GEOL 204 Dinosaurs, Early Humans, Ancestors & Evolution:
The Fossil Record of Vanished Worlds of the Prehistoric Past
Spring Semester 2016
Lectures: ASY 2203, TuTh 9:30-10:45 am

Discussion Sections

0101 PLS 1158, M 3-3:50 pm	0104 PLS 1168, M 3-3:50 pm	0107 PLS 1119, M 3-3:50 pm
0102 PLS 1158, M 4-4:50 pm	0105 PLS 1168, M 4-4:50 pm	0108 PLS 1119, M 4-4:50 pm
0103 PLS 1158, M 5-5:50 pm	0106 PLS 1168, M 5-5:50 pm	0109 PLS 1119, M 5-5:50 pm

Instructor:
Dr. Thomas R. Holtz, Jr.
Room: GEO 4106, Office Hours: Wednesday 10-11:30 am or by appointment
Phone: x546965, Email: tholtz@umd.edu

Teaching Assistants:

Kristel Izquierdo	Sections 0101, 0102, 0103	
Room: CHEM 1227	Office Hours Fri 2-3 pm	Email: kig@umd.edu
James W. Dottin III	Sections 0104, 0105, 0106	
Room: CHEM 1223B	Office Hours Mon 1:30-2:30 pm	Email: jdottin@umd.edu
Justine Grabiec	Sections 0107, 0108, 0109	
Room: CHEM 2225	Office Hours Mon 11 am-12:45 pm	Email: jusgrabiec@gmail.com

NOTE: It is your responsibility as a student to completely read through and understand this syllabus. If you have questions about it, please contact Dr. Holtz. You will be held responsible for following all requirements of this syllabus.

Course Description: Where did we, and the other living things on Earth, come from? What lived here before us? How do we know? The questions of the origins of humanity and of the other inhabitants of our world have intrigued cultures throughout history. During the last several centuries scientists have developed many techniques in the natural historical sciences-geology, paleontology, biology, archaeology-which allow us to answer those questions. "The Fossil Record" will consider the many different types of evidence from used to reconstruct events in the history of life by looking at particular case studies of the fossil record. In discussion sections students will be introduced to reading the scientific literature and interpreting examples of data sets, plots, and charts used to interpret the fossil world. Additionally, we will discuss some of the various reasons that otherwise-knowledgeable people reject the scientifically incontrovertible evidence for an ancient Earth and the evolution of life and humanity. We will also examine how the fossil record informs our understanding of (and possible response to) the recent and near-future impact of human technology and activity on the Earth systems and planetary biosphere.

What this course isn't: This is NOT my course on dinosaur paleontology! Please note that there are many words in the title of this course after "Dinosaurs"… In fact, the short name for this course is "The Fossil Record". If you want a course mostly about dinosaurs, try my Fall semester class GEOL 104 Dinosaurs: A Natural History. (Don't worry, though: we do cover some dinosaur paleontology in this class!) This is also neither an overview of the History of Life (that's GEOL 102 Historical Geology) nor a course that gives you the main techniques and methods you need to identify and interpret fossils (that's GEOL 331 Principles of Paleontology).

I-Series Courses: The I-Series courses are designed to address important issues that spark the imagination, demand intellect, inspiration, and innovation, and conclude where possible with real-world implementation. They are intended to fulfill university general education requirements in a creative and contemporary way and to challenge students to apply diverse intellectual traditions to today's big issues.

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

- Identify the major techniques used by scientists to date events in the ancient past, the evolutionary relationships of organisms, and the behavior and function of ancient life
- Recognize how scientists test alternative models of evolutionary events and transitions
- Properly identify the various components of a peer-reviewed research paper, its conclusions, and the evidence used to support those conclusions
- Effectively present and document scientific information by means of by means of PowerPoint presentations

Course Themes: This course examines how scientists reconstruct events and life forms of the prehistoric past. 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
- The role of information from the prehistoric past in understanding climate change and modern biodiversity

Lecture Themes: Each lecture will have one (sometimes more) central question presented towards the beginning, and over the course of the lecture you will see how paleontologists and related scientists answer those questions. It is important that you pay attention to ***HOW*** such questions are answered, and not merely what the answers are.

A Note on Content: Science is demonstrably Humanity's most effective way of assessing reality about the natural world. Many of its discoveries contradict deeply held traditional, religious, political, or personal beliefs. In this particular course, we shall examine what Science has uncovered about the age of the Earth and its inhabitants, the origin and interrelationships of species (including our own), and the reality of climate change (including human contribution to this phenomenon). We will not shy from indicating where the scientific discoveries demonstrate that other beliefs about these aspects of the natural world are in error. If you find it distressing to hear people's beliefs called inaccurate (whether you hold them or not), this may not be the course for you: there are many other courses available at the University which fulfill the same requirement. If, however, you wish to understand not merely what Science has discovered but also HOW it discovered it—regardless of its implications for traditional, religious, political, or personal beliefs—then we encourage your active participation.

