

ANTH S-1300 Summer Seminar: Human Evolution
DRAFT SYLLABUS

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Tuesdays, Thursdays 12-3pm
Museum of Comparative Zoology 541

Course description: How do we know how humans evolved? This seminar will investigate the evidence and methods used to reconstruct human evolution. We will review 8 million years of evolutionary history, focusing on the origins of defining features of our species such as bipedalism, tool use, language, art, and agriculture. We will evaluate interpretations of the past using different lines of evidence including genetic and fossil data, the archaeological and ethnographic records, and comparisons with living primates. To gain first-hand experience in research methods, students will work with fossils and artifacts from Harvard museums and complete exercises in Harvard laboratories.

Course goals:

Content:

- Identify traits that distinguish humans from other primates
- Evaluate hypotheses for when and why these traits evolved using evidence from fossils, genetics, archaeology, ethnographic studies, and primatology
- Summarize key biological/behavioral transitions in human evolution
- Recognize major primate groups, fossil hominins, and artifact types

Skills:

- Distinguish between, comprehend, and evaluate different sources including research papers, news articles, opinion pieces, and textbooks
- Explain concepts of human evolution to diverse audiences
- Write and speak about scientific research

Course format:

This course meets twice per week for 3 hours sessions. Most sessions will comprise 1) instructor-led lecture, 2) student-led discussion of a scientific paper and associated articles, and 3) activities in laboratories and collections of Harvard's Department of Human Evolutionary Biology, Department of Anthropology, Museum of Natural History, and Peabody Museum.

Required reading:

Why Evolution is True. Jerry A. Coyne. Oxford: Oxford University Press. 2009.

A pdf of this text can be downloaded from the course website or you may purchase a hardcopy from the Harvard Coop or elsewhere. All other readings are posted as pdfs or web links on the course website.

Assignments summary:

Pre course survey	5 points
Introductory meeting	5
Pre-class questions	80 (10 pts each)
Discussion leader	20
Participation	60 (5 pts per class)
In-class activities	45 (5 pts each)
Collaborative quizzes	60 (30 pts each)
Evolution outreach review	30
Research paper	
Proposal	10
Comprehensive outline	20
Paper	50
Presentation	20
Post course survey	5
Total	415

Assignments details:

1) Pre/post course surveys: Before the first week of class and after the last week students will complete a survey about your understanding of course concepts and the scientific process. Neither survey is graded for accuracy. You will receive full credit for completing them.

2) Instructor meeting: During the first two weeks of class you will schedule a 15-minute meeting with your Instructor to introduce yourself and discuss course goals.

3) Pre-class questions: Questions about each session's assigned reading, designed to focus reading and stimulate thought, will be posted on the course website. You must upload short responses to the course website **at least one hour** before the start of each class. **Only 8 out of 12 responses will be graded.** You may choose which weeks to submit. If more than 8 are submitted, those with the best grades will be counted.

4) Discussion leader: Each session, two students will co-lead discussion of the "discussion reading" articles. These usually comprise one research paper and several other sources (news stories, opinion pieces, textbook chapters) about that study. Leaders should begin discussion with a 10-15 summary of the research paper, explaining the questions, methods, and conclusions. They should then guide a class discussion with the goal of evaluating the research and the way it was presented in other sources.

5) Participation: You should come to class prepared to discuss the assigned reading. You are expected to listen to classmates and contribute thoughtful comments, which demonstrate engagement with the assigned reading and flow of the discussion (60 points total, 5 points per class for all meetings).

6) In class-activities: We will analyze fossils/artifacts and conduct experiments in laboratories and collections of Harvard's Departments of Human Evolutionary Biology, Department of Anthropology, Museum of Natural History, and Peabody Museum. You will complete worksheets showing the data collected, conclusions, and reflections, submitted at the end of class or start of next class. The in-class activity during Class 1 is ungraded (45 points total, 5 points per class for 9 meetings).

