Syllabus - Part I: Course Information
Anthropology 329: Human Evolutionary Genetics (01:070:329)

Wednesdays, 12:35 pm - 3:35 pm, BIO-302

Course website available through https://sakai.rutgers.edu/portal

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Office Hours: Wednesdays 11:00 am - 12:00 pm, and by appointment

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This syllabus is in two parts. Part I contains important information about the course, including a course description, the goals of the course, the Sakai website, the grading system, attendance policy, other classroom policies, and the policy on cheating and plagiarism. Read it carefully and consult it whenever you have questions about the course. If you cannot find the answer to your question here, see Dr. Batiste for assistance.

Part II is a detailed list of the lecture topics, readings, exams, important due dates and other assignments (e.g., films, in-class activities) arranged by date. Part II may be revised and updated from time to time over the course of the semester. You will be notified by e-mail whenever an updated version of Part II is posted on the course Sakai site.

PREREQUISITES

01:119:115 & 01:119:116 - General Biology I & II, ***or***
01:070:102 - Introduction to Human Evolution

COURSE DESCRIPTION & GOALS OF THE COURSE

This course explores how recent work on human evolutionary genetics informs our understanding of human evolution. Topics include genetic variation, population genetics, phylogenetics, genetics of human origins and the emergence of modern humans, human migrations, human and Neanderthal admixture, recent adaptations to diverse diets and environments, and the evolutionary genetics of human disease.

By the end of the course, students will gain an understanding of the following:

- Current primary research on human evolutionary genetics
- Principles of population genetics from the perspective of human evolution
- How data from genetic studies can inform theories of human origins, migration patterns, and modern medicine.
- Computational methods to study the population dynamics of a human sample population.
- The ethical questions involved in the use of CRISPR, GMOs, and similar issues.
- How to read scientific papers and present their findings to others

SAKAI SITE

Much of the material needed for the course will be available on Sakai. To access, go to https://sakai.rutgers.edu/ and log in with your Rutgers NetID and password. Once you are logged in you should see a tab at the top of the page that says "**Human Evo Genetics - Fall 2016**". If that tab is not visible, click on "**My Active Sites**." If you do not see it there either, call the Sakai Help Line (848-445-8721) or email sakai@rutgers.edu for assistance.

When you get to the "Human Evo Genetics - Fall 2016" page, there will be a column on the left with a number of tabs. Much of the information and material you will need in the course can be found by clicking on the **Resources** tab.

REQUIRED TEXTS

Jobling,M. et al. (2013). Human Evolutionary Genetics. 2nd Ed. New York: Garland Science.

- This book is available at the Rutgers Barnes and Noble Bookstore. It is also available to rent or buy as an eTextbook at a significant savings over the cost of purchasing a physical copy of the book.

  A reference copy will also be on reserve at Douglass Library.

All other required and recommended readings are provided on the course Sakai site in the **Resources** tab as PDF documents or links. During the course of the semester, additional reading may be assigned. These will also be made available in the **Resources** tab.

GRADING AND ASSESSMENT

Your course grade will be determined by your grades on the following five components:

1. **Weekly Quizzes** (See Syllabus Part II for start date): To successfully complete this course, it is important to stay on schedule with the weekly readings and your lecture notes. Short quizzes on the day's assigned readings and/or other material recently assigned or covered in lecture will take place approximately 5 minutes after the beginning of every lecture. Questions may be multiple choice, fill-in-the-blank, or short answer. Each quiz will be worth a total of 5 points. In computing your final quiz score for the course, your two lowest-scoring quizzes will be dropped.

   - Quiz questions will be presented via PowerPoint slides. You must come to class prepared with paper and a writing utensil to record your answers and turn in.
   - Failure to write your name on your quiz will result in a score of zero for that quiz.

2. **Journal Article Discussions** (See Syllabus Part II for start date): Reading and understanding primary scientific research is a vital skill for the 21st Century. To help build this skill, much of the reading for this course will be current research in human evolutionary genetics, and each week, students will be assigned to lead class discussion on the assigned readings for that week.