Texts: No single textbook is planned for this course. Selections of short book chapters & peer-reviewed technical and review papers will be made available on ELMS; these must be read by the discussion day they are listed. Also, please keep current with the online lecture notes. 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 Organization: 2 lectures per week (Tuesday, Thursday), 1 section per week (Monday).

Grade:	Mid-Term Exam I:	17.5%	Quizzes:	10%
	Mid-Term Exam II:	17.5%	Platform Presentation:	10%
	Final Exam:	20%	Platform Presentation Peer Grading:	2%
	Discussion Participation & Homework:	15%	Lecture Summary:	8%
			EXTRA CREDIT POINTS for Course Evaluation	

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.

Midterm Exams (17.5% each): Two pen-and-paper exams on February 28 and April 6, 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.umd.edu/catalog/index.cfm/show/content.section/c/27/ss/1584/s/1540. 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. Format is similar to the mid-term exams. The preliminary date is ***MONDAY MAY 15, 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: see http://www.umd.edu/catalog/index.cfm/show/content.section/c/27/ss/1584/s/1540.

Quizzes (10%): These will be held during the Discussion section, but represent their own graded item. These are short answer (typically true/false, multiple choice, or matching questions) referring to material from the previous week's lectures. They will normally be held at the beginning of the Discussion section, so please be on time. The lowest quiz grade is automatically dropped. Only quizzes missed for excused absences can be made up; quizzes missed due to unexcused absences are simply graded as "0". (The first such missed quiz becomes your automatically dropped quiz grade.) Quizzes missed for excused absences ***MUST*** be made up before the next Discussion week, barring extraordinary circumstances: they are normally made up during the TA's office hours.

Team Platform Project "Notes from the Fossil Record" (10% total): As a term project for the course you will have a small group (normally 4 students) team which will research a set of research papers on a particular subject, which will be presented as an in-Discussion section platform presentation (PowerPoint or Prezi). More details about the logistics of the project, the types of subjects, grading rubric, etc., will be made available later this semester. The breakdown of the different elements of this project are:

- 1% Teams lists and Contracts – Due February 27
- 1% Topic Proposal – Due March 6
- 1% Annotated Bibliography – Due March 13
- 7% Presentation Itself – Presented on April 3, 10, 17, 24, or May 1

Peer Grading of Presentations (2%): It is also your responsibility to watch and evaluate the presentations of other teams. Rubrics and rules for this will be provided later.

Lecture Summary (8% total): In order to keep current with the course, to help prepare for quizzes and exams, and to help focus your thinking, every student will turn in a brief summary of the previous week's lectures by the time of the discussion section. You will turn them in via ELMS. These summaries should be short: only a brief paragraph of a few sentences per lecture. They should deal with the key concepts of the lectures. One approach might be to state the key question for the lecture, then (in your ***own words***) the answer to that question.

NOTE: in each Discussion section meeting a student will be called upon to give their summary for one of the lectures, to serve as the prompt for a section-wide review of the subject of that lecture. Failure to be able to give a response will result in ***a drop of one point for that discussion section meeting grade***.

Discussion Participation & Homework (15%): An essential element of education in general (and the I-Series in particular) is discussion, reflection, and clarification of key concepts. That is one of the main functions of the discussion sections. In each discussion section there will be a review of the previous week's lectures and readings; a review of homework assignments; the assignment and explanation of new homework

projects; and occasionally some logistical items (for example, planning small group projects). In some situations there will be interactive activities.

In order to get the complete Participation aspect of the "Discussion Participation & Homework" grade you must:

- Attend every discussion section (the TA will keep a record of the presence and absence of students in their section, normally by using the quizzes)
- Be prepared to (when called upon) provide your summary of the previous week's lecture, and be able to participate in a review discussion about it
- Be able and willing to discuss the readings, and homework assignments in an informed manner
- Be a productive and constructive participant in the discussions
- Put away smart phones, laptops, tablets, etc., except where required for some class activity. (NO texting or using social media in section meetings, for instance.)

The TA may (at their own discretion) award up to 2 more percentage points as extra credit for particularly helpful or effective participation in the discussion for students in their section. Students who are present for all discussion sections but are non-participants or are disruptive may be docked up to 2 and 4 percentage points (respectively) at the TA's discretion.

