

# ANTHROPOLOGY 483: EVOLUTIONARY BIOLOGY FOR ANTHROPOLOGISTS

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THE UNIVERSITY OF TENNESSEE – KNOXVILLE  
SPRING 2019

**TIME:** TUESDAYS AND THURSDAYS, 2:10 – 3:25 P.M.

**LOCATION:** 504C STRONG HALL

**INSTRUCTOR:** DR. BENJAMIN M. AUERBACH

**CONTACT INFORMATION**

OFFICE: 416 STRONG HALL

OFFICE HOURS: WEDNESDAYS, 11:00 A.M. – 12:00 P.M. OR BY APPOINTMENT

E-MAIL: AUERBACH@UTK.EDU

(DR. AUERBACH DOES NOT READ E-MAILS BETWEEN 7 P.M. AND 8 A.M.)

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**COURSE AT-A-GLANCE**

- The course emphasizes literacy and conversancy in basic concepts of evolutionary theory and its applications to anthropological inquiry.
- Students will learn about current topics in anthropology, including morphological integration, species concepts, hybridity, and pattern versus process in evolution.
- Students are expected to engage in classroom discussions and develop critical evaluation skills concerning scientific studies.
- Evaluation takes the form of weekly short answer assignments and two take-home essay exams.

**IMPORTANT SUBMISSION DEADLINES**

Note that late submissions will not be graded.

**Each Friday at 2:00 P.M. (with some exceptions):** Weekly Responses [via e-mail](#)

**10 February at 5:00 P.M.:** Critical response to *The Eugenics Crusade* [via e-mail](#)

**10 March at 5:00 P.M.:** Take-home midterm exam [via Canvas](#)

**31 March at 5:00 P.M.:** Critical response to *Your Inner Fish* [via e-mail](#)

**3 May at 5:00 P.M.:** Take-home final exam [via Canvas](#)

**COURSE DESCRIPTION**

Evolutionary studies are fundamental to biological anthropology, and anthropological disciplines have used concepts derived from evolutionary theory to develop a variety of approaches to research questions. Research from paleoanthropology to modern human ecology relies on a thorough understanding of evolutionary theory and modeling. Thus, any person planning to pursue anthropology as a professional should possess a background in evolutionary biology.

This lecture course provides you, advanced undergraduate students, with a fundamental background in evolutionary biology, both from historical and modern theoretical perspectives. Whenever possible, examples from anthropology are used to illustrate ideas and processes. Concepts covered (see the course schedule below) include the history of evolutionary theory, systematics, variation, forces of evolution, evolution in the fossil record, species & species concepts, pattern and process, and EvoDevo. While none of these topics will be explored exhaustively, you will learn about fundamental concepts for each subject and be provided with the tools with which to investigate them further, both independently and in more advanced graduate studies.

### COURSE OBJECTIVES

By the end of this course, you will:

- develop an appreciation for the scientific inquiry that led to major developments in evolutionary biology;
- procure a thorough understanding of basic evolutionary theory, including mechanisms and the origins of biological diversity;
- appreciate the scales at which evolutionary biology operates, from the molecular level to the fossil record;
- pursue critical application of evolutionary processes to understanding of human evolution and cultural history.

### COURSE STRUCTURE

Classes will meet twice each week unless noted otherwise in the Course Schedule (see below). The course is structured as an upper-division lecture. Dr. Auerbach will formally introduce major themes and subjects, but you are expected to contribute to the class by participating in discussions about those ideas. On all meeting days of the course, Dr. Auerbach will lecture on the main points of the topic(s) covered by the readings (though not necessarily on all the details of the readings). **It is in your interest to take notes.** Dr. Auerbach *will not* make lecture notes available.

Please note that Dr. Auerbach will be away at professional workshops and conferences throughout the semester. You will be expected to watch two documentaries (*Your Inner Fish* and *The Eugenics Crusade*) outside of class in lieu of lecture and write a critical response paper (see the Evaluation section below).

### COURSE READINGS

All course readings will be made available via PDFs on Canvas. You may wish to look into acquiring a copy of Futuyma & Kirkpatrick's *Evolution*, though this is not required.

