HUMAN BIOLOGY AND SOCIETY
ANTHROPOLOGY 314 – SPRING, 2013

Instructor:

Professor: **Adam Van Arsdale**
Lecture: T/F, 11:10, PNE 349
Office: PNE 348

Office Hours: Thursday, 1:00-3:00pm
and by appointment
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Course Description:
Advances in genetic sequencing technology have dramatically reduced the cost of obtaining genetic data. As a result, personal genomic information is now available and utilized at an ever-increasing pace. As an anthropologist, the arrival of the "genomic age" raises important questions about how we approach and understand the topic of what it means to be human. Never before have individuals had such direct access to the raw data at the core of their own biology. This class will examine personal genomics from a biocultural anthropology perspective, simultaneously dealing with the question of what personal genomics has to offer and what consequences arise given the availability of genomic information. The important distinction between information and knowledge, uncertainty and determinism, and the ethical and legal apparatus around genomics will be examined through the use of genomic case studies focused on issues of health and ancestry.

Course Goals:
- Develop an understanding of the data procurement, analytical methods and terminology associated with genomic research
- Critically examine the relationship between genomic data, identity and perception of risk and uncertainty
- Improve your ability to address complex biocultural subjects through an anthropological lens, incorporating quantitative and qualitative, scientific and humanistic approaches
- Increased fluency with the information and tools publically available to explore personal genomic data

Grading:
- Family history: 10% (*due **2/12**, **in class***)
- Essay #1: 10% (*online, due **2/15**, 5pm*)
- Genome browser exercise: 10% (*online, due **3/8**, 5pm*)
- Personal genome project: 25% (*in class, **4/16-5/3***)
- Essays #2: 20% (*online, due **5/7**, 10am*)
- Peer evaluations: 5% (*online, due **4/16-5/3***)
- Weekly responses: 10% (*online, due **weekly***)
- Participation: 10% (***weekly***)

Texts:
This course will include readings from a wide variety of sources. All of the assigned articles are available electronically via the College's electronic subscriptions. The two books we will be reading are both available (and inexpensive) through online vendors:

- M. Angrist (2010), Here is a human being: At the dawn of personal genomics. Harper Perennial (*hardcover or paperback*).
- T. Goetz (2011), The Decision Tree: How to make better choices and take control of your health, Rodale Books (*hardcover or paperback*)

Some of our readings come from online sources, including some of the many blogs that focus on genomic issues, research and policy. You are strongly encouraged to monitor several of these blogs on a weekly, if not daily basis. A complete list of relevant blogs as well as some resources to help track them are available via the course website.

Personal genomic data through 23andme:
A final text, optional to everyone in the class, is your own personal genetic data. The course will be utilizing 23andme.com for optional personal genotyping. While everyone in the class will work with individual genetic data, participation in 23andme's genotyping services ($99 + $8.25 s/h) is entirely optional. Details of this service, the course privacy policy, and how these data will be incorporated into the course will be discussed at the beginning of the semester.

Course Website:
Our class will be using the Sakai course conference platform. The website includes several features, including a calendar that will contain information on assignment due dates and relevant campus events for the course, a copy of the course syllabus, links to outside resources, class documents, a drop-box for class assignments, and a forum for class discussion and weekly responses.

Concerns:
If you have any concerns regarding your ability to complete the assignments of the course or trouble understanding specific concepts, I am always available for consultation. In addition to my office hours I can be reached with regularity via e-mail. Assistance is also available for students through the Pforzheimer Learning and Teaching Center. All work in this class is subject to the Wellesley Honor Code. While students are encouraged to discuss the course materials and assignments both in and out of class, all of your work must reflect your own independent efforts. All assignments must be turned in on time. Unless approval is granted from Prof. Van Arsdale, no late assignments will be accepted. No extra credit will be available for this course. This course covers a lot of material from a range of different topics – DO NOT BE AFRAID TO ASK QUESTIONS!!!

SYLLABUS (subject to change)

Week 1: (Jan. 28-Feb. 1) Introduction

Tuesday – How does genetic knowledge alter what it means to be human?
Friday – Your genes are not your own: genetics, kinship and family history

Readings:

- Goetz, chapters 1-2 (1-49)
- Angrist, chapter 1 (1-9)
- Ashley, et al. (2010), "Clinical assessment incorporating a personal genome, " *The Lancet* 375:1525-1535
- Guttmacher, et al. (2004), "The family history—more important than ever," *The New England Journal of Medicine* 351(22):2333-2336

Week 2: (Feb. 4-8): Genetics

Tuesday – Genetics 101 and 201: How do genes shape phenotypic variability?
Friday – Genetics 301: Genes, environment and determinism

Readings:

- Goetz, chapters 3-5 (50-115)
- Buchanan, "Why does genetic determinism persist, in spite of the evidence?" - http://ecodevoevo.blogspot.com/2010/02/why-does-genetic-determinism-persist-in.html

SUPPLEMENTAL READING

- Mitchell (2012), "The trouble with epigenetics, parts 1 and 2" *Wiring the Brain - http://www.wiringthebrain.com/2013/01/the-trouble-with-epigenetics-part-1.html, http://www.wiringthebrain.com/2013/01/the-trouble-with-epigenetics-part-2.html*
- Genetics Home Reference, *NIH* - http://ghr.nlm.nih.gov/
- Tenesa & Haley (2013), "The heritability of human disease: estimation, uses and abuses" *Nature Reviews Genetics* 14:139-149

Week 3: (Feb. 11-15): Genomics and Consent

Tuesday – The scope of genomic information
Friday – What constitutes consent?

