

## Term Information

Effective Term Autumn 2022  
*Previous Value* Autumn 2013

## Course Change Information

### What change is being proposed? (If more than one, what changes are being proposed?)

We propose that the course be included in the Origins and Evolution GE Theme.

### What is the rationale for the proposed change(s)?

To have this course be included in the Origins and Evolution Theme because it fits the ELOs of the theme.

### What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

The only programmatic implication is that this course can now be used by students to satisfy a GE theme requirement.

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

## General Information

Course Bulletin Listing/Subject Area Anthropology  
Fiscal Unit/Academic Org Anthropology - D0711  
College/Academic Group Arts and Sciences  
Level/Career Undergraduate  
Course Number/Catalog 3300  
Course Title Human Origins  
Transcript Abbreviation Human Origins  
Course Description The search for human origins through a reconstruction of the human and non-human primate fossil records of the last 60 million years; emphasis on human skeletal, behavioral, and social patterns.  
Semester Credit Hours/Units Fixed: 3

## Offering Information

Length Of Course 14 Week, 12 Week, 8 Week, 7 Week, 6 Week  
Flexibly Scheduled Course Never  
Does any section of this course have a distance education component? No  
Grading Basis Letter Grade  
Repeatable No  
Course Components Lecture  
Grade Roster Component Lecture  
Credit Available by Exam No  
Admission Condition Course No  
Off Campus Never  
Campus of Offering Columbus, Lima, Mansfield, Marion, Newark, Wooster  
*Previous Value* Columbus

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## Prerequisites and Exclusions

**Prerequisites/Corequisites**

Prereq: 2200, or permission of instructor.

*Previous Value*

*Prereq: 2200 (200), or permission of instructor.*

**Exclusions**

*Previous Value*

Not open to students with credit for 300.

**Electronically Enforced**

No

## Cross-Listings

**Cross-Listings**

## Subject/CIP Code

**Subject/CIP Code**

40.0604

**Subsidy Level**

Baccalaureate Course

**Intended Rank**

Freshman, Sophomore, Junior, Senior

## Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Origins and Evolution

*Previous Value*

*Required for this unit's degrees, majors, and/or minors*

## Course Details

**Course goals or learning objectives/outcomes**

- SWBAT: (1) identify distinguishing features of paleospecies, (2) conduct cladistic analyses (3) analyze primate functional morphology, (4) recognize the significance of key fossil finds, and (5) critically evaluate debates in paleoanthropology.

*Previous Value*

**Content Topic List**

- Search for human origins
- Human fossil records
- Primate fossil records
- Human skeletal, behavioral, and social patterns

**Sought Concurrence**

No

## Attachments

- Anthropology 3300 OE GE submission questions\_FINAL.docx: Theme Submission Questions for Anth 3300  
*(Other Supporting Documentation. Owner: Guatelli-Steinberg, Debra)*
- Anthropology 3300 Spring 2022 Revised.docx: Anthropology 3300 syllabus  
*(Syllabus. Owner: Guatelli-Steinberg, Debra)*

## Comments

**COURSE CHANGE REQUEST**  
3300 - Status: PENDING

Last Updated: Vankeerbergen, Bernadette  
Chantal  
07/29/2022

**Workflow Information**

| Status           | User(s)   | Date/Time           | Step                   |
|------------------|---|---------------------|------------------------|
| Submitted        | Guatelli-Steinberg, Debra   | 06/06/2022 04:28 PM | Submitted for Approval |
| Approved         | Guatelli-Steinberg, Debra   | 06/07/2022 02:50 PM | Unit Approval          |
| Approved         | Vankeerbergen, Bernadette Chantal   | 07/29/2022 12:51 PM | College Approval       |
| Pending Approval | Cody, Emily Kathryn<br>Jenkins, Mary Ellen Bigler<br>Hanlin, Deborah Kay<br>Hilty, Michael<br>Vankeerbergen, Bernadette Chantal<br>Steele, Rachel Lea | 07/29/2022 12:51 PM | ASCCAO Approval        |