7) Collaborative quizzes: There will be two in-class quizzes during the semester. During the first 20 minutes, you will complete the quiz alone without notes (10 points). During the next 40 minutes students will re-take the quiz in small collaborative groups using any class or online resources (20 points). [2 quizzes, 60 points total]

8) Evolution outreach review: You will review an example of human evolution in the public sphere. Options are listed on the course website and include, museum exhibits, documentary films, podcasts, live performances, and popular nonfictions texts (400-600 words).

9) Research paper: Throughout the semester students will research a topic and question of their choosing related to course content. The research will be assessed at several stages, resulting in a formal proposal, comprehensive outline, final paper, and presentation. The final paper should be 10-15 pages double spaced.

Policy on attendance and late assignments

You are expected to abide by the Summer School student responsibilities:
<http://www.summer.harvard.edu/resources-policies/student-responsibilities>

Attendance is mandatory. Absences must be pre-approved by the instructor or due to extenuating circumstances with documentation (e.g. doctor's note). Students with excused absences will be provided make-up assignments. *Unexcused* absences will receive 0 points for participation and in-class activities that day.

No late pre-class questions will be accepted, but you will choose 8 out of 12 class meetings to submit them. In-class activities must be submitted during class or at the beginning of the following class. All other written assignments (evolution outreach review, research paper stages, and pre/post surveys) are due at or before the posted deadline. **In most cases extensions will be granted provided they are requested at least 3 days prior to the assignment due date.** Late submissions without prior permission will be penalized 5% per day.

Academic Integrity Policy

You are responsible for understanding Harvard Summer School policies on academic integrity (<http://www.summer.harvard.edu/policies/student-responsibilities>) and how to use sources responsibly. Not knowing the rules, misunderstanding the rules, running out of time, submitting the wrong draft, or being overwhelmed with multiple demands are not acceptable excuses. To support your learning about academic citation rules, please visit the Resources to Support Academic Integrity (<http://www.summer.harvard.edu/resources-policies/resources-support-academic-integrity>) where you will find links to the Harvard Guide to Using Sources and two free online 15-minute tutorials to test your knowledge of academic citation policy. The tutorials are anonymous open-learning tools.

In ANTH S-1300, discussion and the exchange of ideas are essential. You are encouraged to discuss course content with classmates, your instructor, and class guests. However, written work should reflect your own thoughts, inspired by class readings, lectures, and activities. **You may seek input on written work, but must list on the submitted work the source of this feedback, including classmates, instructors, Writing Center, or proctors.** You must also adhere to standard citation practices in this discipline and properly cite any books, articles, websites, lectures, etc. that have helped you with your work.

The Harvard College Honor Code

Members of the Harvard College community commit themselves to producing academic work of integrity – that is, work that adheres to the scholarly and intellectual standards of accurate attribution of sources, appropriate collection and use of data, and transparent acknowledgement of the contribution of others to their ideas, discoveries, interpretations, and conclusions. Cheating on exams or problem sets, plagiarizing or misrepresenting the ideas or language of someone else as one's own, falsifying data, or any other instance of academic dishonesty violates the standards of our community, as well as the standards of the wider world of learning and affairs.

Accessibility and accommodations

The Summer School is committed to providing an accessible academic community. The Accessibility Office offers a variety of accommodations and services to students with documented disabilities. Please visit <http://www.summer.harvard.edu/resources-policies/accessibility-services> for more information. **All accommodation requests must go through the Accessibility Services Office.** Do not make separate arrangements with the instructor.

