

ANTHROPOLOGY 349D
ANTHROPOLOGICAL GENETICS
FALL 2014

COURSE INFORMATION: Unique #31580
TTh 11:00 am - 12:30 pm, SAC 4.118

COURSE INSTRUCTOR: Dr. Deborah Bolnick
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Phone: (512) 471-7532
Office Hours: SAC 4.148, Tuesday 12:30-2:30 pm *or by appointment*

TEACHING ASSISTANT: Lauren Springs
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Office Hours: SAC 4.166, Wednesday 1-3 pm *or by appointment*

COURSE DESCRIPTION:

This course explores the intersection of genetics and anthropology. We will cover the basic principles of molecular and population genetics as relates to the study of humans and non-human primates. We will discuss the ways in which genetics can contribute to the field of anthropology, as well as how anthropological knowledge can illuminate genetic research. This class will contain a mixture of lectures, class discussions of the assigned readings, and laboratory work. You will gain hands-on experience in genetic analysis, and you will learn to understand and evaluate molecular anthropology research. You will also improve your writing and critical thinking skills in this class.

WRITING FLAG:

This course carries the Writing Flag. Writing Flag courses are designed to give students experience with writing in an academic discipline. In this class, you can expect to write regularly during the semester, complete substantial writing projects, and receive feedback from your instructor and TA to help you improve your writing. You will also have the opportunity to revise one assignment (the research paper), and you will be asked to read and discuss your peers' work. You should expect a substantial portion of your grade to come from your written work. Writing Flag classes may be used to fulfill three hours of the communication component of the university core curriculum and meet the Core Communications objectives of Critical Thinking, Communication, Teamwork, and Personal Responsibility, established by the Texas Higher Education Coordinating Board.

INDEPENDENT INQUIRY FLAG:

This course carries the Independent Inquiry flag. Independent Inquiry courses are designed to engage you in the process of inquiry over the course of a semester, providing you with the opportunity for independent investigation of a question, problem, or project related to your major. You should therefore expect a substantial portion of your grade to come from the independent investigation and presentation of your own work.

COURSE REQUIREMENTS:

- 1. Exam 1 (20%).** The first exam on **October 7** will cover material from lectures, discussions, labs, *and* readings. The exam may include multiple choice, matching, short answer, and essay questions.
- 2. Exam 2 (20%).** The second exam on **November 25** will cover material presented in the lectures, discussions, labs, *and* readings following the first exam. Exam format will be similar to that of the first exam.
- 3. Short Writing Assignments (10%).** Five short writing assignments (1-1.5 pages each, double-spaced) will be given over the semester. In some assignments, you will reflect on the assigned readings before coming to a class discussion; in others, you will apply what you have learned in class to analyze a genetic dataset. These assignments will be graded based on the thought and effort you put into the assignment, and will give you the opportunity to receive some informal feedback on your writing. Assignments should be submitted electronically via the Assignments tab on the course website (in Canvas).
- 4. Class Participation (15%).** This portion of your grade will be based on your participation in class activities and discussions. On one discussion day, you will work with one other student to help lead the class discussion. Together, you will be responsible for (a) summarizing the main points of the readings for the class, and (b) providing questions to help guide the class discussion. This activity will make up 1/3 of your class participation grade.
- 5. Research Paper (30%).** The research paper (10-12 pages, double-spaced) will allow you to explore a relevant topic of your choice in more detail. A 2-page proposal plus bibliography (5%) is due on **October 21**. Part 1 of the paper (10%) is due on **November 11**. After receiving feedback, you will make revisions and submit your final research paper (15%) on **December 4**. Detailed instructions for the paper will be handed out in September. All components of the research paper will be submitted electronically via the Assignments tab on the course website (in Canvas).
- 6. Research Presentation (5%).** Each student will give a 7-8 minute presentation on the subject of their research paper on **Saturday, December 13 (9 am - 12 pm)**.

READINGS:

- Required: Relethford, John H. 2003. *Reflections of Our Past*. Boulder: Westview Press.
- Required: Course reader from Speedway Printing (715 West 23rd Street, 478-3334).
- Optional Reference: Relethford, John H. 2011. *Human Population Genetics*. Hoboken: John Wiley & Sons, Inc. *The electronic edition available through www.lib.utexas.edu.*

COURSE WEBSITE:

Class information, handouts, and a discussion forum will be available at the course website on Canvas (<http://canvas.utexas.edu>). Course updates will also be sent to your university e-mail account. Please check both regularly.

