ANTHROPOLOGY 617: EVOLUTIONARY PROCESSES IN HUMAN EVOLUTION
SPRING 2019 (CLASS 96395)
WEDNESDAY 2:45-5:35, AS 117C

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Office hours: Tuesdays, 1:30 to 3:30 pm, or by appointment. (NOTE: The best way to reach me is to come to office hours. The next best way is by e-mail. However, please be aware that I receive a large volume of student e-mail and I am unlikely to respond right away.)

COURSE DESCRIPTION

Natural Selection is not Evolution.
- Ronald Fisher

That evolution involves non-adaptive differentiation to a large extent at the subspecies and even the species level is indicated by the kinds of differences by which such groups are actually distinguished by systematics. It is only at the subfamily and family levels that clear-cut adaptive differences become the rule. The principal evolutionary mechanism in the origin of species must thus be an essentially nonadaptive one.
- Sewall Wright

Fitness is a bugger.
- J.B.S. Haldane

Fisher, Wright, and Haldane demonstrated how natural selection could occur under Mendelian genetics, helping to develop the modern evolutionary synthesis. Fisher's quote from the beginning of *The Genetical Theory of Natural Selection* is thus not a repudiation of evolution or natural selection, but rather a recognition that evolution is more than just natural selection. Extending this, Wright thought that although natural selection is a powerful evolutionary force, it is probably not involved in most speciation events. And Haldane pithily summed up the difficulty in actually quantifying the one thing that natural selection is meant to optimize: fitness. But rightly or wrongly, paleoanthropologists have historically focused on natural selection explanations for the patterns of variation observed within the tribe Hominini (hominins being humans and those extinct species which are more closely related to us than to our closest living relatives, the chimpanzees and bonobos). Population geneticists, on the other hand, have generally stressed the primary role of non-adaptive forces in producing inter-population diversity. This semester we will explore historical and current thinking on the various forces of evolution and their role in human evolution, from both theoretical and analytical perspectives.

This course will use a discussion format, and you and your fellow students are responsible for leading and participating in the discussions – the best way to learn this material is to make efforts to explain it to others! Do not expect me to give lectures during which you can be passive note-takers. This course will be enjoyable and successful for you only if every student actively participates. Read each article closely and be prepared to comment on all of them during every class.

The prerequisite for this course is graduate standing in the Department of Anthropology or permission of the instructor.

REQUIRED READINGS

We will be reading Thomas Kuhn's *The Structure of Scientific Revolutions* as well as a set of articles, some of which will be selected by you in consultation with me. Those readings that I've already selected are included in the course schedule at the end of this syllabus.

COURSE WEBSITE

The course website can be found on Blackboard. Readings and announcements will be posted there. Check the website regularly for announcements about changes to office hours, readings, or anything else important.

GRADING

This course uses the A-E grade system. Your final grade is determined based on the following components:

leading discussion:	**30%**	**research project:**	**30%**
class participation:	**20%**	**final presentation:**	**20%**

Leading discussion of readings (30%): Starting on the third week of class, each week's discussion will be led by a student. The student leading discussion will rotate each week and everyone will lead discussion multiple times over the course of the semester. By the Wednesday in the week before a student leads discussion, that student will have met with me to finalize discuss points that should be highlighted in their presentation and discussion and prepared a list of reading questions to distribute to the class. ALL students will carefully read all of the assigned readings, while that week's discussion leaders will be responsible for guiding the class discussion. In addition, each student will choose a topic to cover in one of the final weeks of class, for which they will come up with a reading list and reading questions in consultation with me, and they will lead discussion on that topic.

Class participation (20%): Do the assigned readings before coming to class and be prepared to participate. Everyone must participate in the discussions – it is NOT acceptable to let all the others do the talking and not comment or ask questions. I will take note of who makes comments and asks questions. You are not expected to be an expert in the topics of discussion. You ARE expected to ask questions and make comments during class to show me that you are making an effort to understand the material, regardless of background, interest, amount of sleep, *etc*. DO NOT rely on the discussion leader or me to do all of the discussing. Everyone should think about the readings – relevance, importance, unresolved questions, confusing bits, *etc*. – and talk about these things in class. To reiterate: it's fine if you don't understand everything in the readings, but be sure to clearly identify what in particular you don't understand so that we can have a productive discussion about it.

Research project (30%): I expect all students to complete an independent research project during the course of the semester. The nature of the project is flexible: it may be a test of an evolutionary question using primary or secondary data written in the form of a scientific journal article, an in-depth literature review on a focused topic, or a detailed proposal for a specific evolutionary research project. Projects must be related to the topics discussed in this class in some way, although ideally they will also be relevant to your M.A. project, dissertation research, *etc*. I expect each of you to meet with me during my office hours by week 6 to discuss your project topic. Class during week 10 is designated as a research day for your projects; we will not meet as a class that day, but you should take this time to work on your projects.