# Anthropology 3300

## HUMAN ORIGINS

Spring 2022

Instructor: Dr. Guatelli-Steinberg  
e-mail: [guatelli-steinbe.1@osu.edu](mailto:guatelli-steinbe.1@osu.edu)  
phone: 614-292-9768

Office hours: T, Th: 2:15-3:30,  
or by appointment



### Course Overview:

Welcome! This course is about the fossil record of primate—but especially human--evolution. We will trace the evolution of human anatomy (especially related to bipedalism), diet, life history characteristics, behavior and culture. Specific topics include methods of paleoanthropology, basic evolutionary principles, cladistics, the living primates as anatomical and behavioral models for fossils, the origins of the primate order and the anthropoid primates, hominoid (or ape) diversification during the Miocene, and the origin and evolution of major hominin fossil species, from the first potential bipeds through anatomically modern humans.

### Course Objectives:

As an outcome of this course, you should be able to understand human origins in the broader context of primate evolution. You should be able to: (1) identify distinguishing features of primate and hominin paleospecies, (2) conduct cladistic analysis and apply cladistic reasoning (3) recognize and analyze essential aspects of primate functional morphology, and (4) recognize the significance of key fossil finds. Finally, you should (5) develop an ability to critically evaluate different lines of evidence bearing on major questions and/or debates in human evolution.

### Text:

- REQUIRED: *Reconstructing Human Origins*. 2012. Third Edition. Glenn C. Conroy and Herman Pontzer. New York and London: W.W. Norton

**E-reserve readings:** Available on our Carmen site under the Weekly Module during which they are assigned.

**The goals of the *Origins and Evolution* GE Theme are:**

1. Successful students will analyze the origins and evolution of natural systems, life, humanity, or human culture at a more advanced and in-depth level than in the Foundations component.
2. Successful students will integrate approaches to the origins and evolution of natural systems, life, humanity, or human culture by making connections to their own experiences and by making connections to work they have done in previous classes and/or anticipate doing in the future.
3. Successful students will appreciate the time depth of the origins and evolution of natural systems, life, humanity, or human culture, and the factors that have shaped them over time.
4. Successful students will understand the origins and evolution of natural systems, life, humanity, or human culture, and the factors that have shaped them over time.

**More specifically, the Expected Learning Outcomes for this theme are: Successful students are able to:**

- 1.1 Apply their understanding of scientific methods to quantitative calculations.
- 1.2 Engage in critical and logical thinking about the origins and evolution of the universe, physical systems, life on earth, humanity, or human culture.
  - 2.1 Identify, describe, and synthesize approaches to or experiences of origins and evolution questions in different academic and non-academic contexts.
  - 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.
- 3.1 Illustrate the time depth of the universe, physical systems, life on earth, humanity, or human culture by providing examples or models.
- 3.2 Explain scientific methods used to reconstruct the history of the universe, physical systems, life on earth, humanity, or human culture and specify their domains of validity.
- 3.3 Engage with current controversies and problems related to origins and evolution questions.
  - 4.1 Describe how the universe, physical systems, life on earth, humanity, or human culture have evolved over time.
  - 4.2 Summarize current theories of the origin and evolution of the universe, physical systems, life on earth, humanity, or human culture.

**Anthropology 3300 addresses the origins and evolution of humanity.** Throughout lecture, lab, readings and discussions, students engage in critical and logical thinking about the origins and evolution of humankind. Lectures are quite interactive, such that students are asked to observe features of fossil forms, to assess similarities and differences and whether one fossil species makes a better candidate ancestor than another. They are asked to reason about phylogenetic relationships using the logic of cladistics. There are six pre-labs and six in-class labs in this course. All of these labs were written to engage students in making logical inferences about the past. One example here is a lab (Lab 4) in which students are asked to use NIH free software ImageJ to measure the area of femoral heads (the ball at the end of the femur) in modern apes, Miocene apes, fossil hominins species and modern humans. They are asked to infer the ancestral size of the femoral head and whether, based on their measurements, similarity between modern humans and modern apes in femoral head size is likely to have arisen independently in their two separate lineages or to have been inherited directly from their last common ancestor. Scheduled discussions (there are five of them throughout the semester) center on debates/controversies in human evolution. For example, in Discussion 5, on “Dietary Debates” students are asked to evaluate these different lines of evidence (anatomy vs. direct indicators of diet, such as stable carbon isotopes present in tooth enamel) and what each can and cannot reveal about the diets of our ancestors.