FEEDBACK POLICY:

I will periodically ask for feedback on your learning, including through anonymous surveys. It's important for me to know your reaction to what we do in class, so please respond to these surveys and help me create an effective environment for teaching and learning.

CLASSROOM POLICIES:

Every student has the right to learn and the responsibility to not deprive others of their right to learn. In order for you and your fellow students to get the most out of this class, please abide by the following policies:

- (1) Attend all classes and arrive on time whenever possible.
- (2) Do not use your cell phone, send emails, visit websites, or play games during class.
- (3) No audio or video recording of any lecture or class activity is permitted without my prior written approval. The materials used in this class — including, but not limited to, exams, handouts, Powerpoint slides, and homework assignments — are copyright protected works. Any unauthorized copying of class materials is a violation of federal law and may result in disciplinary actions being taken against you. Sharing class materials without my specific, written approval may also be a violation of the University's Student Honor Code and an act of academic dishonesty, which could result in further disciplinary action. This includes, among other things, uploading class materials to websites for the purpose of sharing those materials with other current or future students.
- (4) Please let me know if you have any problem that is preventing you from performing satisfactorily in this class.

GRADING POLICIES:

If an assignment is turned in late, the assignment grade will be lowered by 10% for each day that the assignment is late. If a serious issue (i.e. illness, family death, etc.) arises that may prevent you from attending class, turning in an assignment on time, or taking an exam, contact Dr. Bolnick by e-mail or phone as soon as possible to discuss an assignment extension or to schedule a make-up exam. Please note that I do not give extra credit assignments, so pay close attention to exam dates and assignment due dates.

Final letter grades will be assigned using the following scale: A (90-100%), B (80-89%), C (70-79%), D (60-69%), F (0-59%). Plus/minus grades will be assigned.

Re-grading Policy: If you believe that an exam or assignment has been graded incorrectly, submit a written request for a re-grade to Dr. Bolnick within one week of when the graded exam or assignment was returned. The written request should include an explanation of your position and be attached to the graded exam or assignment. If you suspect that a simple addition error was made, speak to the instructor or TA to have the error corrected.

Credit/No-Credit Policy: To receive credit for this course if you enrolled on the pass/fail basis, you must 1) take the two exams, 2) turn in a paper proposal, part 1 of the research paper, and final research paper, 3) complete at least three of the short writing assignments, and 4) receive the equivalent of a D or higher in this class.

Accommodations: Students with disabilities or a chronic illness may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities at <http://www.utexas.edu/diversity/ddce/ssd>, 512-471-6259 (voice), or 512-410-6644 (video phone). Please notify me as soon as possible of any accommodations that will be needed.

Academic Dishonesty: Each student in this course is expected to abide by the University of Texas Honor Code. Any work submitted by a student in this course for academic credit must be the student's own work. You are encouraged to study together and to discuss information with other students. You can give or receive “consulting” help, but one student should never have possession of a copy of all or part of the work done by someone else (in electronic or paper form). Should copying occur, both the student who copied work from another student and the student who gave material to be copied will automatically receive a zero for the assignment. Similarly, you must do your own work during exams. Any collaborative behavior during exams will result in failure of the exam. Any cheating or plagiarism will be reported to the Dean of Students, and the penalty may also include failure of the course and University disciplinary action. For more information, see <http://deanofstudents.utexas.edu/sjs> and <http://www.lib.utexas.edu/services/instruction/learningmodules/plagiarism>.

Religious Holy Days: By UT Austin policy, you should notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, exam, or assignment in order to observe a religious holy day, I will give you an opportunity to complete the missed work within a reasonable time after the absence.

Attendance: I do not formally take attendance, but I am aware of who comes to class and who does not. Attendance is necessary to earn points for class participation, and consistent attendance can help raise your grade if you end up with a borderline final grade. Whether or not you come to class, you are responsible for keeping up with what happens in class.

EMERGENCY EVACUATION POLICY:

Occupants of UT buildings are required to evacuate and assemble outside when a fire alarm is activated or an announcement is made. Emergency evacuation routes and emergency procedures can be found at: www.utexas.edu/emergency. Please be aware of these evacuation policies: (1) Familiarize yourself with exits to the classroom and building. The nearest exit may not be the one you used when you entered the building. (2) If you require assistance to evacuate, inform the instructor in writing during the first week of class. (3) In the event of an evacuation, follow the instructor's directions. (4) Do not re-enter a building unless you're given instructions by the Austin Fire Department, the UT Austin Police Department, or the Fire Prevention Services office.