Readings:

- Goetz, chapters 6-7 (116-168)
- Angrist, chapters 2-3 (10-53)
- Harmon, "Indian Tribe wins fight to limit research of its DNA, "*NY Times* 4/21/10 - http://www.nytimes.com/2010/04/22/us/22dna.html?hp=&pagewanted=all&_r=0
- Vorhaus, "The Havasupai Indians and the Challenge of Informed Consent for Genomic Research" – *Genomics Law Report - http://www.genomicslawreport.com/index.php/2010/04/21/the-havasupai-indians-and-the-challenge-of-informed-consent-for-genomic-research/#more-3201*
- 23andMe consent document - https://www.23andme.com/about/consent/

Week 4: (Feb. 18-22): Legal genetics

Tuesday – (NO CLASS, MONDAY SCHEDULE)
Friday – Legal issues surrounding the use and control of genetic data

Readings:

- Angrist, chapter 4 (54-77)
- Feero, et al. (2011), "Genomics, health care, and society," *The New England Journal of Medicine* 365(11):1033-1041
- Bohannon (2013), "Genealogy Databases Enable Naming Of Anonymous DNA Donors" *Science* 339:262
- Wright, "Responsible and effective use of personal genomes" – *Genomes Unzipped http://www.genomesunzipped.org/2011/06/responsible-and-effective-use-of-personal-genomes.php#more-3620*
- Conley & Vorhaus, "Supreme court to rule on patentability of human genes" – *Genomics Law Report* - http://www.genomicslawreport.com/index.php/2012/11/30/supreme-court-to-rule-on-patentability-of-human-genes/#more-6923 (click through to earlier links!)

SUPPLEMENTAL READINGS

- Suter (2012), "From Sweaty Towels to Genetic Stats: Stalking Athletes for their Genetic Information" *Recent Patents on DNA & Gene Sequences* 6:189-192
- Gymrek, et al. (2013), "Identifying Personal Genomes by Surname Inference" *Science* 339:321-324

Week 5: (Feb. 25-March 1): Prediction, risk and uncertainty

Tuesday – Probability theory and hazard ratios
Friday – Pleiotropy, penetrance, polygenic traits and effect size

Readings:

- Angrist, chapters 5-8 (99-168)
- Wiszmeg, et al. (2012), "Difficult questions and ambivalent answers on genetic testing, " *Culture Unbound-Journal of Current Cultural Research* 4:463-480
- Cooper & Shendure (2011), "Needles in stacks of needles: Finding disease-causal variants in a wealth of genomic data" *Nature Reviews Genetics* 12:628-640

SUPPLEMENTAL READINGS

- Ng, et al. (2009), "An agenda for personalized medicine" *Nature* 461:724-726
- Gigerenzer, et al. (2008), "Helping doctors and patients make sense of health statistics" *Psychological Science in the Public Interest* 8(2):53-96

Week 6: (March 4-8): Human genomics, case study #1 – Genetic ancestry

Tuesday – Who are your ancestors? Single-system ancestry estimates
Friday – Whole genome ancestry estimation and challenges

Readings:

- Angrist, chapter 9-10 (169-221)
- Plagnol, "Exaggerations and errors in the promotion of genetic ancestry testing," *Genomes Unzipped* - http://www.genomesunzipped.org/2012/12/exaggerations-and-errors-in-the-promotion-of-genetic-ancestry-testing.php
- Wagner (2010), "Interpreting the Implications of DNA Ancestry Tests" *Perspectives in Biology and Medicine* 53(2):231-248

SUPPLEMENTAL READINGS

- Bolnick, et al. (2007), "The science and business of genetic ancestry testing," *Science* 318(5849):399-400
- Wagner, et al. (2012), "Tilting at windmills no longer: A data-driven discussion of DTC DNA ancestry tests" *Genetics in Medicine* (1-8)
- Wagner & Shriver, Payne Jr. (2007),"Responses to Bolnick, et al. 2007" *Science* 318:399-400
- Royal, et al. (2010), "Inferring Genetic Ancestry: Opportunities, Challenges, and Implications" *American Journal of Human Genetics* 86:661-673

Week 7 (March 11-15): Human genomics, case study #2 – Huntington's Disease

Tuesday – Genetic epidemiology of Huntington Disease
Friday – Certain diagnosis, uncertain future

Readings:

- Goetz, chapters 9-10 (191-242)
- Block & Hayden (1990), "Predictive testing for Huntington's Disease in childhood: challenges and implications" *American journal of human genetics* 46(1):1-4
- Cox & McKellin (1999), "There's this thing in our family: predictive testing and the construction of risk for Huntington Disease" *Sociology of Health & Illness* 21(5):622-646.