ANTH S-1300 Calendar

SUN	MON	TUES	WED	THURS	FRI	SAT
Jun 24 Week 1 Primates	25 Pre-survey; Instructor meetings →	26 <i>Evo theory</i>	27	28 <i>Primates</i>	29	30
Jul 1 Week 2 Hominin	2 Evolution Outreach review DUE	3 <i>LCA, hominins</i>	4 4th of July holiday	5 <i>Australopiths</i> QUIZ 1	6	7
8 Week 3 Homo	9	10 <i>H. erectus</i>	11	12 <i>Tools</i>	13 Paper proposal DUE	14
15 Week 4 H. sapiens	16	17 <i>Neanderthals</i>	18	19 <i>modern humans</i>	20	21
22 Week 5 Symbolism, global spread	23 <i>President's Day</i>	24 <i>Language, symbolism</i> QUIZ 2	25	26 <i>Global dispersals</i>	27 Paper Outline DUE	28
29 Week 6 Settling down	30	31 <i>Farming</i>	Aug 1	2 <i>Variation</i> Final presentations	3	4
5 Week 7 Finals	6	7 <i>No class</i> Final paper DUE	8	9 <i>No class</i>	10	11 <i>Spring break</i>

Course schedule

Readings subject to change. Consult course website for up-to-date readings.

Week 1 – Humans as primates

- What is the theory of evolution?
- What types of evidence are used to study evolution?
- What is unique about humans compared to other primates?
- How can a **phylogenetic** approach be used to identify **ancestral** vs **derived** traits?

Jun 26, Class 1: Evolutionary theory and evidence

BACKGROUND READING:

Introduction and Chapters 1-5. Coyne, J.A., 2009. *Why Evolution is True*, Oxford: Oxford University Press.

ACTIVITY:

Harvard Museum of Natural History

Reflect & write on how evidence for evolution is presented at HMNH (**ungraded**)

Jun 28, Class 2: Meet the primates

BACKGROUND READING

Pg 23-50. Marks, J., 2002. *What It Means to be 98% Chimpanzee*, Berkeley: University of California Press.

DISCUSSION READING

Kühl, H.S. et al., 2016. Chimpanzee accumulative stone throwing. *Nature Scientific Reports*, pp.1–8.

Kehoe, L., 2016. Mysterious new behaviour found in our closest living relatives. *The Conversation*, pp.1–4. <https://theconversation.com/mysterious-new-behaviour-found-in-our-closest-living-relatives-55512>

“Ritualized behavior? Chimps all throw rocks at the same tree” *Ars Technica*. 3/2/2016. <https://arstechnica.com/science/2016/03/ritualized-behavior-chimps-all-throw-rocks-at-the-same-tree/>

“Is this proof chimps believe in God? Scientists baffled by footage of primates throwing rocks and ‘building shrines at sacred tree’ for no reason” *The Daily Mail*. 3/3/2016. <http://www.dailymail.co.uk/sciencetech/article-3475816/Is-proof-chimps-believe-God-Scientists-baffled-footage-primates-throwing-rocks-building-shrines-sacred-tree-no-reason.html>

ACTIVITY:

Harvard Museum of Natural History

Identify ancestral and derived traits of primates, apes, humans using known phylogeny and specimens on display at HMNH

**Week 2 – Becoming bipeds:
From the Last Common Ancestor to the first hominins**

- What features were likely present in our last common ancestor with chimpanzees and the earliest hominins?
- What are evolutionary hypotheses for the origins of bipedalism?
- Who were the *Australopithecines*?

DUE MONDAY 2 JULY: Evolution outreach review

Jul 3, Class 3: LCA and putative hominins

BACKGROUND READING:

Chapter 8, “What About Us?.” Coyne, J.A., 2009. *Why Evolution is True*, Oxford: Oxford University Press.

DISCUSSION READING:

Chapter 2, “Understanding Apes: How We Became Biped.” Lieberman, D.E. 2013. *The Story of the Human Body*. New York: Pantheon Books.

“Becoming Human: The Evolution of Walking Upright.” *Smithsonian.com*. 8/6/2012. <https://www.smithsonianmag.com/science-nature/becoming-human-the-evolution-of-walking-upright-13837658/>

Pg 72-80. Relethford, J.H., 2017. *Great Myths of Human Evolution*, Chichester: John Wiley & Sons Inc.

ACTIVITY:

Human Evolutionary Biology collections.

Hypothesize biological and behavioral traits of our last common ancestors with chimpanzees using phylogenetic reasoning.