The course has five major components: Lectures, Pre-Labs, Labs, Discussions and Exams.

#### Pre-Lab and Lab Procedures and Expectations:

1. Pre-Labs must be completed before you can begin the in class portion of each lab.
2. The in-class portion of the lab will include both actual and virtual elements. Some of the questions can be finished for homework if you don't finish during the class period.
3. The only way a missed lab can be made up is if there is a compelling reason for your having missed the lab, such as an illness or emergency. **Otherwise, labs can't be made up.**
4. Labs will be marked 10% off for each day late, and **because I plan to return them to you in a timely manner, they will not be accepted if they are more than three days late.**
5. **Both pre-labs and labs can only be turned in as PDFS. These are individual assignments—copying answers from others will be considered Academic Misconduct (see below).**

#### Discussion Procedures and Expectations:

1. Discussion questions will be posted under the Weekly Module in which they occur. You are expected, in advance of the discussion, to read the assigned reading that corresponds to each discussion and to think about the discussion questions that are posted. In assigned groups, you will then come together to answer the questions.
2. Designate one person from your discussion ( a different person each discussion) as the discussion leader. That person will both help facilitate the discussion and record the groups' answers to discussion questions.
3. At the end of the discussion, the discussion leader is expected to upload the groups' answers to Carmen as a pdf file.
4. On some occasions, discussions will not take the entire class period. That extra time is there by design: it will give you some time to review course material with your group members. **This is a very good thing to do in this information-dense class—to go over, with your group, questions from your lecture notes, labs, readings, etc.-- on an ongoing basis throughout the course.**

#### Exam Expectations:

Make-up exams are given **only** if you have an emergency that prevents you from taking the exam on the date and time it is given. Official documentation (doctor's note, accident report, etc.) is required for any make-up accommodation. Any make-up exams must be completed within one week after the exam. (Otherwise, a "0" will be given for that exam).

#### Grading:

There is no extra credit and grades are based on a standardized scale (93-100% = A; 90-92.9% = A-, 87-89.9% = B+, 83-86.9% = B, 80-82.9%=B-, etc.)

#### Extra Help:

I HAVE **DROP-IN OFFICE HOURS ON TUES AND THURS FROM 2:15 TO 3:30**. IF YOU CANNOT MAKE THESE OFFICE HOURS WE CAN CERTAINLY SET UP ALTERNATIVE MEETING TIMES. I CANNOT DO JUSTICE TO DETAILED EXPLANATIONS OF COURSE MATERIAL OVER E-MAIL, SO IF THAT'S WHAT YOU NEED, EITHER SHOW UP AT OFFICE HOURS OR SET UP AN ALTNERNATIVE MEETING TIME WITH ME.

- (I) Discussions: 20 points each (five discussions for a total of 100 points)
- (II) Pre-Labs: 10 points each (six pre-labs for total of 60 points)
- (III) Labs: Points vary from 10-40 points (seven labs including "Lab 0" for a total of 180 points)
- (IV) Exams: 120 points each (Three exams for a total of 360 points)

## University Policies and Information:

### Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

### Disability Services

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 098 Baker Hall, 113 W. 12<sup>th</sup> Avenue.

### Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting [ccs.osu.edu](http://ccs.osu.edu) or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org).