Ackermann RR. 2019. Reflections on the history and legacy of scientific racism in South African paleoanthropology and beyond. *Journal of Human Evolution* 126:106-111.

Ackermann RR, Mackay A, Arnold ML. 2016. The hybrid origin of "modern" humans. *Evolutionary Biology* 43:1-11.

- Auerbach BM. 2012. Skeletal variation among early Holocene North American humans: implications for origins and diversity in the Americas. *American Journal of Physical Anthropology* 149:525-536.
- Black E. 2003. *War Against the Weak*. New York: Dialog Press.
- Boughner JC, and Rolian C (editors). 2016. *Developmental Approaches to Human Evolution*. New York: Wiley-Blackwell.
- Browne J. 2006. *Darwin's Origin of Species: A Biography*. New York: Atlantic Monthly Press.
- Futuyma DJ, and Kirkpatrick M. 2017. *Evolution*. Fourth edition. Sunderland, MA: Sinauer Associates, Inc.
- Green RM, Fish JL, Young NM, Smith FJ, Roberts B, Dolan K, Choi I, Leach CL, Gordon P, Cheverud JM, Roseman CC, Williams TJ, Marcucio RS, and Hallgrímsson B. 2017. Developmental nonlinearity drives phenotypic robustness. *Nature Communications* 8:1970.
- Hunley KL, and Cabana GS. 2016. Beyond serial founder effects: the impact of admixture and localized gene flow on patterns of regional genetic diversity. *Human Biology* 88:219-231.
- Lewontin R. 2000. *The Triple Helix: Gene, Organism, and Environment*. Cambridge, MA: Harvard University Press.
- Marks J. Ten facts about human variation. In: *Human Evolutionary Biology* (Muehlenbein MP, editor). Cambridge: Cambridge University Press. pp. 265-276.
- Roseman CC. 2014. Troublesome reflection: racism as the blind spot in the scientific critique of race. *Human Biology* 86:233-240.
- Roseman CC, and Auerbach BM. 2015. Ecogeography, genetics, and the evolution of human body form. *Journal of Human Evolution* 78:80-90.
- Ruff CB. 1994. Morphological adaptation to climate in modern and fossil hominids. *Yearbook of Physical Anthropology* 37:65-107.
- Savell KRR, Auerbach BM, and Roseman CC. 2016. Constraint, natural selection, and the evolution of human body form. *Proceedings of the National Academy of Sciences USA* 113:9492-9497.
- Schroeder L, and Ackermann RR. 2016. Evolutionary processes shaping diversity across the *Homo* lineage. *Journal of Human Evolution* 111:1-17.
- Shanker K, Vijayakumar SP, and Ganeshiah KN. Unpacking the species conundrum: philosophy, practice and a way forward. *Journal of Genetics* 96:413-430.
- Weiss KM, and Buchanan AV. 2004. *Genetics and the Logic of Evolution*. New York: Wiley-Liss.
- Weiss KM, and Fullerton SM. 2005. Racing around, getting nowhere. *Evolutionary Anthropology* 14:165-169.

### ATTENDANCE POLICY

You are expected to attend all lectures barring legitimate professional, athletic, religious, legal or medical reasons. If lectures must be missed, Dr. Auerbach should be contacted at minimum 24 hours before class meets. **Students who have more than three unexcused absences from class will be docked one letter grade for the final course grade.**

### COURSE WEB SITE

All course materials, including supplemental readings, will be available online from the course Canvas site (online.utk.edu). **Please do not submit any assignments to Dr. Auerbach via Canvas. All assignments should be turned into Dr. Auerbach via e-mail. Exams will be submitted to Dr. Auerbach through Canvas using the Unicheck software.**

## **STUDENTS WITH SPECIAL NEEDS**

If you require accommodation because of special needs in learning, please contact the Office of Disability Services at 2227 Dunford Hall (974-6087). Please also contact Dr. Auerbach immediately via e-mail after you register with the Office of Disability Services. Arrangements will be made to adjust the course to fit your needs.