Analyze skull casts to establish general trends in hominin evolution (chimp, *Sahelanthropus*, *Ardipithecus*, *Australopiths*, *Homo erectus*, Neanderthals, modern humans).

Jul 5, Class 4: The era of Australopiths

BACKGROUND READING:

Pg 114-129. Stringer, C. & Andrews, P., 2011. *The Complete World of Human Evolution*, London: Thames and Hudson.

DISCUSSION READING:

Copeland, S.R. et al., 2011. Strontium isotope evidence for landscape use by early hominins. *Nature*, 474(7349), pp.76–78.

Schoeninger, M., 2011. In search of the australopithecines. *Nature*, 474, pp.43–44.

“Teeth of Human Ancestors Hold Clues to Their Family Life.” *New York Times*. 6/1/2011. <http://www.nytimes.com/2011/06/02/science/02social.html>

ACTIVITY:
Collaborative quiz 1

Week 3 – The Genus *Homo*, the first hunter-gatherers

- How did *Homo erectus* double in body and brain size ~2 Ma?
- What new behaviors emerged with *Homo erectus*?
- What can we learn about human evolution from stone tools?

Jul 10, Class 5: *Homo erectus* the trailblazer

BACKGROUND READING:

Wrangham, R. & Carmody, R., 2010. Human adaptation to the control of fire. *Evolutionary Anthropology*, 19(5), pp.187–199.

DISCUSSION READING:

Bramble, D.M. & Lieberman, D.E., 2004. Endurance running and the evolution of Homo. *Nature*, 432, pp.345–352.

Pickering, T.R. & Bunn, H.T., 2007. The endurance running hypothesis and hunting and scavenging in savanna-woodlands. *Journal of Human Evolution*, 53(4), pp.434–438.

Lieberman, D.E. et al., 2007. The evolution of endurance running and the tyranny of ethnography: A reply to Pickering and Bunn (2007). *Journal of Human Evolution*, 53(4), pp.439–442.

“How running made us human: Endurance running let us evolve to look the way we do.” *Science Daily*. 11/24/2004.
<https://www.sciencedaily.com/releases/2004/11/041123163757.htm>

ACTIVITY:

Harvard Skeletal Biology and Biomechanics Lab, Human Evolutionary Department
Measure endurance running traits of classmates

Jul 12, Class 6: Tool-making and other new tricks

BACKGROUND READING:

Shea, J.J., 2017. Occasional, obligatory, and habitual stone tool use in hominin evolution. *Evolutionary Anthropology*, 26(5), pp.200–217.

“Stone Cold Science.” B. Alex. *Discover Magazine*. P 64-68. 11/2017.

DISCUSSION READING:

Putt, S.S. et al., 2017. The functional brain networks that underlie Early Stone Age tool manufacture. *Nature Human Behavior*, 1, pp.1–8.

Putt, S.S., 2017. Brain-imaging modern people making Stone Age tools hints at evolution of human intelligence. *The Conversation*, pp.1–5. <https://theconversation.com/brain-imaging-modern-people-making-stone-age-tools-hints-at-evolution-of-human-intelligence-77231>

“Brain scans suggest our unique, human-like thought evolved 1.8 million years ago.” *WIRED*. 5/9/2017. <http://www.wired.co.uk/article/human-thought-evolve-date-time>

“Stone-age men were first ‘pianists,’ say experts.” *The Yorkshire Post*. 5/8/2017. <https://www.yorkshirepost.co.uk/news/stone-age-men-were-first-pianists-say-experts-1-8532779>

ACTIVITY:
Harvard Anthropology Department
Experimentally make stone tools

DUE FRIDAY 13 JULY: Research paper proposal

Week 4 – Modern humans, Neanderthals, and more

- How did modern humans compare to Neanderthals and Denisovans in terms of morphology, behavior, and genetics?
- How do we define “modern humans” and where/when did they emerge?
- Why did Neanderthals and other human types go extinct?