### Sexual Misconduct

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at [titleix@osu.edu](mailto:titleix@osu.edu)

### Diversity

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

# ANTH 3300: SCHEDULE

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| Day           | Topic<br>Reading should be done in advance of the class for which it is assigned   | Assignments Due<br>Points              |
|---------------|--|--|
| Tu<br>11-Jan  | Lecture: Introduction; Course Mechanics, Trends in Human Evolution<br>Reading: RHO (Reconstructing Human Origins) Text: Ch 8 pp. 269-270 and 311-315               |  |
| Th<br>13-Jan  | Lecture: Fossils; Methods of Paleoanthropology<br>Reading: RHO Text: Ch 3 (all)  |  |
| Tu<br>18-Jan  | Lecture: Evolutionary Processes and Classification; Introduction to Cladistics<br>Reading: RHO Text: Ch 2 (all) and Ch 4 pp. 89-111                                | Lab 0<br>(10 points)                   |
| Th<br>20-Jan  | Discussion 1: Salamander's and Narrowmouth's Tail; Review in Groups<br>Reading: E-Reserve #1 The Salamander's Tale<br>Reading: E-Reserve #2 The Narrowmouth's Tale | Discussion 1<br>Answers<br>(20 points) |
| Tu<br>25-Jan  | Follow up from Discussion; Lecture: Cladistics cont'd and Primate Taxonomy<br>Reading: RHO Text: Ch 1: pp. 4-25; Pre-Lab 1   | Pre-Lab 1<br>(10 points)               |
| Th<br>27-Jan  | Lab 1: Comparative Primate Craniodental Anatomy<br>Reading: Lab 1  | Lab 1 (20 points)                      |
| Tu<br>1-Feb   | Follow up from Lab I; Intro to Lab II; Lecture: Introduction to Primate Evolution<br>Reading: Pre- Lab 2<br>E-Reserve #3: Primate Origins I: (pp 78-95)            | Pre-Lab 2<br>(10 points)               |
| Th<br>3-Feb   | Lab 2: Comparative Primate Postcranial Anatomy<br>Reading: Lab 2   |  |
| Tu<br>8-Feb   | Follow up from Lab 2, Lecture: Primates of the Paleocene, Eocene and Oligocene<br>E-Reserve #4: Primate Origins 2 (pp 109-120)                                     | Lab 2<br>(30 points)                   |
| Th<br>10-Feb  | Discussion 2: <i>Carpolestes</i> ; Review in groups<br>Reading: E-Reserve #5: Primate Origins Nailed<br>Reading: E-Reserve #6: Comment on Grasping Primate Origins | Discussion 2<br>Answers<br>(20 points) |
| Mon<br>14-Feb | Optional Review Session 1-3 (Zoom link TBA)  |  |
| Tu<br>15-Feb  | EXAM 1: Weeks 1-5  | EXAM 1<br>(120 points)                 |
| Th<br>17-Feb  | Lab 3: The Miocene: Planet of the Apes<br>Reading: Pre-Lab 3, Lab 3 and Chapter 5 (all)  | Pre-Lab 3<br>(10 points)               |