   In your role as discussion leader, you will be expected to have a thorough understanding of the article, and be able to communicate the research question, methods, findings and broader implications of the article to the class. In addition, you will need to effectively

respond to students' questions and keep the discussion on topic. Each student will lead the discussion of at least two research articles; the exact number will depend on the size of the class and the number of readings assigned each week.

3. **Midterm Exam** (See Syllabus Part II for date): The midterm exam will be held in our regular lecture room, BIO 302, at our regular lecture time, 2:15 – 3:35. The exam will consist of short answer and essay questions. It will test students' substantive knowledge of the readings, lectures and other class material.

    - **No make-up exams will be given to accommodate your vacation travel plans.** If your travel plans make it impossible for you to take the Midterm, you should **drop the course.**

4. **Research Paper** (See Syllabus Part II for due dates): For the final research paper, you will select a topic related to human evolutionary genetics and write an 8-10 page review of the primary scientific literature related to your topic. The assignment is divided into five parts due throughout the semester. The full assignment description, along with weighting of each section and complete formatting/submission instructions can be found on the course Sakai site, under the **Assignments** tab.

5. **Participation:** You will only succeed in this course if you come prepared to lecture, pay attention and actively engage in class discussions. You are expected to contribute something substantive to each week's discussion; your participation grade will be based on the quality (rather than quantity) of these active and informed contributions to our discussions. A total of 5 participation points can be earned per week. In computing your final course participation grade, your two lowest weekly scores will be dropped.

In computing your course grade, the five items above will be weighted as follows:

Component	***% of Final Grade***
Weekly Quizzes	20%
Article Discussion	15%
Research Paper	25%
Midterm Exam	25%
Participation	15%
Total	***100%***

Final grades will be assigned following the standard Rutgers cut-offs (A = 90-100%, B+ = 88-89%, B = 80-87%, C+ = 78-79%, C = 70-77%, D = 60-69%, F = 59% and below). Grades will not be curved. Requests for higher grades after grades have been assigned will be denied except in the case of genuine errors in computing/assigning grades.

Extra Credit: You can earn up to 5 points of extra credit by attending an approved outside University-sponsored lecture and writing a three-page thesis and significance statement on the lecture. See the **Assignments** tab on the course Sakai page for details.

ATTENDANCE

Your regular and timely class attendance is expected. You will only succeed in this course if you come prepared to lecture, pay attention and participate in class discussions. Many components of your grade (leading discussion, weekly quizzes, participation) require your attendance in order to earn points for them. It is extremely important that you attend lectures since the information, concepts, and specific examples from the readings will be discussed and interpreted. In addition, **not all material covered in class will come directly from the readings.** You are responsible for this information on the midterm exam and weekly quizzes.

After the Add/Drop period ends, attendance will be taken at the beginning of each class (see Syllabus Part II for start date). If you expect to miss a lecture, please go to the University absence reporting website, https://sims.rutgers.edu/ssra/, to indicate the date and reason for your absence. Notification of the absence must be prior to the absence, and retroactive notifications are not acceptable. An email is automatically sent to Dr. Batiste. **Do not email Dr. Batiste about absences outside of this system.**

At the end of the semester, your two lowest combined daily quiz and participation grades will be dropped before computing your final grade for these items and your final course grade for the term. **In effect, you will have two automatically excused absences.** Consider them as "free passes." After these have been used, for each unexcused absence you accumulate, two (2) percentage points will be deducted from your final course grade.

If you have a legitimate excuse for missing a lecture (e.g., a medical excuse, family emergency, or religious holiday), please follow proper procedures for documenting this with your advising dean. If, at the end of the term, you have two or more absences, you will be expected to use your free passes for the first two: Free passes will be applied to excused absences before unexcused absences. Quiz and participation grades for additional excused absences will be dropped before computing your average quiz grade for the term.