Jul 17, Class 7: Neanderthals and Denisovans

BACKGROUND READING:
Roebroeks, W. & Soressi, M., 2016. Neandertals revised. *Proceedings of the National Academy of Sciences*, 113(23), pp.6372–6379.

Nowell, A., 2010. Defining Behavioral Modernity in the Context of Neandertal and Anatomically Modern Human Populations. *Annual Review of Anthropology*, 39(1), pp.437–452.

“Meet the Denisovans.” B. Alex. *Discover Magazine*. 12/2016.

DISCUSSION READING:
Finlayson, C. et al., 2012. Birds of a Feather: Neandertal Exploitation of Raptors and Corvids M. D. Petraglia, ed. *PLOS ONE*, 7(9), p.e45927.

“Caveman Couture: Neandertals Rocked Dark Features.” *Scientific American*. 9/19/2012. <https://blogs.scientificamerican.com/observations/caveman-couture-neandertals-rocked-dark-feathers/>

“Neandertals used features as ‘personal ornaments.’” 9/17/2012. *BBC News*. <http://www.bbc.com/news/science-environment-19623929>

ACTIVITY:
Harvard Peabody Museum

Compare artifacts made by *Homo erectus*, Neanderthals, and modern humans (**handle real stone tools up to 1 million years old!**)

Jul 19, Class 8: *Homo sapiens*

BACKGROUND READING:

Stringer, C., 2012. Evolution: What makes a modern human. *Nature*, 485(7396), pp.33–35.

Ch 19, “Chimpanzee Cognition and the Roots of the Human Mind,” A. Rosati. In *Chimpanzees and Human Evolution*. Muller, M.N., Wrangham, R.W. & Pilbeam, D., 2017. Cambridge, MA: Harvard University Press.

DISCUSSION READING:

Hublin, J.-J. et al., 2017. New fossils from Jebel Irhoud, Morocco and the pan-African origin of *Homo sapiens*. *Nature*, 546(7657), pp.289–292.

Stringer, C. & Galway-Witham, J., 2017. On the origin of our species. *Nature*, 546, pp.212–214.

“World’s oldest *Homo sapiens* fossils found in Morocco.” A. Gibbons. *Science*. 6/7/2017. <http://www.sciencemag.org.ezp-prod1.hul.harvard.edu/news/2017/06/world-s-oldest-homo-sapiens-fossils-found-morocco>

“Scientists Have Found the Oldest Known Human Fossils.” E. Yong. *The Atlantic*. 7/7/2017. <https://www.theatlantic.com/science/archive/2017/06/the-oldest-known-human-fossils-have-been-found-in-an-unusual-place/529452/>

ACTIVITY:

Human Evolutionary Biology collections

Compare skeletal morphology of Neanderthals, modern humans, and other archaic *Homo*

Week 5 – Language, symbolism, and global spread

- When and why did humans gain the capacity for symbolic thought? How can we detect this with archaeological, fossil, or genetic data?
- How does human language differ from animal communication systems? How can we study the evolution of language?
- When did modern humans spread to different parts of the planet? What biological and cultural adaptations were necessary?

Jul 24, Class 9: Language and symbolism

BACKGROUND READING:

Ch 21, “Communication and Language.” K.E. Slocombe and T. Scott-Phillips. In *Chimpanzees and Human Evolution*. Muller, M.N., Wrangham, R.W. & Pilbeam, D., 2017. Cambridge, MA: Harvard University Press.

DISCUSSION READING:

Dediu, D. & Levinson, S.C., 2013. On the antiquity of language: the reinterpretation of Neanderthal linguistic capacities and its consequences. *Frontiers in psychology*, 4, pp.1–17.