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| Tu<br>22-Feb        | Follow up from Lab 3, Lecture: Hominoids & Molecular Clock, Bipedal Anatomy<br>Reading: E-Reserve: #7: The Orangutan's Tale   | Lab 3<br>(20 points)                                     |
| Th<br>24-Feb        | <b>Discussion 3: Bipedalism; Review in groups</b><br>Reading: RHO text Ch 8 270-278 and 301-311<br>Reading: E-Reserve # 8: Littlefoot's Tale<br>Reading: E-Reserve # 9: Epilogue to Littlefoot's Tale   | Discussion 3<br>Answers<br>(20 points)                   |
| Tu<br>1-March       | Three early possible bipeds; <i>Ardipithecus ramidus</i> ; <i>Au. anamensis</i><br>Reading: RHO Ch 6: pp 157-162; Ch 7: 206-209;<br>Reading: RHO Ch 7, pp. 235-240; and Ch 8: 278-280<br>Reading: E-Reserve #10: A New Kind of Ancestor: <i>Ardipithecus</i> Unveiled<br>Reading: Pre-Lab 4 | Pre-Lab 4<br>(10 points)                                 |
| Th<br>3-March       | Lab 4: Bipedalism and <i>Orrorin</i><br>Reading: Lab 4  |  |
| Tu<br>8-March       | Follow up from Lab 4; Lecture: <i>A. afarensis</i> and <i>K platyops</i> ; <i>Au. africanus</i><br>Reading: RHO Ch 7, pp. 240-248; and Ch 6: pp 183-192   | Lab 4<br>(30 points)                                     |
| WED ZOOM<br>9 March | Optional Review Session 2-4 PM online (link TBA)  |  |
| Thurs<br>10 March   | EXAM 2 (Weeks 6-9)  | EXAM 2<br>(120 points)                                   |
| Tu<br>22-March      | <b>Discussion 4: <i>Australopithecus sediba</i>; Review in groups</b><br>Reading: E-Reserve #11: Skeletons Present an Exquisite Paleopuzzle   | •Pre-Lab 5 (10 pts)<br>•Discussion 4<br>Answers (20 pts) |
| Th<br>24 March      | Lab 5: Dietary Divergence between <i>Paranthropus</i> and <i>Homo</i><br>Reading: Lab 5   |  |
| Tu<br>29 March      | Follow up from Lab 5; Lecture: <i>Paranthropus</i> and <i>Homo habilis</i><br>Reading: RHO Ch 8: pp. 257-268 and Chapter 9: 327-346   | Lab 5<br>(40 points)                                     |
| Th<br>31 March      | <b>Discussion 5: Dietary Debates; Review in Groups</b><br>Reading: E-Reserve #12: Viewpoints: Feeding Mechanics, Diet, and ....   | Discussion 5<br>Answers (20 pts)                         |
| Tu<br>5 April       | Follow up from Discussion 5; Lecture <i>Homo erectus</i><br>Reading: RHO Ch 10, pp. 377-399 and 403-447   |  |
| Th<br>7 April       | Lecture: <i>Homo erectus</i> cont'd<br>Reading: E-Reserve #13: The First Pioneer.<br>Reading: E-Reserve #14: Stunning Skull Gives a Fresh....   |  |

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| <b>T</b><br><b>12-April</b>        | <b>Homo heidelbergensis and Neanderthals</b><br><b>Reading: RHO Ch 11 (all) and Pre-Lab 6</b>  | <b>Pre-Lab 6</b><br><b>(10 points)</b> |
| <b>Th</b><br><b>14-April</b>       | <b>Lab 6</b><br><b>Reading: Lab 6</b>  |  |
| <b>Tu</b><br><b>19-April</b>       | <b>More Neanderthals / Paleogenetics</b><br><b>Reading: RHO Ch 13: pp. 534-587</b>   | <b>Lab 6</b><br><b>(30 points)</b>     |
| <b>Th</b><br><b>21-April</b>       | <b>Anatomically modern humans, <i>Homo floresiensis</i> and <i>Homo naledi</i></b><br><b>Reading: RHO Ch 12 (all)</b><br><b>Reading: E Reserve # 15: Eve's Tale</b><br><b>Reading: E Reserve # 16: Rethinking the Hobbits of Indonesia</b> |  |
| <b>TUE ZOOM</b><br><b>26-April</b> | <b>Optional Review Session 2-4 PM online (link TBA)</b>  |  |
| <b>Th 28-April</b>                 | <b>EXAM 3: Emphasizes Weeks 11 (beginning March 22) to Week 15 (ending April 21)</b><br><b>NOTE TIME 2-3:45</b>  | <b>EXAM 3 (120 pts)</b>                |