Students are expected to arrive on time, and stay for the entire lecture. ***Late arrival or early departure without prior permission is considered an unexcused absence.***

ACADEMIC INTEGRITY

All students must strictly adhere to the Rutgers Academic Integrity Policy. This policy identifies and defines violations including cheating, fabrication, facilitating academic dishonesty, plagiarism, and denying others access to information or material. For further information, including definitions of each of these violations and consequences of violating the Academic Integrity Policy, go to http://academicintegrity.rutgers.edu/.

You are responsible for knowing what constitutes plagiarism and academic dishonesty and what the consequences are for such violations.

LATE / MISSED WORK

There is no make up for missed quizzes or leading of paper discussions.

Research Paper: Each portion of the research paper assignment must be submitted electronically to Sakai no later than 11:59 pm on the assigned due date. Late submissions will subject to a penalty as follows:

- Less than 12 hours late: 10 percentage point deduction (= one full letter grade)
- Between 12 - 24 hours late: 20 percentage point deduction (= two full letter grades)
- Between 24 - 48 hours late: 30 percentage point deduction (= three full letter grades)
- Over 48 hours late: No credit

Exceptions will only be made under unusual circumstances and with a valid excuse, which **must** be documented in writing by an appropriate authority (e.g., physician). The occurrence of such circumstances must be brought to the attention of your advising dean. In addition you must contact Dr. Batiste (via email) within 48 hours of the missed deadline.

Exams: No make-up exams will be given except under very unusual circumstances and with a valid excuse, which **must** be documented in writing by an appropriate authority (e.g., physician) and reported to your advising dean. Since a missed exam also involves a missed class period, you must use the Absence Reporting System (https://sims.rutgers.edu/ssra/) as well. This documentation and reporting must occur within 48 hours of the missed exam.

CLASSROOM ETIQUETTE

You are expected to act with courtesy in lecture. This includes, but is not limited to:

- All mobile phones must be silenced or turned off (this includes no texting!)
- Behave respectfully to Dr. Batiste, guests and other students
- Address your instructor and guest lecturers by their appropriate titles and names
- No playing games or cards
- No headphones or listening to music
- No reading the newspaper or other non-course related material

While in class, students are expected to give their full attention to Dr. Batiste, guest lecturers, and classmates. Reading, talking, sleeping, eating, texting, browsing the web, packing up to leave before dismissal are all inappropriate classroom behaviors and will not be tolerated.

It is very disruptive when students arrive late to class or leave early. If you come to class late, be sure to enter quietly and take care not to disturb the class in progress. If you know before coming to class that you will need to leave early, let Dr. Batiste know before class begins, sit close a door, and leave quietly and unobtrusively.

Ringing phones and audible text message alerts are similarly disruptive. If you are expecting an important/emergency phone call or text that must be addressed during class, again, let Dr. Batiste know before class begins, sit close to a door and leave the room quietly to answer.

When participating in discussions, remember to be respectful of everyone concerned. Intentionally disrespectful/uncivil questions or comments are inappropriate classroom behaviors and will not be tolerated.

Use of Laptops: Laptops are permitted for the purpose of taking lecture notes only, though you are strongly encouraged to take notes by hand for better retention and comprehension of the course material. Checking email, Facebook, and all other non-course related online or offline uses are prohibited. Failure to conform to these guidelines may result in a ban on students' use of electronics in the classroom.

IMPORTANT NOTE ON LECTURE SLIDES

Many professors and instructors choose to make their lecture slides available to students via their course Sakai sites. I believe that this practice unintentionally encourages students to take fewer notes, since they can "get the slides" at a later date. This is a poor substitute for active and engaged note-taking in class and can lead to poorer retention and comprehension of the course material. Therefore, I will **not** post lecture slides. Instead, I encourage you to exchange contact information with one or more of your classmates and work together to fill in any gaps you may have in your lecture notes.