Additionally, throughout the course there will be short homework projects handed out in the discussion section to be turned in the following week. These packets are intended to allow you to use and interpret the type of data (some of it directly from the peer-reviewed literature) that paleontologists and other scientists employ in understanding the fossil record. Your TA will discuss aspects of the homework in class, and you may discuss the packets with your classmates, but the answers you turn in ***must be your own.*** If there is even the appearance that you collaborated on homework answers, your homework will be turned over to the Office of Student Conduct for evaluation. Homework grades are incorporated into the division of the Discussion Participation in which they are due.

Attendance in Discussion Section: While the expectation is that students attend ***EVERY*** lecture and ***EVERY*** discussion section, it is recognized that occasionally conditions (accident, illness, etc.) arise that prevent such. To recognize that, every student is allowed ***one*** (1) absence in discussion section without penalty, so long as:

A. It is not the date of their Team Project Presentation.
B. They inform their TA by email (cc:ing Dr. Holtz in the email) before hand (if at all possible), or certainly by the end of that same day that they will be absent and the reason for that absence.
C. When returning to class, students must bring a note identifying the date of and reason for the absence, and acknowledging that the information in the note is accurate.
D. They turn in any assignments due at the TA's office or mailbox in Geology the next working day.
E. They are responsible for picking up any newly handed out homework assignment handed out in section.

Should these conditions not be met, the students will receive a 0 for the grade for that discussion section meeting. Additionally, if there is more than one absence the student will receive a 0 for the grade each additional discussion section meeting missed.

If there is a medical condition or other extraordinary circumstance that does require missing ***more than 1*** discussion section meeting—or missing the date of the Team Project Presentation—the student must provide written documentation from the appropriate sort of official (health professional; court official; etc.) explaining the absence.

In cases of dispute between student and TA over the Discussion Participation grade Dr. Holtz (as "instructor of record") will be the final arbiter (but be informed he will take the TA's advice very seriously).

EXTRA CREDIT Course Evaluation: CourseEvalUM will be open for students to complete their evaluations for Spring 2017 courses at the end of the semester. Students can access CourseEvalUM through ELMS in order 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 at the IRPA course evaluation website: https://www.irpa.umd.edu/Assessment/CourseEval/StuFastFacts.html

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

In order to reward good citizenship, the class as a total will receive +1 if at least 70% of the students do the CourseEvaluation and +2 if 90% or more!

Otherwise, no separate extra credit assignments as such planned for this course, although individual exams, quizzes, and homework assignments may have extra credit questions that add up in the final course grade.

LATE ITEM POLICY: Late Homework Assignments and will be docked 25% of the total grade if not turned in on time, but turned in (at the TA's mailbox in the Geology Building or at their office) prior to the next day, or docked 50% if handed in the next day. After that point, the grade for that assignment will be a 0.

Websites: http://www.geol.umd.edu/~tholtz/G204/
Website includes copies of the syllabus, handouts, lecture notes, etc. This site will be built up throughout the semester as each lecture page, etc., is added.

http://elms.umd.edu/
The ELMS Canvas site will include required online exams; readings; announcements concerning the class; copies of the handouts; and so forth. If you have not already done so, make sure that you get access to ELMS.

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. For specifics with regards to this course, see the following:

Laptop/Tablet/Smartphone 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.

Attendance in lecture is expected. If you cannot make a certain lecture, try and find another student who might lend your their notes. (In fact, establishing a study group early in the course has proven useful for many students in the past). Attendance in discussion sections is ***required***: see the grade items for "Discussion Participation & Homework" above for details.

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.

Copyright:

MAIN SCHEDULE

Week	Topic	Lecture Question
I	Jan. 27 Lecture "Into the Darkness of Prehistory: Our Long Quest for Origins"	How did people discover the prehistoric past?
II	Jan . 30 Discussion: Introductions; Policy Review; Course Overview	
	Jan. 31 Lecture "Bringing Fossils to Life: Paleobiology and the Methods of Science"	What is the "Scientific Method"? How do we use the fossil record to understand the biology and evolution of extinct organisms?
	Feb. 2 Lecture "Bones in the Stones & Shells in the Shales: Fossils and Fossilization"	What are fossils, and how do they form?
IIi	Feb. 6 **Quiz 1**; Discussion: Paleo CSI; Understanding Scientific Papers HW assigned	
	Feb. 7 Lecture "Clocks in the Rocks: Geologic Time"	How do we determine the age of fossils?
	Feb. 9 Lecture "Hot Times in the Old Town Tonight: The PETM and the Anthropocene Contrasted"	What do ancient events show about the effects of climate change on the living world?
IV	Feb. 13 **Quiz 2**; Discussion: Geologic Time activity; Paleoclimate HW assigned	
	Feb. 14 Lecture "On the Origin of Species by Means of Natural Selection"	What is evolution, and how does it work?
	Feb. 16 Lecture "Ancestors, 'Missing Links', and Transitions: The Fossil Record of Speciation and Macroevolution"	How do new species form, and how quickly do these changes take place? What is macroevolution, and what do fossils say about patterns above the species level?
V	Feb. 20 **Quiz 3**; Discussion: Evolution; Overview of Team Projects; Evolution HW assigned	
	Feb. 21 Lecture "The Tree of Life: Reconstructing the Pattern of Evolution"	How do we determine the relationships between organisms? How do we reconstruct ancestral states?
	Feb. 23 Lecture "Earth and Life Through Time: A (Very Brief!) Overview of the History of Life on Earth"	What is the broadest scale picture of Earth History?
VI	Feb. 27 **Quiz 4**; Discussion: Phylogenetics; Exam Review; Phylogenetics HW assigned; Teams and Contract due	