Analytical projects should be written in scientific journal format, with an abstract, introduction, materials and methods, results, and discussion. Literature reviews should also be written in the style of

a scientific review article for a scientific journal. Proposals should be written in the form of a NSF Doctoral Dissertation Improvement Grant Proposal. In all cases, the project should be contextualized in terms of the relevant literature. Papers will be graded on content, style, and grammar. Papers are due on Wednesday, May 8th at the beginning of class.

Presentation of research project (20%): During the last class meeting, students will present their research projects to the rest of the class in the form of a PowerPoint presentation, after which the rest of the class will ask questions of each presenter. Due to the small size of this class we have some flexibility with the length of the presentations, so we'll discuss that component of it once people have settled on the type of project that they're doing. You will be graded on the clarity of your verbal presentation, your ability to handle questions, and the clarity of your slides. Presentations should provide a brief introduction and contextualization, but should focus on the results and implications of the research if applicable. Your slides should reinforce your talk without distracting the audience. For example, in general you should limit yourself to one figure per slide, include minimal text (just a few bullet points per slide, no paragraphs), and any text that you do have should be large and easily readable (*i.e.*, 20 point font or larger).

Attendance: Attendance is mandatory. Poor attendance suggests you are not committed to doing well in the course. I will allow excused absences in the case of religious holidays, documented illness, professional conferences, and possibly other activities, but please let me know about these absences with as much advance notice as possible. I understand that people have family emergencies, have car trouble, *etc*., and that sometimes you simply can't make class. Please just let me know why you missed class. If you have more than one unexcused absence, I reserve the right to deduct 5% from your final grade for each additional absence. Please be aware that even if you have an excused absence you are still expected to complete all of the readings for all classes. If for some reason you will miss a class for which you are scheduled to lead the discussion, it is your responsibility to find someone to trade with you – if you fail to do so, you will automatically get a zero for leading discussion that day.

ACADEMIC INTEGRITY

Academic dishonesty of any kind will not be tolerated in this course. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information or citations, facilitating acts of academic dishonesty by others, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Students who are found to be academically dishonest will receive academic sanctions as outlined in the university's Graduate Regulations and Degree Requirements:

http://www.albany.edu/graduatebulletin/requirements_degree.htm#penalties

STUDENTS WITH DISABILITIES

If you have special needs, please notify me immediately; I will be happy to work with you. Let me know if you anticipate needing any type of special accommodation in this course or have questions about physical access. For more information about "reasonable accommodation", please see the Disability Resource Center's Reasonable Accommodation Policy:

http://www.albany.edu/disability/docs/RAP.pdf

MAJOR DEADLINES

Wednesday, Feb. 27th: Meet with me by this date to discuss research project
Wednesday, May 8th: Final research presentation in class, and research papers due at the beginning of class – no exceptions

COURSE SCHEDULE

The topic and readings for each week are provided below. Topics and readings for the later weeks of the course will be determined by the students leading discussion that week in consultation with me. Please note that this schedule is subject to change.

WEEK	TOPIC	READINGS
1: 1/23	Introduction (The Forces of Evolution)	
2: 1/30	Paradigms in Human Evolution	Kuhn, 1962 Tattersall, 2012
3: 2/6	Natural Selection and Genetic Drift	Gould and Lewontin, 1979 Clutton-Brock and Harvey, 1979 Cavalli-Sforza *et al.*, 1964 Lande, 1976
4: 2/13	Mutation and Gene Flow	Wright, 1932 Scally and Durbin, 2012 Arnold and Kunte, 2017
5: 2/20	Reconstructing Phylogeny	Szalay, 1981 Cracraft, 1981 Folinsbee *et al.*, 2015 Holder and Lewis, 2003
6: 2/27	Hominin Phylogeny	Mayr, 1950 Rogers and Gibbs, 2014 McNulty, 2016 Wood and Collard, 1999 Strait *et al.*, 2015
7: 3/6	Macroevolution	Eldredge *et al*., 2005 Vrba, 2005 Jablonski, 2017 Potts, 1998
8: 3/13	Heterochrony	McNamara and McKinna, 2005 Webster and Zelditch, 2005 Godfrey and Sutherland, 1996
9: 3/20	**NO CLASS (SPRING BREAK)**	
10: 3/27	**RESEARCH DAY (AAPA)**	
11: 4/3	Evolutionary Constraints and Lines of Least Resistance	Hoffmann, 2014 Futuyma, 2010 Schluter, 1996 Ungar and Hlusko, 2016

12: 4/10	Role of Genetic Drift in Human Evolution	Smith, 2011 Ackermann and Cheverud, 2004 Schroeder and Ackermann, 2017
13: 4/17	Student Topic 1	TBD
14: 4/24	Student Topic 2	TBD
15: 5/1	Student Topic 3	TBD
16: 5/8	FINAL PRESENTATIONS	

Some possible additional topics: models of modern human origins, macroevolutionary models of multivariate correlated response to selection, identifying evolutionary forces in modern human population diversification

FULL CITATIONS FOR READINGS

Ackermann RR and Cheverud JM. 2004. Detecting genetic drift versus selection in human evolution. *Proceedings of the National Academy of Sciences USA*. 101:17946–17951.