IMPORTANT NOTE ABOUT EMAIL

You will receive frequent emails about the course. These emails can only be sent to your official Rutgers email address, so you should be sure to monitor that account frequently. If you usually use a non-Rutgers email account (e.g., Gmail or Hotmail) you should arrange to have your Rutgers email forwarded to the account you usually use.

Syllabus - Part II: Topics and Readings
Anthropology 329: Human Evolutionary Genetics (01:070:329)

Date	Topic / Activities	Readings / Notes
07-Sep	**1. Introduction to the Course** • Overview of syllabus & topics • How to read a scientific paper	Syllabus Parts I & II Mueller & Oppenheimer 2014
14-Sep	**2. Evolutionary Theory & Human Evolutionary Genetics** • What is Hum Evo Genetics? • Evolution & genetics • Intro to Genetics	**Jobling Ch 1** A Brief History of Genetics: Units 1-3 Film: Darwin and the Tree of Life
21-Sep	**3. Variation & Genetic Diversity - I** • Transcription, translation, mutations, etc • SNPs, insertions, recombination, etc	**Jobling Ch 2 & 3** Doolittle, 2013 Kong et al. 2002 **Article Discussions begin** **Attendance begins**
28-Sep	**4. Variation & Genetic Diversity - II** • Methods for assessing genome variation • Effects of natural selection on genomic variation	**Jobling Ch 4 & 5** Broman et al., 1998 Chen & Rajewsky, 2007 Kazazian et al., 2004
05-Oct	**5. Phylogenetics, Dating & Population History**	**Jobling Ch 6** Antunez-de-Mayolo et al., 2002 Caldararo, 2003 Stoneking & Krause, 2011 **Paper Topic Due by 11:59pm**
12-Oct	**6. Human Origins - I** • What makes us human? • Humans and apes	**Jobling Ch 7** Alcan et al., 2007 Hughes et al., 2010 Patterson et al., 2006
19-Oct	**7. Human Origins - II** • Becoming Human	**Jobling Ch 8** Alaya et al., 1994 Carroll, 2003 **Annotated References Due by 11:59pm**

26-Oct	**8. Human Origins - III** • Modern Humans • Ancient DNA **Review for Midterm**	**Jobling Ch 9** Willerslev & Cooper, 2005 Pääbo et al., 2004 Henn et al., 2011
02-Nov	**9. * * * MIDTERM EXAM (Bring Student ID & writing utensils!) * * ***	
09-Nov	**10. Human Migration** • Out-of-Africa vs. Multiregionalism • The New World	**Jobling Ch 11 & 13** Chatters et al., 2014 Comas et al., 2013 Li et al., 2008 **Paper Outline Due by 11:59pm**
16-Nov	**11. Admixture** • Humans and Neanderthals	**Jobling Ch 14** Abi-Rached et al., 2011 Green et al., 2010
23-Nov	*** * * No Class: Change in Designation of Class Days (Friday Classes) * * ***	
30-Nov	**12. Agriculture**	**Jobling Ch 12** Perry et al., 2007 **Paper Draft Due by 11:59pm**
07-Dec	**13. Recent Evolution & Adaptations** • High altitude adaptations • Lactase persistence	**Jobling Ch 15** Hawks et al., 2007 Huerta-Sanchez et al., 2014 Tishkoff et al., 2007
14-Dec	**14. Evolutionary Medicine**	**Jobling Ch 16 & 17** Jorde et al., 2001 Wu et al., 2014 **Final Paper Due by 11:59pm**

Full Bibliographic References for Assigned Readings

A Brief History of Genetics: Defining Experiments in Genetics. Cambridge, MA: NPG Education, 2010. www.nature.com/scitable/ebooks/a-brief-history-of-genetics-defining-experiments-16570302/

Abi-Rached, L. et al. (2011). The shaping of modern human immune systems by multiregional admixture with archaic humans. *Science,* 334: 89-94.

Ayala, F. J., et al. (1994). Molecular genetics of speciation and human origins. *PNAS*, *91*(15), 6787-6794.