## **EVALUATION**

You should expect to engage topics with critical thinking, in addition to developing a fundamental understanding of key evolutionary concepts. You are expected to synthesize information presented in readings and in class, in order to develop well-supported arguments about the primary ideas introduced throughout the course. Evaluation of your performance will rest on participation in class, weekly response assignments, two critical essays, and the completion of two take-home exams.

See the first page of the syllabus for the directions and deadlines for submitting assignments and examinations to Dr. Auerbach.

## ***PARTICIPATION AND WEEKLY RESPONSES (30%)***

You should come to class fully prepared. This means that all of the readings provided must be read before coming into class, so that you benefit from lectures to gain a deeper understanding of the material covered. Your participation—asking questions and contributing information in class—is encouraged throughout the course. Your participation will require you to be able to develop informed arguments based on the information you have read.

Short answer responses to assigned questions are due at the end of each week. Dr. Auerbach will give prompts for each week. **You should answer the question independently, but you are allowed to discuss the concepts with other students in the course. However, do not write your responses collaboratively.** These responses reflect what you are learning in the course, and will help Dr. Auerbach address areas of misunderstanding or knowledge gaps throughout the semester.

There are a few Fridays in which you do not need to submit a weekly response: **11 January, 8 February, 29 March, and 12 April.**

## ***RESPONSE PAPERS (10% EACH)***

In February, you are required to critically watch the PBS documentary *The Eugenics Crusade* (2 hours), and in late March, watch Neil Shubin's *Your Inner Fish* three-part documentary (3 hours) outside of class. Classes these weeks are cancelled because Dr. Auerbach is away. *The Eugenics Crusade* covers much of the material that is also provided in the readings for that week, concerning the methods by which evolutionary theory was perverted toward structural racism and legal policy in favor of negative eugenic beliefs. Dr. Shubin's series covers many basic principles of modern evolutionary thought, including how developmental models and genotype-phenotype mapping have allowed a more

complete understanding of organismal morphology. After watching each series, you should write a brief (up to four page) argumentative response paper in response to one of a choice of prompts provided by Dr. Auerbach. Dr. Auerbach will explain this paper in more detail in class.

### ***TAKE-HOME EXAMINATIONS (25% EACH)***

Two short answer and essay exams will be administered during the semester, which you will complete outside of class. In these, you will need to be able to identify key concepts and individuals in evolutionary theory. The exams will only cover the information for that section, though be aware that many concepts (e.g., forces of evolution) will be emphasized throughout the course. Each exam will also have one or two brief essay questions, which will ask you to synthesize the ideas that you have encountered through lectures and reading. Synthesizing knowledge will be given priority on all exam questions. Grading guidelines are found at the end of this syllabus in the Appendix.

As these are take-home exams, you are expected to be able to look up and draw on sources to fully respond to questions. **UNLIKE WEEKLY RESPONSES, THESE ARE NOT COLLABORATIVE.** You must complete the exams independently; if you collaborate with other students, or if you plagiarize your responses, you will receive a score of zero on the exam.

**FINAL GRADES ARE NOT NEGOTIABLE.  
NO EXTRA CREDIT IS AVAILABLE.**

**Academic honesty:** Simply, don't cheat. Evolutionary knowledge is an awesome asset, and it is hoped that you will find the discovery of this information extremely rewarding. Follow the guidelines for each of the assignments and you'll reap long-term benefits. Assignments or exams found to be plagiarized or resulting from academic dishonesty will assigned a grade of zero.

### **ATTENDANCE, SUBMISSION AND MAKE UP POLICY**

Short of legitimate athletic, religious, legal or medical reasons, you will not be eligible to take examinations at any time other than those that are officially designated. Exams and assignments **must** be submitted at the deadline time. Late submissions (without prior permissions for extensions from Dr. Auerbach) will be assigned a grade of zero.

### **TIPS FOR GETTING THE MOST OUT OF THE COURSE**

As a crucial part of this course is keeping up with the reading before class meetings, you need to give ample time to reflect on the perspectives presented in the textbook and papers you read. You are *strongly* encouraged to read broadly, looking into additional sources to help you better develop an understanding of the topics covered. An excellent place to start is always in the references cited within the assigned readings. Dr. Auerbach is also available to point you toward additional resources as specific questions arise.

