GEOL 204 Dinosaurs, Early Humans, Ancestors & Evolution: The Fossil Record of Vanished Worlds of the Prehistoric Past

Spring Semester 2013
Lectures: CHE 2110, TuTh 9:30-10:45 am
Clicker Channel 35; Session ID GEOL204

Discussion Sections:

0101 PLS 1158, M 3-3:50 pm
0102 PLS 1158, M 4-4:50 pm
0103 PLS 1158, M 5-5:50 pm
0104 PLS 1184, M 3-3:50 pm
0105 PLS 1184, M 4-4:50 pm
0106 PLS 1184, M 5-5:50 pm

Instructor:
Dr. Thomas R. Holtz, Jr.
Room: Centreville 1216, Office Hours: M 2-4 pm or by appointment
Phone: x54084, Email: tholtz@umd.edu

Graduate Teaching Assistants:
Katherine Watter
Room: GEO 3106, Office Hours Tues 8:15-9:15 am
or by appointment
Email: katherine.watter@gmail.com

Anna Statkiewicz
Room: GEO 4108, Office Hours Tues 11-12 am and Fri 1-2 pm or by appointment
Email: astatkie@umd.edu

CLICKERS: This course uses clickers. Please make certain that you either have access to an RF-LCD clicker or that you obtain a license to use ResponseWare with your web-accessible device (laptop, smart phone, Blackberry, etc.). Also, make certain that you register your clicker before class begins at http://clickers.umd.edu/Students/WebRegistration.html.

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: 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 critical events in the history of life by looking at particular case studies of significant evolutionary origins and transitions. 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 the recent (and potential future) impact of human technology and activity on the Earth systems and planetary biosphere.

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 PowerPoint platform presentations and wiki pages
**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.

**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 lecture day they are listed.

**Course Organization:** 2 lectures per week (Tuesday, Thursday), 1 section per week (Monday).

**Grade:**

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<tr>
<th>Component</th>
<th>Weight</th>
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<tr>
<td>Online Exam 1:</td>
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<td>Online Exam 2:</td>
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<td>Clicker Participation:</td>
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<td>Discussion Participation:</td>
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**Grade Scale:** ≥90, A; 80-89, B; 70-79, C; 60-69, D; <60, F. “+” and “-” grades are given to the top and bottom two-point range, respectively, within each grade.

**Online Exams:** Rather than sit-down exams during course time, there will be three online exams throughout the semester (independent of the final exam). For each of these there will be a section comprised of true/false, multiple choice, matching, and similar type questions (totaling between 60-80% of the points, depending on the exam) and a series of short essay questions (totaling the remaining 20-40%). These exams will be open-notes, but they **ARE** subject to the Honor Pledge: you may not seek help from other people in doing these. The questions, their orders, and answers are randomized, so no two student’s exams will be identical.

You will have a period of 5 days (Monday through Friday) in which to complete the exam. You may only take it once. Since these are accessible on the web, there **NO EXCUSES** for missing them (including illness; travel due to sports, band, etc.; and so forth). Failure to correctly submit the exam on ELMS during the time period results in a 0 for that exam. Each exam covers the material from the previous exam (or the start of the course, for the first exam) until the week immediately before the exam.

The exam schedule is:

- Exam 1: Feb. 18-Feb. 22
- Exam 2: Mar. 25-Mar. 29
- Exam 3: Apr. 29- May 3

**Final Exam:** There will be a traditional, sit-down final exam during the regularly scheduled exam season. It is cumulative for the entire course.

**Team Project:** As a term project for the course you will have a small group (3-4 students) team which will research a particular project related to prehistoric life, which will be presented as a PowerPoint presentation in discussion and supported by research documented in the form of a wiki. Each of these two aspects (presentation and wiki) are worth 10% of the total grade. More details about the logistics of the project, the types of subjects, grading rubric, etc., will be made available later this semester.

**Homeworks:** 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.

**Participation/Clicker Quizzes:** An essential element of education in general is attending lectures and reflecting on the information provided there. In order to help guide this reflection and understanding, a series of clicker quizzes and surveys will be presented during the class. These will not be announced in advance, and may occur at any time in any given lecture. Not every lecture will have a clicker quiz, but some may have more than one. You are expected to be present and ready to answer the clicker quizzes and surveys whenever they are offered (sometimes more than once in a given lecture). Prior to Feb. 5 (the last day of Add/Drop) the quizzes will not count to the final course grade; following that point quizzes (although not surveys) will be graded. The grades are based on the summed total for that day’s quizzes; each day’s worth of quizzes is weighted equally. The lowest three day’s grades will be automatically dropped: this is the method by which absences due to illness, travel, University sports activity, etc. will be dealt.