Arnold ML and Kunte K. 2017. Adaptive genetic exchange: a tangled history of admixture and evolutionary innovation. *Trends in Ecology and Evolution*. 32:601-611.

Cavalli-Sforza LL, Barrai I, and Edwards AWF. 1964. Analysis of human evolution under random genetic drift. *Cold Spring Harbor Symposia on Quantitative Biology*. 29:9-20.

Clutton-Brock TH and Harvey PH. 1979. Comparison and adaptation. *Proceedings of the Royal Society of London B*. 205:547-565.

Cracraft J. 1981. Pattern and process in paleobiology: the role of cladistics analysis in systematic paleontology. *Paleobiology*. 7:456-468.

Eldredge N, Thompson JN, Brakefield PM, Gavrilets S, Jablonski D, Jackson JBC, Lenski RE, Lieberman BS, McPeek MA, and Miller III W. 2005. The dynamics of evolutionary stasis. *Paleobiology*. 31:133-145.

Folinsbee KE, Evans DC, Fröbisch J, Tsuji LA, and Brooks DR. 2015. Quantitative approaches to phylogenetics. *in* Henke W and Tattersall I (eds.): *Handbook of Paleoanthropology*. p. 167-215.

Futuyma DJ. 2010. Evolutionary constraint and ecological consequences. *Evolution*. 64:1865–1884.

Godfrey LR and Sutherland MR. 1996. Paradox of peramorphic paedomorphosis: heterochrony and human evolution. *American Journal of Physical Anthropology*. 99:17-42.

Gould SJ and Lewontin RC. 1979. The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme. *Proceedings of the Royal Society of London B*. 205:581-598.

Hoffmann A. 2014. Evolutionary limits and constraints. in Losos JB, Baum DA, Futuyma DJ, Hoekstra HE, Lenski RE, Moore AJ, Peichel CL, Schluter D, and Whitlock MC (eds.): *The Princeton Guide to Evolution*. p. 247-252.

Holder M and Lewis PO. 2003. Phylogeny estimation: traditional and Bayesian approaches. *Nature Reviews Genetics*. 4:275-284.

Jablonski D. 2017. Approaches to macroevolution: 1. General concepts and origin of variation. *Evolutionary Biology*. 44:427-450.

Kuhn T. 1962. *The structure of scientific revolutions*. Chicago: University of Chicago Press.
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McNamara KJ and McKinney ML. 2005. Heterochrony, disparity, and macroevolution. *Paleobiology*. 31:17-26.
McNulty KP. 2016. Hominin taxonomy and phylogeny: what's in a name? *Nature Education Knowledge*. 7(1):2.
Potts R. 1998. Variability selection in hominid evolution. *Evolutionary Anthropology*. 7:81-96.
Rogers J and Gibbs RA. 2014. Comparative primate genomics: emerging patterns of genome content and dynamics. *Nature Reviews Genetics*. 15:347-359.
Scally A and Durbin R. 2012. Revising the human mutation rate: implications for understanding human evolution. *Nature Reviews Genetics*. 13:745-753.
Schluter D. 1996. Adaptive radiation along genetic lines of least resistance. *Evolution*. 50:1766-1774.
Schroeder L and Ackermann RR. 2017. Evolutionary processes shaping diversity across the *Homo* lineage. *Journal of Human Evolution*. 111:1-17.
Smith HF. 2011. The role of genetic drift in shaping modern human cranial evolution: a test using microevolutionary modeling. *International Journal of Evolutionary Biology*. 201:145262. doi:10.4061/2011/145262
Strait D, Grine FE, and Fleagle JG. 2015. Analyzing hominid phylogeny. *in* Henke W and Tattersall I (eds.): *Handbook of Paleoanthropology*. p. 1781-1806.
Szalay FS. 1981. Functional analysis and the practice of the phylogenetic method as reflected by some mammalian studies. *American Zoologist*. 21:37-45.
Tattersall I. 2012. Paleoanthropology and evolutionary theory. *History and Philosophy of the Life Sciences*. 34:259-281.
Ungar PS and Hlusko LJ. 2016. The evolutionary path of least resistance. *Science*. 353:29-30.
Vrba ES. 2005. Mass turnover and heterochrony events in response to physical change. *Paleobiology*. 31:157-174.
Webster M and Zelditch ML. 2005. Evolutionary modifications of ontogeny: heterochrony and beyond. *Paleobiology*. 31:354-372.
Wood B and Collard M. 1999. The human genus. *Science*. 284:65-71.
Wright S. 1932. The roles of mutation, inbreeding, crossbreeding and selection in evolution. *in* Jones DF (ed.): *Proceedings of the Sixth International Congress of Genetics, Vol. I*. p. 256-266.