“Scientists say our languages might preserve Neanderthal talk.” J. Viegas. *NBC News*. 7/11/2013. <https://www.nbcnews.com/science/science-news/scientists-say-our-languages-might-preserve-neanderthal-talk-f6C10604072>

“How Complex Was Neanderthal Speech?” M. Ettliger. *Slate*. 8/22/2013. http://www.slate.com/blogs/quora/2013/09/22/how_complex_was_neanderthal_speech.html

“Did Neanderthals Speak?” N.H. Lents. *The Human Evolution Blog*. <https://thehumanevolutionblog.com/2015/02/09/did-neanderthals-speak/>

ACTIVITY:

Collaborative Quiz 2

Jul 26, Class 10: Modern humans everywhere

BACKGROUND READING:

Nielsen, R. et al., 2017. Tracing the peopling of the world through genomics. *Nature*, 541(7637), pp.302–310.

DISCUSSION READING:

Holen, S.R. et al., 2017. A 130,000-year-old archaeological site in southern California, USA. *Nature*, 544(7651), pp.479–483.

Hovers, E., 2017. Unexpectedly early signs of Americans. *Nature*, 544, p.420.

“Controversial study claims humans reached Americas 100,000 years earlier than thought.” E. Callaway. *Nature*. 4/26/2017. <https://www-nature-com.ezp-prod1.hul.harvard.edu/news/controversial-study-claims-humans-reached-americas-100-000-years-earlier-than-thought-1.21886>

“A New Study Says Humans Were in Americas 130,000 Years Ago.” E. Yong. *The Atlantic*. 4/26/2017. <https://www.theatlantic.com/science/archive/2017/04/new-study-puts-humans-in-america-100000-years-earlier-than-expected/524301/>

ACTIVITY:

Harvard Developmental and Evolutionary Genetics Lab, Human Evolutionary Bio Tour of genetics laboratory

DUE FRIDAY 27 JULY: Research paper comprehensive outline

Week 6 – Settling down: agriculture and living humans

- What changes do species undergo during the domestication process?
- What were the causes and consequences of humans adopting agriculture?
- What traits are shared by all living humans? How do living human populations differ at a biological level?
- Do ethnicity, ancestry, and race have biological meanings?

Jul 31, Class 11: From foragers to farmers

BACKGROUND READING:

Diamond, J., 2002. Evolution, consequences and future of plant and animal domestication. *Nature*, 418, pp.700–707.

Dugatkin, L. & Trut, L., 2017. How to Tame a Fox and Build a Dog. *American Scientist*, 105(4), pp.240. <https://www.americanscientist.org/article/how-to-tame-a-fox-and-build-a-dog>

DISCUSSION READING:

What research talk: “Domestication and Human Evolution – Did *Homo sapiens* self-domesticate.” R. Wrangham. <https://www.youtube.com/watch?v=acOZT240bTA>

“How humans (maybe) domesticated themselves.” E. Engelhaupt. *Science News*. 7/6/2017. <https://www.sciencenews.org/article/how-humans-maybe-domesticated-themselves>

Cieri, R.L. et al., 2014. Craniofacial Feminization, Social Tolerance, and the Origins of Behavioral Modernity. *Current Anthropology*, 55(4), pp.419–443.

ACTIVITY:

Harvard Zooarchaeology Laboratory, Peabody Museum
Analyze bones of domesticated and wild species

Aug 2, Class 12: Variation among living humans

BACKGROUND READING:

Jorde, L.B. & Wooding, S., 2004. Genetic variation, classification and “race.” *Nature Genetics*, 36(11), pp.S28–S33.

DISCUSSION READING:

Chapter 6, “Race and Ancestry: How Our Genes Connect and Divide Us.” In *DNA is not destiny*, Heine, S.J., 2017. New York: W.W. Norton & Company.

Royal, C.D. et al., 2010. Inferring Genetic Ancestry: Opportunities, Challenges, and Implications. *The American Journal of Human Genetics*, 86(5), pp.661–673.

Jobling, M.A., Rasteiro, R. & Wetton, J.H., 2015. In the blood: the myth and reality of genetic markers of identity. *Ethnic and Racial Studies*, 39(2), pp.142–161.

ACTIVITY:
Final paper presentations
Feedback, reflections on classmates presentations

DUE TUESDAY AUGUST 7: Final Research paper