ANTHROPOLOGY 349D
ANTHROPOLOGICAL GENETICS
FALL 2012

COURSE INFORMATION: Unique #31251
TTh 11:00 am - 12:30 pm, SAC 5.168

COURSE INSTRUCTOR: Dr. Deborah Bolnick

TEACHING ASSISTANT: Rick Smith

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 to read and discuss your peers' work.

COURSE REQUIREMENTS:
1. **Exam 1 (20%).** The first exam on **October 9** 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 20** 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.
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 be responsible for (a) orally 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 <u>2-page proposal and bibliography</u> (5%) is due on **October 25**. <u>Part 1 of the paper</u> (10%) is due on **November 13**. 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 late September.

6. **Research Presentation (5%).** Each student will give a 7-8 minute presentation on the subject of their research paper on **December 4 or 6**.

COURSE WEBSITE:

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

READINGS:

1. Required: Relethford, John H. 2003. *Reflections of Our Past*. Boulder: Westview Press.
2. Required: Course reader from Abel's Copies (715D West 23rd Street, 472-5353).
3. Optional Reference: Relethford, John H. 2011. *Human Population Genetics*. Hoboken: John Wiley & Sons, Inc. *The electronic edition available through www.lib.utexas.edu.*

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) Please let me know if you have any problem that is preventing you from performing satisfactorily in this class.

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.

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. 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.

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.

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.

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.

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, 471-6259 (voice), or 232-2937 (video phone). Please notify me as soon as possible of any accomodations that will be needed.

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.

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
8/30	Introduction, History, and Mendelian Genetics *READING*: Marks (A), O'Rourke	
9/4	DNA, Genes, and Mutations *READING*: Stone & Lurquin	
9/6	**(D)** Folk Heredity and Eugenics *READING*: *Scheinfeld, *Allen, *Sinnott & Dunn, *Kalb, *Bianchi	**SWA 1 Due**
9/11	**(L)** DNA Extraction	
9/13	Genome Complexities *READING*: Weiss (*on web*), Commoner, Gibbs, Pray, Talbott	
9/18	**(D & L)** Genetic Essentialism; ABO PCR *READING*: *Nelkin & Lindee, *Roof, Clark & Pazdernik (A)	**SWA 2 Due**
9/20	Population Genetics I *READING*: Mielke et al.	
9/25	**(L)** Electrophoresis, ABO Genotyping, and mtDNA PCR *READING*: Clark & Pazdernik (B)	
9/27	Population Genetics II *READING*: Fix, Mielke & Fix, Relethford	**SWA 3 Due**
10/2	**(D)** Admixture; Overview of Research Paper Assignment *READING*: **Reflections* chapter 10; Hafner	
10/4	Population Genetics III; Review for Exam 1	
10/9	**Exam 1**	**Exam 1**
10/11	**(L)** Mitochondrial DNA Sequence Analysis *READING*: Clark & Pazdernik (C)	
10/16	**(D)** Genetic Kinship *READING*: *Nash, *Tallbear, *Geddes	**SWA 4 Due**
10/18	*Motherland: A Genetic Journey* (film)	
10/23	**(D)** Genomics, Ancestry, and Identity *READING*: *Wailoo, *Bolnick et al., *Rotimi, *Nelson	
10/25	Humans and Apes *READING*: *Reflections* chapter 2, Marks (B), Cohen	**Research Proposal & Bibliography Due**
10/30	Origins and Dispersal of Modern Humans *READING*: *Reflections* chapter 3, Weaver & Roseman, Appenzeller	
11/1	**(D & L)** Human Genomic Diversity; Amelogenin PCR *READING*: **Reflections* chapter 5, *Barbujani and Colonna	
11/6	**(L)** Ancient DNA; Amelogenin Genotyping *READING*: Kaestle & Horsburgh	**SWA 5 Due**

Date	Topic and Readings	Important Dates
11/8	**(D)** Neandertal and Denisovan DNA *READING*: **Reflections* chapter 4, *Gibbons (A), *Gibbons (B), *Lalueza-Fox and Gilbert, *Krause et al.	
11/13	Prehistoric Migration I: Colonization of the Americas *READING*: *Reflections* chapter 6, Goebel et al.	**Research Paper Part 1 Due**
11/15	**(D)** Prehistoric Migration II: Europe and the Pacific *READING*: **Reflections* chapters 7-8, *Skoglund et al.	
11/20	**Exam 2**	**Exam 2**
11/22	*NO CLASS (Thanksgiving)*	
11/27	Primate Molecular Ecology (Carrie Veilleux, Guest Lecturer) *READING*: Surridge et al.	
11/29	**(D)** Primate Behavior *READING*: *Utami et al., *Tung et al., *Schubert et al.	
12/4	**Student Presentations**	**Research Paper Due; Presentations**
12/6	**Student Presentations**	**Presentations**

READINGS ON THE INTERNET:

Weiss K. 2012. Ooops! 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/ooops-human-genome-does-not-exist-part.html and then navigate from there to the next four newer posts.)

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.

Kalb C. 2004. Brave new babies. *Newsweek* January 26:44-52.

Bianchi DW. 2012. Fetal genes in mother's blood. *Nature* 487:304-305.

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.

Pray LA. 2004. Epigenetics: genome, meet your environment. *The Scientist* 18:14-20.

Talbott S. 2010. Getting over the code delusion. *The New Atlantis* Summer:3-27.

Nelkin D, Lindee MS. 1995. The powers of the gene. In: *The DNA Mystique.* New York: W.H. Freeman and Co. pp 1-16, 38-57.

Roof J. 2007. Excerpt from "Flesh made word". In: *The Poetics of DNA*. Minneapolis: University of Minnesota Press. pp 109-114.

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.
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. (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.
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.
Relethford, John H. 2011. Natural selection in human populations. In: *Human Population Genetics*. Hoboken: John Wiley & Sons, Inc. pp 353-375.
Hafner K. 2007. Seeing corporate fingerprints in Wikipedia edits. *New York Times* (August 19).
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.
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.
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.
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.
Appenzeller T. 2012. Eastern odyssey. *Nature* 485:24-26.
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.

Krause J, Lalueza-Fox C, Orlando L, Enard W, Green RE, Burbano HA, Hublin J-J, Hänni C, Fortea J, de la Rasilla M, Bertranpetit J, Rosas A, Pääbo S. 2007. The derived *FOXP2* variant of modern humans was shared with Neandertals. *Current Biology* 17:1908-1912.

Goebel T, Waters MR, O'Rourke DH. 2008. The late Pleistocene dispersal of modern humans in the Americas. *Science* 319:1497-1502.

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.

Schubert G, Stoneking CJ, Arandjelovic M, Boesch C, Eckhardt N, Hohmann G, Langergraber K, Lukas D, Vigiland L. 2011. Male-mediated gene flow in patrilocal primates. *PLoS ONE* 6(7):e21514.