	Feb. 28 **MID-TERM EXAM I**	
	Mar. 2 Lecture "The End of All Things: Reconstructing Mass Extinctions"	What is a mass extinction, and how do we recognize one?
VII	Mar. 6 Discussion: Research Strategies & Geologic Timelines Demonstration; Paper topics due	
	Mar. 7 Lecture "Death From Above: The Cretaceous/Paleogene Extinction"	What caused the Cretaceous/Paleogene mass extinction?
	Mar. 9 Lecture "Death From Below: The Permo-Triassic Extinction"	What caused the Permo-Triassic mass extinction?
VIII	Mar. 13 **Quiz 5**; Discussion: Mass Extinctions; Extinction HW assigned; Annotated Bibliography due	
	Mar 14 Lecture "First Impressions: The Riddle of the Ediacarans"	What do the Ediacaran fossils represent?
	Mar. 16 Lecture "Shell Games: The Long Fuse of the Cambrian Explosion"	What caused the Cambrian Explosion?
	SPRING BREAK Mar. 20-24	
IX	Mar. 27 **Quiz 6**; Discussion: Presentation Logistics and Skills	
	Mar 28 Lecture "Reign of the Dinosaurs: What's the Big Deal?"	How did (some) dinosaurs get so big?
	Mar. 30 Lecture "The Hot-Blooded Dinosaurs: Reconstructing Dinosaur Physiology"	Were dinosaurs warm-blooded?
X	Apr. 3 **Quiz 7**; Team Presentation 1	
	Apr. 4 Lecture "Feathered Dragons: The Origins of Birds & of Avian Flight"	How did birds evolve from (other) dinosaurs, and how did bird flight evolve?
	Apr. 6 **MID-TERM EXAM II**	
XI	Apr. 10 Team Presentation 2	
	Apr. 11 Lecture "Drawing Out Leviathan: The Origin of Whales"	What does the fossil record tell us about the origin of whales?
	Apr. 13 Lecture "Wild and Wooly: Origins of the Quaternary Ice Age and Its Fauna"	How did the Quaternary Ice Age form? From where did its characteristic biota come?

XII	Apr. 17 **Quiz 8**; Team Presentation 3	
	Apr. 18 Lecture "Scatterlings of Africa: The Origins of Humanity"	Where, and from what, did humans evolve? What were proto-humans like?
	Apr. 20 Lecture "Last Man Standing: The Rise of *Homo sapiens*"	What makes our species unique, and what happened to our closest kin?
XIII	Apr. 24 **Quiz 9**; Team Presentation 4	
	Apr. 25 Lecture "Out of Eden: The Spread of *Homo sapiens*"	How did humanity spread around the world?
	Apr. 27 Lecture "The Call of Distant Mammoths: The Pleistocene Megafaunal Extinctions"	What happened to the Pleistocene megafauna?
XIV	May 1 **Quiz 10**; Team Presentation 5; Human Origins HW assigned	
	May 2 Lecture "Denying the Fossil Record: Evolution Denial and U.S. Science Education"	Why do so many Americans reject the reality of evolution?
	May 4 Lecture "The Sixth Extinction: The Holocene Extinctions & Modern Defaunations"	How does the fossil record inform us about the on-going modern extinctions?
XV	May 8 **Quiz 11**; Discussion: Final Exam review; Science Eduation	
	May 9 Lecture "Reversing the Tide? Conservation Paleontology, Rewilding, and De-extinction"	How can the paleontological perspective be used in service of endangered species and threatened ecosystems?
	May 11 Lecture "What Good is the Fossil Record? Perspectives of the Prehistoric Past"	How do we balance public and private interests in fossil specimens? How do scientists get their information out to the public?

Typically homework projects will be due the section meeting after they are assigned.

FINAL EXAM (NOTE: subject to change: to be confirmed later toward the end of the semester):
May 15 (***MONDAY***): 8:00-10:00 am, ASY 2203