BEHAVIOR CONCERNS ADVICE LINE (BCAL):

If you are worried about someone who is acting differently, you may use the Behavior Concerns Advice Line to discuss by phone your concerns about another individual's behavior. This service is provided through a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP), and The University of Texas Police Department (UTPD). Call 512-232-5050 or visit <http://www.utexas.edu/safety/bcal>.

SCHEDULE OF TOPICS, READINGS, AND IMPORTANT DATES:

(L) = lab; (D) = class discussion; SWA = Short Writing Assignment

* indicates readings that must be completed BEFORE coming to class

Date	Topic and Readings	Important Dates
8/28	Introduction, History, and Mendelian Genetics <i>READING: Marks (A), O'Rourke</i>	
9/2	DNA, Genes, and Mutations <i>READING: Stone & Lurquin</i>	
9/4	(D) Folk Heredity and Eugenics <i>READING: *Scheinfeld, *Allen, *Sinnott & Dunn, *Bianchi, *Greely, *Murray</i>	SWA #1 Due
9/9	Genome Complexities <i>READING: Weiss (on web), Zimmer, Commoner, Gibbs, Hurley</i>	
9/11	(L, SAC 5.168) DNA Extractions <i>READING: Nelkin & Lindee</i>	
9/16	Population Genetics I <i>READING: Mielke et al.</i>	SWA #2 Due
9/18	(L, SAC 5.168) ABO PCR; Population Genetics II <i>READING: Clark & Pazdernik (A)</i>	
9/23	Population Genetics III <i>READING: Relethford, Mielke & Fix</i>	
9/25	(L, SAC 5.168) Gel Electrophoresis and ABO Genotyping <i>READING: Clark & Pazdernik (B)</i>	
9/30	(L, SAC 5.168) mtDNA PCR; Population Genetics IV <i>READING: Fix</i>	SWA #3 Due
10/2	(D) Admixture; Review for Exam 1 <i>READING: *Reflections chapter 10; *Eubanks</i>	
10/7	Exam 1	Exam 1
10/9	(L, CLA 1.404) Mitochondrial DNA Sequence Analysis <i>READING: Clark & Pazdernik (C)</i>	
10/14	(D) Genetic Kinship <i>READING: *Nash, *Tallbear, *Geddes</i>	SWA #4 Due
10/16	<i>Motherland: A Genetic Journey</i> (film)	
10/21	(D) Genomics, Ancestry, and Identity <i>READING: *Wailoo, *Rotimi, *Nelson</i>	Research Proposal & Bibliography Due
10/23	(D) Commercial Genetic Testing and Bioethics <i>READING: *Bolnick et al., *Balding et al; *Williams (on web)</i>	
10/28	(L, Room TBA) Humans and Apes <i>READING: Reflections chapter 2, Marks (B), Cohen</i>	

Date	Topic and Readings	Important Dates
10/30	(D) Origins of Modern Humans <i>READING: *Reflections</i> chapter 3, *Weaver & Roseman	
11/4	(L, SAC 5.168) Amelogenin PCR; Modern Human Dispersal <i>READING: Henn et al. 2012, Reyes-Centeno et al. 2014</i>	
11/6	(D) Human Genomic Diversity <i>READING: *Reflections</i> chapter 5, *Barbujani and Colonna	
11/11	(L, SAC 5.168) Ancient DNA and Biomolecular Archaeology <i>READING: Kaestle & Horsburgh</i>	Research Paper Part 1 Due
11/13	(D) Neandertal and Denisovan DNA <i>READING: *Reflections</i> chapter 4, *Gibbons (A), *Gibbons (B), *Lalueza-Fox and Gilbert, *Gibbons (C)	
11/18	Prehistoric Migration I: Colonization of the Americas <i>READING: Reflections</i> chapter 6, O'Rourke and Raff	SWA #5 Due
11/20	(D) Prehistoric Migration II: Expansions in Europe <i>READING: *Reflections</i> chapters 7 and 9, *Skoglund et al.	
11/25	Exam 2	Exam 2
11/27	<i>NO CLASS (Thanksgiving)</i>	
12/2	(L, Room TBA) Primate Molecular Ecology <i>READING: SurrIDGE et al.</i>	
12/4	(D) Primate Behavior <i>READING: *Utami et al., *Tung et al.</i>	Final Research Paper Due
12/13	Student Research Presentations (9 am - 12 pm)	Presentations