Clicker quizzes are governed by the Honor Code: if you were to answer for another person on a clicker quiz (or similar case of cheating), you will be dealt with accordingly. However, there will be cases when you are asked to discuss the question with those seated near you before answering.

**Discussion Participation:** 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 may be small quizzes in discussion about the previous week’s lectures, homeworks, etc.

In order to get the complete Discussion Participation grade you must:
- Attend every discussion section (the TA will keep a record of the presence and absence of students in their section)
- Be able and willing to discuss the lectures, readings, and homework assignments in an informed manner
- Be a productive and constructive participant in the discussions

Compliance with this earns the student their full 10%. 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.

**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 be docked 1 of the 10 percentage points for each discussion section meeting missed. Additionally, if there is more than one absence the student will be docked 1 of the 10 percentage points for 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).

**LATE ITEM POLICY:** Late Homework Assignments 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. Online Exams cannot be completed for a grade after their regularly assigned due date passes.
No separate extra credit assignments planned for this course, although individual exams and homework assignments may have extra credit questions which add up in the final course grade.

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; Team Project wikis; and so forth. If you have not already done so, make sure that you get access to ELMS.

Other Policies:  Academic integrity:  All work on tests, homeworks, etc. must be your own. Although group study can be very useful, make sure that all your work you turn in is your own. The University of Maryland has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://shc.umd.edu/SHC/Default.aspx.

The University of Maryland is one of a small number of universities with a student-administered Honors Code and an Honors Pledge, available on the web at http://osc.umd.edu/OSC/AcademicHonorPledge.aspx. The code prohibits students from cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures. The University Senate encourages instructors to ask students to write the following signed statement on each examination or assignment: “I pledge on my honor that I have not given or received any unauthorized assistance on this examination (or assignment).”

Academic Accommodations:  If you have a documented disability, you should contact Disability Support Services 0126 Shoemaker Hall. Each semester students with documented disabilities should apply to DSS for accommodation request forms which you can provide to your professors as proof of your eligibility for accommodations. The rules for eligibility and the types of accommodations a student may request can be reviewed on the DSS web site at http://www.counseling.umd.edu/DSS/receiving_serv.html.

Religious Observances:  The University System of Maryland policy provides that students shall not be penalized because of observances of their religious beliefs, students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the responsibility of the student to inform the instructor of any intended absences for religious observances in advance. Notice should be provided as soon as possible but no later than the end of the schedule adjustment period (February 5). Faculty should further remind students that prior notification is especially important in connection with final exams, since failure to reschedule a final exam before the conclusion of the final examination period may result in loss of credits during the semester. The problem is especially likely to arise when final exams are scheduled on Saturdays.

Miscellaneous:  Absences from the final exam will not be excused except for those causes approved by University policy (see http://www.umd.edu/catalog/index.cfm/show/content.section/c/27/ss/1584/s/1540 of the Undergraduate Catalog). Only those students excused for these causes will be eligible for a make-up exam.
Much of the information presented is not available in the readings; it is essential that students attend all lectures and take their own notes. 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).

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.

Keep up with the required readings! Although the format of the lectures and the readings do not always match, the readings are important as well. Some of the material to be tested is covered in more detail in the readings than in class.

Readings should be done prior to the classtime they are listed.

Course Evaluations: CourseEvalUM will be open for students to complete their evaluations for Spring 2013 courses between Tuesday, April 23, and Friday, May 10. Students can go directly to the website (www.coursesevalum.umd.edu) to complete their evaluations, beginning April 23. 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!

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**MAIN SCHEDULE**

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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Lecture Question</th>
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<tbody>
<tr>
<td>I</td>
<td>Jan. 24 Lecture “In the Beginning: Our Long Quest for Origins”</td>
<td>How have people explained the origins of Earth, Life &amp; Humanity in the past?</td>
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<td>II</td>
<td>Jan. 28 Discussion: Introductions</td>
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<td>Jan. 29 Lecture “The Nature of Science”</td>
<td>What is the “Scientific Method”?</td>
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<td>Jan. 31 Lecture “The Dynamic Earth: Basics of Geology”</td>
<td>How do rocks form, and how do they record environments of the past?</td>
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<td>III</td>
<td>Feb. 4 Discussion: Scientific Method &amp; Logic; Scientific Method HW assigned</td>
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<td>Feb. 5 Lecture “Bones in the Stones &amp; Shells in the Shales: Fossils and Fossilization”</td>
<td>What are fossils, and how do they form?</td>
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Feb. 7 Lecture “Clocks in the Rocks: Geologic Time”  How do we determine the age of fossils?