SUPPLEMENTAL READINGS

- Klitzman, et al. (2007), "The roles of family members, health care workers, and others in decision-making processes about genetic testing among individuals at risk for Huntington disease" *Genetics in Medicine* 9(6):358-371
- Duyao, M., et al. (1993), "Trinucleotide repeat length instability and age of onset in Huntington's disease." *Nature genetics* 4(4):387-392

Week 8 (March 18-22): SPRING BREAK – No Class

Week 9 (March 25-29): Human genomics, case study #3 – BRCA1, BRCA2 and breast cancer

Tuesday – The functional and epidemiological role of *BRCA1* and *BRCA2*
Friday – Preventative medical intervention

Readings:

- Ellisen, et al. (1998), "Hereditary breast cancer" *Annual review of medicine* 49(1):425-436
- Finkler (2004), "Illusions of controlling the future: risk and genetic inheritance," *Anthropology & Medicine* 10(1):51-70.
- Schwartz, et al. (2011) "Long-term outcomes of *BRCA1/BRCA2* testing: risk reduction and surveillance" *Cancer* 118(2):510-517
- Werner-Lin, et al. (2012) "My funky genetics: *BRCA1/2* mutation carriers' understanding of genetic inheritance and reproductive merger in the context of new reprogenetic technologies" *Families, Systems & Health* 30(2):166-180

SUPPLEMENTAL READING

- McAllister, et al. (2007), "The emotional effects of genetic diseases: implications for clinical genetics." *American Journal of Medical Genetics Part A* 143(22): 2651-2661.
- Koehly, et al. (2008), "Sisters in hereditary breast and ovarian cancer families: communal coping, social integration, and psychological well-being."*Psycho-Oncology* 17(8): 812-821

Week 10 (April 1-5): Human genomics, case study #4 –ApoE, heart disease and Alzheimer's

Tuesday, April 2 – The *ApoE* gene cluster and variants
Friday, April 5 – *ApoE* and Alzheimer's

Readings:

- Angrist, chapters 12-13, epilogue (239-284)
- Chilibeck, et al. (2011), "Postgenomics, uncertain futures, and the familiarization of susceptibility genes," *Social Science & Medicine* 72(11)1768-1775
- Lock (2006), "Living with uncertainty: The genetics of late onset Alzheimer's Disease" *General Anthropology* 13(2):1-9
- Eisenberg, et al. (2010), "Worldwide allele frequencies of the human apolipoprotein E gene: climate, local adaptations, and evolutionary history." *American journal of physical anthropology* 143(1): 100-111

SUPPLEMENTAL READINGS

- Jarvik, et al. (2008), "Children of persons with Alzheimer disease: What does the future hold?." *Alzheimer disease and associated disorders* 22(1):6

- Minihane, et al. (2007), "ApoE genotype, cardiovascular risk and responsiveness to dietary fat manipulation." *Proceedings of the Nutrition Society* 66(2):183-197.

Week 11 (April 8-12): Personal Genomics, week 1

Tuesday – An introduction to the discussion of personal genomic data
Friday – Personal genomic project work day (no class – AAPA conference)

Readings:

- Callier (2012) "Swabbing students: should universities be allowed to facilitate educational DNA testing?" *American Journal of Bioethics* 12(4):32-40.
- Hughes, "It's Time To Stop Obsessing About the Dangers of Genetic Information" *Slate* (1/7/2013) - http://www.slate.com/articles/health_and_science/medical_examiner/2013/01/ethics_of_genetic_information_whole_genome_sequencing_is_here_and_we_need.single.html

SUPPLEMENTAL READINGS

- Voss (2009), "Set your DNA free" *The New Scientist,* August 22, 22-24
- Dunsworth (2012), "Your genome is showing" (video) - http://fora.tv/2012/11/29/Your_Genome_is_Showing_Human_Origins_Gets_Personal (California Academy of Sciences)

Week 12 (April 15-19): Personal Genomics, week 2

Tuesday – Topic, TBD
Friday – Topic, TBD

Readings:

- TBD

Week 13 (April 22-26): Personal Genomics, week 3

Tuesday – Topic, TBD
Friday – Topic, TBD

Readings:

- TBD

Week 14 (April 29-May3): Personal Genomics, week 4

Tuesday – Topic, TBD
Friday – Topic, TBD

Readings:

- TBD

Week 15 (May 6-10): Conclusions

Tuesday – The ethics and practice of personal genomics

Readings:

- Kolor, et al. (2012) "Public awareness and use of direct-to-consumer personal genomic tests from four state population-based surveys, and implications for clinical and public health practice." *Genetics in Medicine* 14:860-867