent display of fossil materials, there is an 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 14**.

**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.

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## COURSE OVERVIEW

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### COURSE DESCRIPTION

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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.

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### LEARNING OUTCOMES

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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

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### COURSE THEMES

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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

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## EXPECTATIONS & POLICIES

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### EXPECTATIONS & ATTENDANCE

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Attendance in lecture is expected. The individual PowerPoints will not be provided to students, although there are detailed lecture notes online and Panopto recordings of the lectures will be available on ELMS. 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.

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### MASK POLICY

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**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 I **STRONGLY** encourage masking if the cold or flu is spreading on campus.

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### COMMUNICATION

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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 of any changes to the schedule of the course due to cancellations.

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### MEMORIZATION

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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

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The University has provided a page on Academic policies at <http://www.ngst.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

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You will need to upload documents to ELMS, take online quizzes, and occasionally watch online lectures this semester, so 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>

During, please refrain from email, social media, online shopping, streaming videos, and other such communication outside the scope of the course. In other words, please restrict your computer use to the activities of the class.

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## LECTURE SCHEDULE

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<i><b>Date</b></i>	<i><b>Topic</b></i>
<i>Aug. 29</i>	Introduction to the Course: What are Dinosaurs (version 1.0)?
<i>Aug. 31</i>	The Science of Uncovering the Past
<i>Sept. 2</i>	The Meaning of Fossils & The History of Prehistory  <b>Pre-Course Survey Due</b>
<i>Sept. 5</i>	<b>LABOR DAY:</b> No class today

<i>Sept. 7</i>	The Great Exhibition through Great Expeditions
<i>Sept. 9</i>	Pages in the Book of Time: Sedimentary Rocks  <b>Nature of Science HW due</b>
<i>Sept. 12</i>	Bones in the Stones: Fossils & Fossilization
<i>Sept. 14</i>	Deep Time: How Old is that Fossil?
<i>Sept. 16</i>	Fossils from the Field to the Museum  <b>Geology HW due</b>
<i>Sept. 19</i>	The Living Earth: Plate Tectonics & Ecology
<i>Sept. 21</i>	Our Bodies, Our Selves: Introduction to Vertebrate Osteology
<i>Sept. 23</i>	Taxonomy & Species  <b>Anatomy &amp; Taxonomy HW due</b>
<i>Sept. 26</i>	Evolution I: Descent with Modification
<i>Sept. 28</i>	Evolution II: Patterns & Processes; Systematics I: The Tree of Life
<i>Sept. 30</i>	Systematics II: Tree-Based Thinking  <b>Phylogeny HW due</b>
<i>Oct. 3</i>	Four on the Floor: Tetrapod Colonization of the Land  <b>MIDTERM EXAM I available 10/4-10/6</b>
<i>Oct. 5</i>	Triassic Transitions & the Age of Reptiles
<i>Oct. 7</i>	The Rise of the Dinosaurs: What is a Dinosaur (version 2.0)?
<i>Oct. 10</i>	Thyreophora: Defense! Defense! Defense!
<i>Oct. 12</i>	Ornithopoda: Beaks, Bills & Crests

<i>Oct. 14</i>	<p>Marginocephalia: That's Using Your Head!</p> <p><b>Dinosaur Diversity I HW due</b></p>
<i>Oct. 17</i>	Sauropodomorpha I: Dawn of the Thunder
<i>Oct. 19</i>	Sauropodomorpha II, Neosauropoda: Size Matters!
<i>Oct. 21</i>	<p>Theropoda I: Dinosaurs Red in Tooth and Claw</p> <p><b>Dinosaur Diversity II HW due</b></p>
<i>Oct. 24</i>	Theropoda II, Coelurosauria: Tyrant Kings and Lesser Royals
<i>Oct. 26</i>	Theropoda III, Maniraptora: The Feathered Dinosaurs
<i>Oct. 28</i>	<p>Theropoda IV: Rise of Birds</p> <p><b>Dinosaur Diversity III HW due</b></p>
<i>Oct. 31</i>	Theropoda V: Dinosaurs Take Flight
<i>Nov. 2</i>	<p>The Worlds of the Dinosaurs; Dinosaurs Without Bones: Trace Fossil Analysis <b>[LECTURE PRE-RECORDED; please watch on Panopto on ELMS]</b></p> <p><b>MIDTERM EXAM II 11/3-5</b></p>
<i>Nov. 4</i>	Dinosaur Olympics: Locomotion and Dinosaurs in the World of Physics <b>[LECTURE PRE-RECORDED; please watch on Panopto on ELMS]</b>
<i>Nov. 7</i>	Through the Eyes of a Dinosaur: Dinosaur Brains & Senses
<i>Nov. 9</i>	<i>Tyrannosaurus</i> Sex: Dinosaur Social Behavior
<i>Nov. 11</i>	Bringing Up Baby: Dinosaur Families and Growth
<i>Nov. 14</i>	<p>The Hot-Blooded Dinosaurs</p> <p><b>Smithsonian Self-Guided Field Trip Project due online</b></p>
<i>Nov. 16</i>	The Hot-Blooded Dinosaurs

<i>Nov. 18</i>	So You Want to Be An Endotherm? <b>Dinosaur Biology HW due</b>
<i>Nov. 21</i>	Dinosaur Hearts and Lungs
<i>Nov. 23-25</i>	<b>THANKSGIVING RECESS: Enjoy your roasted maniraptoran</b>
<i>Nov. 28</i>	Life in the Fast Lane
<i>Nov. 30</i>	Dragons of the Sea & Air
<i>Dec. 2</i>	In the Shadow of the Dinosaurs: Mesozoic Mammals <b>Denizens of the Mesozoic HW due</b>
<i>Dec. 5</i>	The Cretaceous/Paleogene Extinction I: All Good Things...
<i>Dec. 7</i>	The Cretaceous/Paleogene Extinction II: Earth's Worst Day, Ever!
<i>Dec. 9</i>	The Cretaceous/Paleogene Extinction III: Dinosaur Apocalypse <b>Dinosaur Extinction HW due</b>
<i>Dec. 12</i>	Legacy of the Dinosaurs: Dinosaurs in Contemporary Society <b>Post-Course Survey due</b>
<i>Dec. 18-20</i>	<b>FINAL EXAM online</b>