Feb. 11 Discussion: Geologic Time; Geologic Time HW assigned

Feb. 12 Lecture “A Song of Ice & Fire: Ice Ages and Greenhouse Warming”  What do ancient events show about the effects of climate change on the living world?

Feb. 14 Lecture “On the Origin of Species by Means of Natural Selection”  What is evolution, and how does it work?

Feb. 18 Discussion: Scientific Literature; Anatomy of a Scientific Paper HW assigned

Feb. 19 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?

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?

---ONLINE EXAM 1 Feb. 18-22---

Feb. 25 Discussion: Phylogenetics; Phylogenetics HW assigned

Feb. 26 Lecture “Bringing Fossils to Life: Methods of Paleobiology”  How do we use the fossil record to understand the biology and evolution of extinct organisms?

Feb. 28 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?

Mar. 4 Discussion: Student Presentation Logistics

Mar. 5 Lecture “Death from Above! The Cretaceous-Paleogene Extinction”  What caused the Cretaceous-Paleogene extinction and the end of the Age of Dinosaurs?

Mar. 7 Lecture “When Life Nearly Died: The Permo-Triassic Extinction”  What caused the Permo-Triassic extinction and the end of the Paleozoic Era?

Mar. 11 Discussion: Mass Extinctions; Mass Extinction HW assigned

Mar. 12 Lecture “First Impressions: The Riddle of the Ediacarans”  What do the Ediacaran fossils represent?

Mar. 14 Lecture “Shell Games: The Long Fuse of the Cambrian Explosion”  What caused the Cambrian Explosion?
SPRING BREAK Mar. 18-22

IX
Mar. 25 Discussion: Team Project Research Strategies
Mar. 26 Lecture “Going Green: The Colonization of Land by Plants”  How did plants colonize the world, and how did that effect the rest of Earth History?
Mar. 28 Lecture “Four on the Floor: The Colonization of Land by Vertebrates”  How did vertebrates move from the sea to land?

---ONLINE EXAM 2 Mar. 25-29---

X
Apr. 1 Discussion: Team Project Preliminary Research results; Preliminary Bibliography due
Apr. 2 Lecture “Reign of the Dinosaurs: What’s the Big Deal?”  How did (some) dinosaurs get so big?
Apr. 4 Lecture “The Hot-Blooded Dinosaurs: Reconstructing Dinosaur Physiology”  Were dinosaurs warm-blooded?

XI
Apr. 8 Discussion: Presentation Skills
Apr. 9 Lecture “Feathered Dragons: The Origins of Birds & of Avian Flight”  How did birds evolve from (other) dinosaurs, and how did bird flight evolve?
Apr. 11 Lecture “Home on the Range: The Evolution of Grasslands”  How did climate, atmospheres, plants & animals interact in the origin and spread of the grassland ecosystems?

XII
Apr. 15 Discussion: Teams Finalize Projects
Apr. 16 Lecture “Scatterlings of Africa: The Origins of Humanity”  Where, and from what, did humans evolve? What were proto-humans like?
Apr. 18 Lecture “Last Man Standing: The Rise of Homo sapiens”  What makes our species unique, and what happened to our closest kin?

XIII
Apr. 22 Discussion: Team Presentations I; Human Origins HW assigned
Apr. 23 Lecture “Out of Eden: The Spread of Homo sapiens”  How did humanity spread around the world?
Apr. 25 Lecture “The Call of Distant Mammoths: The Pleistocene Megafaunal Extinctions”  What happened to the Pleistocene megafauna?

XIV
Apr. 29 Discussion: Team Presentations II
Apr. 30 Lecture “The Greatest Show on Earth: The Public and Biological Evolution I”  Why do so many Americans reject the reality of evolution?
May 2 Lecture “Only a Theory? The Public and
Biological Evolution II”              believe instead?

---ONLINE EXAM 3 Apr. 29-May 3---

XV  May 6 Discussion: Team Presentations III

May 7 Lecture “Last Chance to See: The Holocene Extinction & Conservation Paleontology” How can the paleontological perspective be used in service of endangered species and threatened ecosystems?

May 9 Lecture “Grandeur in This View of Life: Perspectives from the Fossil Record” 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 13 (MONDAY): 8:00-10:00 am, CHE 2110