## COURSE SCHEDULE: Evolutionary Biology for Anthropologists (ANTH 483) – SPRING 2019

DATE	TOPIC	READINGS
10 January	Introduction to the course How to make critical arguments	Weiss & Fullerton 2005
<b>PART ONE</b>		<b>FUNDAMENTALS OF EVOLUTION</b>
15 January	Getting started: Concepts and analytic approaches	Weiss & Buchanan, Chapter 2
17 January	A brief history of evolution	Futuyma & Kirkpatrick, Chapter 1 Browne (optional reading)
22 January	What evolves: phenotypic evolution	Weiss & Buchanan, Chapter 3 Futuyma & Kirkpatrick, Chapter 6
24 January	How genes relate to phenotypes	Weiss & Buchanan, Chapters 4 and 5
29 January	Natural selection	Futuyma & Kirkpatrick, Chapter 3
31 January	Genetical theory of evolution	Futuyma & Kirkpatrick, Chapter 5
5 February	Perverting evolution: Eugenics	Black, Chapters 3-5 Marks 2012 Roseman 2014
7 February	NO CLASS ( <i>Dr. Auerbach at professional workshop</i> )	
10 February	<i>The Eugenics Crusade</i> Critical Response due by 5:00 P.M. via e-mail	
12 February	Genetic drift	Futuyma & Kirkpatrick, Chapter 7
14 February	Evolution in space	Futuyma & Kirkpatrick, Chapter 8
19 February	How to be fit, and why is there sex?	Futuyma & Kirkpatrick, Chapters 10 & 11

<b>DATE</b>	<b>TOPIC</b>	<b>READINGS</b>
21 February	Origins of diversity: gene evolution	Futuyma & Kirkpatrick, Chapter 14
26 February	Defining boundaries: genes, organisms and environments	Lewontin, Chapters 1 & 2
28 February	The triple helix	Lewontin, Chapters 3 & 4
1 March	Midterm Take-Home Examination posted	
5 March	Species and species concepts	Futuyma & Kirkpatrick, Chapter 9
7 March	Phylogenetics	Futuyma & Kirkpatrick, Chapter 16
10 March	Midterm Take-Home Examination due by 5:00 P.M. via Canvas	
<b>PART TWO</b>	<b>APPLYING EVOLUTIONARY THEORY TO ANTHROPOLOGICAL QUESTIONS</b>	
12 March	Returning to Evo-Devo	Boughner & Rolian, Chapters 1 & 13
14 March	Evo-Devo in the cranium and limbs	Boughner & Rolian, Chapters 2, 6 & 7
18-22 March	<b>SPRING BREAK</b>	
26 & 28 March	NO CLASS ( <i>Dr. Auerbach at AAPA Conference</i> )	
31 March	<i>Your Inner Fish</i> Critical Response due by 5:00 P.M. via e-mail	
2 April	Patterns in evolution: climate and human variation	Ruff 1994 Auerbach 2012
4 April	Dismantling patterns	Roseman and Auerbach 2015 Savell et al. 2016
9 April	NO CLASS ( <i>Dr. Auerbach at Experimental Biology Conference</i> )	

<b>DATE</b>	<b>TOPIC</b>	<b>READINGS</b>
11 April	Toward a more complete understanding of the origins of variance	Hallgrimsson et al. 2009 Green et al. 2017
16 April	The hybrid origins of hominids	Ackermann et al. 2016 Schroeder & Ackermann, 2017
18 April	Unpacking the problem of defining species	Shanker et al. 2017 Ackermann et al. (draft)
23 April	Future horizons: DNA, definitions, and ethics	Kaestle & Horsburgh 2002 Horsburgh 2015 Hunley and Cabana 2016
24 April	Final Take-Home Examination posted	
25 April	Democratizing science and evolutionary thinking	Ackermann 2019 Athreya & Ackermann 2019
3 May	Final Take-Home Examination due by 5:00 P.M. via Canvas	