**Anthropology 3300: Human Origins**

**Submitted for approval for the new theme Origins and Evolution**

**Background:** Anthropology 3300 is about human origins and hominin evolution as evidenced by the fossil record, genetics, and comparative biology. We trace the evolution of human anatomy (especially related to bipedalism and brain evolution), diet, life history characteristics, behavior and material culture through time. The focus of the first third of the course is on basic principles and methods of paleoanthropology and the evolution of the major primate taxonomic grouping to which humans belong. Specific topics in the first third of the course include dating methods, methods of reconstructing past climates, basic evolutionary principles, taxonomy, cladistic analysis, the living primates as anatomical and behavioral models for fossil species, the origins of the primate order, the evolution of anthropoid primates, and hominoid (or ape) diversification during the Miocene. The remaining two thirds of the course focuses on the last 7 million years of human evolution, from the earliest possible bipeds to *Homo sapiens*. This is an essential course in the Origins and Evolution Theme, as it enables students to gain insight into the evolution of human biology, behavior, and evolving material culture. Students will gain these insights through lectures, labs, readings, and discussions.

**Expected learning outcomes specific to the course:** Successful students will be able to: (1) identify distinguishing features of primate and hominin paleospecies, (2) conduct cladistic analysis and apply cladistic reasoning (3) recognize and analyze essential aspects of primate functional morphology and apply these to fossil remains (4) recognize the significance of key fossil finds, (5) understand the convergence of genetic studies of human and primate genomes with hominin evolution, and (6) critically evaluate different lines of evidence bearing on major questions and/or debates in human evolution.

**(I) How Anthropology 3300 meets ELOs shared by all themes**

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| <p>ELO 1.1 Engage in critical and logical thinking.</p> | <p>Throughout lecture, lab, readings and discussions, students engage in critical and logical thinking about the origins and evolution of humans.</p> <p>a) Lectures are quite interactive, such that students are asked to observe features of fossil forms that are displayed, often using 3D models, to assess similarities and differences and whether one fossil species makes a better candidate ancestor than another. One place we do this is in the lectures on early hominin australopiths –students are asked to comment on apparent shared derived features with the genus <i>Homo</i> (here they are being asked to use the logic of cladistic analysis).</p> <p>b) There are six pre-labs and six in-class labs in this course. All of these labs were written to engage students in making logical inferences about the past. One example here is a lab (Lab 4) in</p> |
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Course subject & number

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|  | <p>which students are asked to use NIH free software ImageJ to measure the area of femoral heads (the ball at the end of the femur) in modern apes, Miocene apes, fossil hominins species and modern humans. They are asked to infer the ancestral size of the femoral head and whether, based on their measurements, similarity between modern humans and modern apes in femoral head size is likely to have arisen independently in their two separate lineages or to have been inherited directly from their last common ancestor.</p> <p>c) Discussions (there are five of them throughout the semester) center on debates/controversies in human evolution. To set the stage for these discussions, our first discussion focuses on ring species, as discussed in Dawkins' "Salamander's Tale" – This discussion requires students to think critically about what we mean by the term species, how speciation occurs, and why the naming of fossil species is a complicated endeavor.</p>                                     |
| <p>ELO 2.1 Identify, describe, and synthesize approaches or experiences.</p>   | <p>Students are asked to identify, describe and synthesize approaches throughout the course. For example, on the topic of what our early ancestors ate, students are first exposed to what we can infer from the anatomy. They are exposed to this approach to reconstructing diets in Labs 1 and 5. Following this lab is a lecture on methods that allow paleoanthropologists to infer what was actually eaten during the lifetime of a fossil organism. One of these methods makes use of stable carbon isotopes to discern whether our ancestors ate certain types of plants. The data derived from this method challenge past inferences made from the analysis of tooth and jaw anatomy. In Discussion 5, on "Dietary Debates" students are asked to evaluate these different lines of evidence (anatomy vs. direct indicators of diet, such as stable carbon isotopes present in tooth enamel) and what each can and cannot reveal about the diets of our ancestors.</p>  |
| <p>ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.</p> | <p>The entire course is designed to establish foundational concepts in the first third that are then applied to new and challenging contexts confronted in labs and discussions. For example, students are asked to apply cladistic reasoning, that they learn in the first third of the course, within various lab exercises and discussions. Thus, for example, we ask students to analyze whether knuckle-walking was present in the common ancestor to African apes and humans, or if knuckle-walking homoplastic in chimps and gorillas. Students are asked to evaluate this idea with respect to the parsimony concept in cladistics. In another example, in Discussion 3, students evaluate possible anatomical pre-cursors to bipedalism. In this discussion students are asked to reflect on what they know from the earlier part of the course that will help them to address this question. This is just one way that students discover how their previous learning can be applied to new and challenging contexts.</p> |