READINGS ON THE INTERNET:

- Weiss K. 2012. Oops! The human genome does not exist! Parts 1-5. *The Mermaid's Tale Blog* August 1-3, 6-7. (Read Part 1 at <http://ecodevoevo.blogspot.com/2012/08/oops-human-genome-does-not-exist-part.html> and then navigate from there to the next four newer posts.)
- Williams PJ. 2012. DeliriousMe: ownership and identity in an age of genomic medicine. *Madlawprofessor's Weblog*, December 17. (madlawprofessor.wordpress.com/2012/12/17/genetic-endowments/)

CONTENTS OF THE COURSE READER:

- Marks J. (A) 2012. The origins of anthropological genetics. *Current Anthropology* 53 (S5):S161-S172.
- O'Rourke DH. 2003. Anthropological genetics in the genomic era: a look back and ahead. *American Anthropologist* 105:101-109.
- Stone L, Lurquin PF. 2007. Foundations of classical and molecular genetics. In: *Genes, Culture, and Human Evolution: A Synthesis*. Malden, MA: Blackwell Publishing. pp 48-72.
- Scheinfeld A. 1944. The Kallikaks after thirty years. *Journal of Heredity* 259-264.
- Allen, GE. 1997. The social and economic origins of genetic determinism: a case history of the American eugenics movement, 1900-1940 and its lessons for today. *Genetica* 99:77-88.
- Sinnott EW, Dunn LC. 1925. The problems of eugenics. In: *Principles of Genetics: An Elementary Text, with Problems*. New York: McGraw-Hill Book Co. pp 402-415.
- Bianchi DW. 2012. Fetal genes in mother's blood. *Nature* 487:304-305.

- Greely HT. 2011. Get ready for the flood of fetal gene screening. *Nature* 469:289-291.
- Murray TH. 2014. Stirring the simmering “designer baby” pot. *Science* 343:1208-1210.
- Zimmer C. 2013. DNA double take. *New York Times*, September 16.
- Commoner B. 2002. Unraveling the DNA myth. *Harper’s Magazine* February: 39-47.
- Gibbs WW. 2003. The unseen genome: gems among the junk. *Scientific American* 289:46-53.
- Hurley D. 2013. Grandma's ousy childhood or excellent adventure might change your personality, bequeathing anxiety or resilience by altering the expressions of genes in the brain. *Discover Magazine* May: 48-55.
- Nelkin D, Lindee MS. 1995. The powers of the gene. In: *The DNA Mystique*. New York: W.H. Freeman and Co. pp 1-16.
- Mielke JH, Konigsberg LW, Relethford JH. 2005. Population genetics and human variation. In: *Human Biological Variation*. Oxford: Oxford University Press. pp 47-85.
- Clark DP, Pazdernik NJ. (A) 2012. Fundamentals of the polymerase chain reaction. In: *Molecular Biology: Understanding the Genomic Revolution*. Second edition. Waltham, MA: Elsevier. pp 164-169.
- Relethford, John H. 2011. Natural selection in human populations. In: *Human Population Genetics*. Hoboken: John Wiley & Sons, Inc. pp 353-375.
- Mielke JH, Fix AG. 2007. The confluence of anthropological genetics and anthropological demography. In: Crawford MH, editor. *Anthropological Genetics*. Cambridge: Cambridge University Press. pp 112-123.
- Clark DP, Pazdernik NJ. (B) 2012. Separation of DNA fragments by electrophoresis; Restriction fragment length polymorphisms. In: *Molecular Biology: Understanding the Genomic Revolution*. Second edition. Waltham, MA: Elsevier. pp 111-113, 134-135.
- Fix AG. 1999. Population genetic models and human migration. In: *Migration and Colonization in Human Microevolution*. Cambridge: Cambridge University Press. pp 51-74.
- Eubanks WR. 2013. Color lines. *The American Scholar*, Spring issue.
- Clark DP, Pazdernik NJ. (C) 2012. DNA sequencing. In: *Molecular Biology: Understanding the Genomic Revolution*. Second edition. Waltham, MA: Elsevier. pp 227-232, 235-242.
- Nash C. 2004. Genetic kinship. *Cultural Studies* 18:1-33.
- TallBear K. 2008. Native-American-DNA.com: in search of Native American race and tribe. In: Koenig BA, Lee SS, Richardson SS, editors. *Revisiting Race in a Genomic Age*. New Brunswick: Rutgers University Press. pp 235-252.
- Geddes L. 2011. Tribal wars: DNA testing divides American Indians. *New Scientist* 2817:8-10.
- Wailoo K. 2012. Who am I? Genes and the problem of historical identity. In: Wailoo K, Nelson A, Lee C, editors. *Genetics and the Unsettled Past: the Collision of DNA, Race, and History*. Piscataway, NJ: Rutgers University Press. pp 13-19.
- Rotimi CN. 2003. Genetic ancestry tracing and the African identity: a double-edged sword? *Developing World Bioethics* 3: 151-158.
- Nelson A. 2008. Bio science: genetic genealogy testing and the pursuit of African ancestry. *Social Studies of Science* 38:759-783.
- Bolnick DA, Fullwiley D, Duster T, Cooper RS, Fujimura JH, Kahn J, Kaufman JS, Marks J, Morning A, Nelson A, Ossorio P, Reardon J, Reverby SM, TallBear K. 2007. The science and business of genetic ancestry testing. *Science* 318:399-400.
- Balding D, Thomas M, Innocent T. 2013. Sense about genetic ancestry testing. *Sense About Science*. pp 1-3.
- Marks J. (B) 2003. 98% chimpanzee and 35% daffodil: the human genome in evolutionary and cultural context. In: Goodman AH, Heath D, and Lindee MS, editors. *Genetic Nature/Culture: Anthropology and Science Beyond the Two-Culture Divide*. Berkeley: University of California Press. pp 132-152.