Alkan, C. et al. (2007). Organization and evolution of primate centromeric DNA from whole-genome shotgun sequence data. *PLoS Computational Biol*ogy *3*(9), e181.

Antunez-de-Mayolo, G. et al. (2002). Phylogenetics of worldwide human populations as determined by polymorphic Alu insertions. *Electrophoresis*, *23*(19), 3346-3356.

Broman, K.W. (1998). Comprehensive human genetic maps: individual and sex-specific variation in recombination. *American Journal of Human Genetics*, 63: 861-869.

Caldararo, N. (2003). Human phylogenetics and ancient DNA: the role of gene sequence variation in the species concept. *The Linnean*, *19*, 27-29.

Carroll, S. B. (2003). Genetics and the making of Homo sapiens. *Nature*, *422*(6934), 849-857.

Chatters, J. C. et al. (2014). Late Pleistocene human skeleton and mtDNA link Paleoamericans and modern Native Americans. *Science*, *344*(6185), 750-754.

Chen, K., & Rajewsky, N. (2007). The evolution of gene regulation by transcription factors and microRNAs. *Nature Reviews Genetics*, 8:93-103.

Comas, I. et al. (2013). Out-of-Africa migration and Neolithic coexpansion of Mycobacterium tuberculosis with modern humans. *Nature Genetics*, *45*(10), 1176-1182.

Doolittle, W.F. (2013). Is junk DNA bunk? A critique of ENCODE. *PNAS,* 110: 5296-5300.

Green, R. (2010). A draft sequence of the Neanderthal genome. *Science,* 328: 710-722.

Hawks, J, et al. (2007). Recent acceleration of human adaptive evolution. *PNAS,* 104: 20753-58.

Henn, B.M. et al. (2011). Hunter gatherer genomic diversity suggests a southern African origin for modern humans. *PNAS,* 108: 5154-5162.

Huerta-Sanchez, E. et al. (2014). Altitude adaptation in Tibetans caused by introgression of Denisovan-like DNA. *Nature*: doi:10.1038/nature13408

Hughes, J.F. et al.(2010). Chimpanzee and human Y chromosomes are remarkably divergent in structure and gene content. *Nature,* 463: 536-539.

Jobling,M. et al. (2013). Human Evolutionary Genetics. 2nd Ed. New York: Garland Science.

Jorde, L. B., et al. (2001). Population genomics: a bridge from evolutionary history to genetic medicine. *Human Molecular Genetics*, *10*(20), 2199-2207.

Kazazian, H.H. et al. (2004). Mobile elements: drivers of genome evolution. *Science,* 303: 1627-1632.

Kong, A. et al. (2002). A high-resolution map of the human genome. *Nature Genetics*, 31: 241-247.

Li, J.Z. et al. (2008). Worldwide human relationships inferred from genome-wide patterns of variation. *Science* 319: 1100-1104.

Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, *25*(6), 1159–1168.

Pääbo, S. et al. (2004). Genetic analyses from ancient DNA. *Annual Review of Genetics*, *38*, 645-679.

Patterson, N. et al. (2006). Genetic evidence for complex speciation of humans and chimpanzees. *Nature*, *441*(7097), 1103-1108.

Perry, G. H., et al. (2007). Diet and the evolution of human amylase gene copy number variation. *Nature Genetics*, *39*(10), 1256-1260.

Stoneking, M., & Krause, J. (2011). Learning about human population history from ancient and modern genomes. *Nature Reviews Genetics*, *12*(9), 603-614.

Tishkoff, S. A., et al. (2007). Convergent adaptation of human lactase persistence in Africa and Europe. *Nature Genetics,* 39: 31-40.

Willerslev, E., & Cooper, A. (2005). Review paper. Ancient dna. *Proceedings of the Royal Society of London B: Biological Sciences*, *272*(1558), 3-16.

Wu, H. et al. (2014). Cellular resolution maps of X chromosome inactivation: implications for neural development, function, and diseases. *Neuron,* 81: 103-119.