**(I) How Anthropology 3300 meets ELOs of the Origins and Evolution Theme.**

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| <p><b>ELO 1.1</b> Apply their understanding of scientific methods to quantitative calculations.</p>   | <p>In both lecture and lab, students often apply their understanding of scientific methods to quantitative calculations. For example, when we cover chronological dating methods in lecture, students break into pairs to calculate the age of fossil based on volcanic layers containing radioactive potassium that bracket the fossil. In labs on functional anatomy, there are various times when students use quantitative calculations, such as when they must calculate the biomechanical advantage of a muscle based on where that muscle attaches in living and fossil forms. Students calculate biomechanical advantage in Labs 1 and 5 for the masseter muscle, and in Lab 4 for the less gluteal muscles.</p>   |
| <p><b>ELO 1.2</b> Engage in critical and logical thinking about the origins and evolution of the universe, physical systems, life on earth, humanity, or human culture.</p> | <p>(This is identical to general theme ELO 1.1.) Throughout lecture, lab, readings and discussions, students engage in critical and logical thinking about the origins and evolution of humans.</p> <p>a) Lectures are quite interactive, such that students are asked to observe features of fossil forms that are displayed, often using 3D models, to assess similarities and differences and whether one fossil species makes a better candidate ancestor than another. One place we do this is in the lectures on australopiths –students are asked to comment on apparent shared derived features with the genus <i>Homo</i> (here they are being asked to use the logic of cladistic analysis).</p> <p>b) There are six pre-labs and six in-class labs in this course. All of these labs were written to engage students in making logical inferences about the past. One example here is a lab (Lab 4) in which students are asked to use NIH free software ImageJ to measure the area of femoral heads (the ball at the end of the femur) in modern apes, Miocene apes, fossil hominins species and modern humans. They are asked to infer the ancestral size of the femoral head and whether, based on their measurements, similarity between modern humans and modern apes in femoral head size is likely to have arisen independently in their two separate lineages or to have been inherited directly from their last common ancestor.</p> |

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|   | <p>c) Discussions (there are five of them throughout the semester) center around debates/controversies in human evolution. To set the stage for these discussions, our first discussion focuses on ring species, as discussed in Dawkins' "Salamander's Tale" – This discussion requires students to think critically about what we mean by the term species, how speciation occurs, and why the naming of fossil species is a complicated endeavor.</p>   |
| <p><b>ELO 2.1</b> Identify, describe, and synthesize approaches to or experiences of origins and evolution questions in different academic and non-academic contexts.</p>                                   | <p>This is nearly identical to general theme ELO 2.1. Identify, describe, and synthesize approaches to origins and evolutions questions in academic and non-academic contexts. Students are asked to identify and describe and synthesize approaches throughout the course. For example, on the topic of what our early ancestors ate, students are first exposed to what we can infer from the anatomy. They are exposed to this approach to reconstructing diets in Labs 1 and 5. Following this lab is a lecture on methods that allow paleoanthropologists to infer what was actually eaten during the lifetime of a fossil organism. One of these methods makes use of stable carbon isotopes to discern whether our ancestors ate certain types of plants. The data derived from this method challenge past inferences made from the analysis of tooth and jaw anatomy. In Discussion 5, on "Dietary Debates" students are asked to evaluate these different lines of evidence (anatomy vs. direct indicators of diet, such as stable carbon isotopes present in tooth enamel) and what each can and cannot reveal about the diets of our ancestors. In this discussion, we also discuss popular media coverage of this debate—i.e., how this debate is covered in non-academic contexts. For example, why might it be misleading, even as it may be heuristic, to, as one science writer reports, label one branch of our evolutionary tree "human cows"?</p> |
| <p><b>ELO 2.2</b> Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.</p> | <p>This ELO is identical to the general theme ELO 2.2. The entire course is designed to establish foundational concepts in the first third that are then applied to new and challenging contexts confronted in labs and discussions. For example, students are asked to apply cladistic reasoning, that they learn in the first third of the course, within various lab exercises and discussions. Thus, for example, we ask students to analyze whether knuckle-walking was present in the common ancestor to African apes and humans, or if knuckle-walking homoplastic in chimps and gorillas. Students are asked to evaluate this idea with respect to the parsimony concept in cladistics. Students are asked to evaluate this idea with respect to the parsimony concept in cladistics.</p>  |