- Cohen J. 2007. Relative differences: the myth of 1%. *Science* 316:1836.
- Weaver TD, Roseman CC. 2008. New developments in the genetic evidence for modern human origins. *Evolutionary Anthropology* 17:69-80.
- Henn BM, Cavalli-Sforza LL, Feldman MW. 2012. The great human expansion. *Proceedings of the National Academy of the Sciences USA* 109:17758–17764.
- Reyes-Centeno H, Ghirotto S, D etroit F, Grimaud-Herv e D, Barbujani G, Harvati K. 2014. Genomic and cranial phenotype data support multiple modern human dispersals from Africa and a southern route into Asia. *Proceedings of the National Academy of the Sciences USA* 111:7248-7253.
- Barbujani G, Colonna V. 2010. Human genome diversity: frequently asked questions. *Trends in Genetics* 26:285-295.
- Kaestle FA, Horsburgh KA. 2002. Ancient DNA in anthropology: methods, applications, and ethics. *Yearbook of Physical Anthropology* 45:92-130.
- Gibbons A. (A) 2010. Close encounters of the prehistoric kind. *Science* 328:680-684.
- Gibbons A. (B) 2011. Who were the Denisovans? *Science* 333:1084-1087.
- Lalueza-Fox C, Gilbert MTP. 2011. Paleogenomics of archaic hominins. *Current Biology* 21:R1002-R1009.
- Gibbons A. (C) 2013. Elusive Denisovans sighted in oldest human DNA. *Science* 342:1156.
- O'Rourke DH, Raff JA. 2010. The human genetic history of the Americas: the final frontier. *Current Biology* 20:R202-R207.
- Skoglund P, Malmstrom H, Raghavan M, Stora J, Hall P, Willerslev E, Gilbert MTP, Gotherstrom A, Jakobsson M. 2012. Origins and genetic legacy of Neolithic farmers and hunter-gatherers in Europe. *Science* 336:466-469.
- SurrIDGE AK, Osorio D, Mundy NI. 2003. Evolution and selection of trichromatic vision in primates. *TRENDS in Ecology and Evolution* 18:198-205.
- Utami SS, Goossens B, Bruford MW, de Ruiter JR, van Hooff JARAM. 2002. Male bimaturism and reproductive success in Sumatran orang-utans. *Behavioral Ecology* 13:643-652.
- Tung J, Barreiro LB, Johnson ZP, Hansen KD, Michopoulos V, Toufexis D, Michelini K, Wilson ME, Gilad Y. 2012. Social environment is associated with gene regulatory variation in the rhesus macaque immune system. *Proceedings of the National Academy of the Sciences USA* 109:6490-6495.