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|  | <p>In another example, in Discussion 3, students evaluate possible anatomical pre-cursors to bipedalism. In this discussion students are asked to reflect on what they know from the earlier part of the course that will help them to address this question. This is just one way that students discover how their previous learning can be applied to new and challenging contexts.</p>   |
| <p><b>ELO 3.1</b> Illustrate the time depth of the universe, physical systems, life on earth, humanity, or human culture by providing examples or models.</p>  | <p>Illustrating the time dept of humanity is something we do throughout the course, especially in lab. Students are asked to construct timelines of different species in the different labs in which we examine them. They also must illustrate where these species fall on a timeline of the evolution of life on earth.</p>   |
| <p><b>ELO 3.2</b> Explain scientific methods used to reconstruct the history of the universe, physical systems, life on earth, humanity, or human culture and specify their domains of validity.</p> | <p>When we cover dating methods as well as methods of paleo-ecological reconstruction, students are asked to state in which contexts these methods are most vs. least appropriate. For example, they are asked to explain over what range of time, and for what objects, different methods of chronological dating are appropriate. These ideas are reinforced throughout the course with checks for understanding when discussing different fossil sites – if, for instance, we are talking about fossils from East vs. South Africa, students are asked which dating methods are most appropriate. Students also must explain how the molecular clock works in the context of hominin origins and the origins of <i>Homo sapiens</i>.</p>   |
| <p><b>ELO 3.3</b> Engage with current controversies and problems related to origins and evolution questions.</p>   | <p>Most of the discussions focus on current controversies and problems. The readings for these discussions often cover different sides of these controversies or problems. For example, early on in the course, students read a debate between paleoanthropologists on an early putative primate fossil ancestor. There are two camps in this debate—one arguing for a direct ancestral linkage to later primates and one arguing that the fossil is not ancestral to later primates. In the discussion we have in class, students consider the pros and cons of the arguments that are made. In another example, on dietary debates in later hominins, students read, discuss, and evaluate two different points of view on how to interpret seemingly contradictory evidence of actual diet vs. dietary adaptation.</p> |
| <p><b>ELO 4.1</b> Describe how the universe, physical systems, life on earth, humanity, or human culture have evolved over time.</p>   | <p>Students are asked to describe trends in human evolution throughout the course. In the last lab, Lab 6, students plot increases in cranial capacity in hominins over time. They are asked to describe how cranial capacities increased over time – did they do so gradually at a steady rate, or did they do so in a more punctuated manner and what does the pattern of evolutionary</p>  |

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|   | change suggest about how human intellectual capacity evolved?   |
| <b>ELO 4.2</b> Summarize current theories of the origin and evolution of the universe, physical systems, life on earth, humanity, or human culture. | Students are asked to summarize and evaluate theories at various points throughout the term. For example, after our in-class discussion on the origins of bipedalism, students are asked on an exam to summarize some of the leading current explanations. Furthermore, they are then asked to suggest how they could use evidence from the fossil record or experiments on living primates to differentiate among these possibilities. |