**ANTH 264/ANBI 134: Human Evolutionary Genetics**

Prof. Amy L. Non
Tuesday/Thursday 11am-12:20pm

<u>Contact Info:</u>
Email: alnon@ucsd.edu
Office Hours: Tues 1pm-2pm (or by appointment in Room 270 of SSB)
Office Phone: 858-822-2612

**Course Summary:**
The aim of this course is to explore how genetic data can be applied to address core issues in human evolution and population genetics. While learning these topics, you will also develop your analytical and critical thinking skills through reading, interpreting, and critiquing the most recent and important studies and topics in the field of anthropological genetics. The course will cover the reconstruction of population history using evidence from studies of contemporary and ancient DNA. We will explore sources of human genetic diversity, including mutation, migration, drift, gene flow, and selection. Through critical evaluation of the latest publications in genetic anthropology, we will discuss the molecular evidence for the origin of modern humans, race, reconstruction of key human migrations, and methods for detection of genetic admixture between populations. The final unit of the course will focus on the role of the environment in shaping human biological diversity and implications for human disease, including examples of epigenetics and the microbiome (ancient and modern).

**Course design:** This seminar course is designed for upper level undergraduate students and graduate students who are interested in molecular genetics and human evolution. Students from all colleges and departments are welcome to enroll. Graduate students will be graded on separate criteria from undergraduates. The course format is mainly discussion with substantial student participation. Lectures will be supplementary only in order to provide necessary introductory and background material.

**Course expectations:**
Students are expected to learn about genetic data supporting theories of human evolution and population migrations. At the end of the course, I expect students will have developed strong critical and analytical reading skills, and a detailed knowledge of the latest findings in genetic anthropology. This class is fairly demanding because it will require integration of knowledge from across a broad range of disciplines, and comprehension of current scientific publications, which can be challenging for students without experience reading scientific literature. Students will be expected to write questions or comments on all primary literature reading assignments to facilitate discussion each week, and to lead a presentation on a research article from the course syllabus. There will also be a number of homework exercises (up to 3) requiring analysis of real molecular data, one midterm, and one final exam. Although basic molecular biological concepts will be reviewed, some knowledge of DNA structure, Mendelian genetics, and basic molecular biology is expected.

Graduate students will be expected to perform additional assignments to undergraduate students, and will be graded on different criteria. Undergraduate students will be graded on participation (25%), 3 homework exercises (25%), 1 oral presentation (20%), and 2 exams (30%). Graduate students will be graded on the same categories worth the same percentages, but will present 2 oral presentations leading discussion on articles, and other additional assignments. Additionally,

graduate student will be asked to meet an extra hour outside of class each week to discuss assigned articles in greater depth or to discuss additional articles of interest to the group.

**Reading Material:**
Reading assignments will be drawn from the textbook, *Human Evolutionary Genetics* by Jobling, Hurles, and Tyler-Smith (latest edition). Additionally, scientific articles will be assigned and posted online each week. If students know of additional articles or topics that they would like to discuss, please contact me.

**Grading:** Final grades will be determined by the following five categories:
1) Participation (including questions/comments) (25%)
2) Three homework exercises (25%)
3) One oral presentation (20%) (two presentations for grad students, 10% each)
4) Two exams (30%).
In converting your numerical average to a letter grade, fractions will be rounded to the nearest whole number and the following scale will apply:
94-100%=A, 90-93%=A-, 87-89%=B+, 83-86%=B, 80-82=B-, 77-79%=C+, 73-76=C, 70-72%=C-, 67-69%=D+, 63-66=D, 60-62%=D-, < 60%=F.

**Participation**
Participation is required of all students and will be based on each student's contribution of original comments, questions, etc to the class. This includes comments to the whole class, as well as small group discussions. Students are not graded on the brilliance of their statements, but on their willingness to talk, a demonstration that the assigned material was read, and the originality of their comments. Simply showing up for class does not constitute participation. Remaining silent in class means that the highest grade a student can receive is a B.

At the beginning of each class, *at least 2 questions or comments for each journal article* assigned for that day's class will be turned in. These questions/comments are required as part of your participation grade. The questions/comments are intended to ensure that each student has read the required materials for that day and is prepared to actively participate in class discussions. If a student misses class, he/she will miss the opportunity to gain participation credit for that day (questions/comments can not be emailed to me for credit, as their purpose is to facilitate discussion). Some additional reading assignments will be assigned only for graduate students, which will be optional readings for undergraduate students.

**Homework Exercises:**
There will be a maximum of four homework **exercises** involving the analysis of hypothetical or actual molecular data. The exercises are intended to give students an opportunity to perform data analyses similar to those conducted in the discussion papers and will be graded on effort and accuracy. Exercises must be turned in **two weeks** after they are assigned. Students who miss the class in which an exercise is assigned are expected to turn the exercise in on time, i.e. two weeks after the missed class. An assignment will be considered late if it is not turned in at the beginning of class on the due date. Grades on late assignments will be reduced half a letter grade (e.g. from B to B-) for each day late. Exceptions to this policy will be made only through advance arrangement.

**Oral Presentation**
Each undergraduate student will present one 15-20 min **oral presentation** based on journal articles posted online. Graduate students will be required to present two oral presentations. The presentation must use Power Point or a similar presentation software. Regardless of whether a

student is presenting an article, all students will read all articles in the syllabus and be prepared to participate in class discussions of the articles. Students will sign up for articles for oral presentation on the third day of class (only one student may sign up for each article).

**Exams**
There will be two **exams** that will consist of short answer and essay questions and questions similar to the homework exercises. Questions must be answered during the class period without reference to books or notes of any kind. Calculators may be used, but no cell phones or similar devices will be allowed. Make-up exams will be scheduled only in extenuating circumstances and will require a doctor's note, police report, or similar supporting documentation. Graduate students may have an option to do an alternative assignment to the exams.

**Useful websites:**
- Useful information is provided by several websites:
- http://www.ncbi.nlm.nih.gov/PubMed - National Library of Medicine database of over 11 million journal articles dating back to the 1960s
- http://www.genome.gov/glossary.cfm  NIH-maintained glossary of genetic terms
- http://www.genomesonline.org/ - status of genome sequencing projects
- http://hsblogs.stanford.edu/morrison/human-genome-diversity-project/ – Human Genome Diversity Project (dated, good for historical perspective)
- http://hapmap.ncbi.nlm.nih.gov  - HapMap Project Website

**Class attendance policy:** Because the class format is mainly discussion, it is very difficult to make up missed classes by borrowing notes, etc. Therefore, students expected to attend all classes and to arrive on time. Participation grade will be diminished if students miss classes (each student is allowed 2 free misses without penalty). Computers are allowed in class, so you can access the readings or look up facts relevant to discussion, but if they are used to check email or surf the web, this will change. Power point lectures will be provided before class when possible, and students can print them and bring them in to take notes. Class discussions/lectures cannot be recorded in any manner without special permission. All cell phones must be turned off during class.

**Strategies for success:**
It is important to complete all the readings on time and it is best to do the readings throughout the week. In this way, you have time to think about and process the information during the week and in between different readings. Ideally, you would read some every night of the week. The amount of reading material is modest, particularly for an anthropology course. This is because it is expected that you will **re-read anything you do not understand** the first time. During your reading, you should **take copious notes** and these notes will form the basis of the summary + questions you must turn in for every article.

You have two weeks to work on the exercises. These exercises are most likely completely different from anything you've ever done and, thus, you may have lots of questions about how to proceed. The intent is that you will use the first week to start on the exercise and come to class the next week (i.e. the week before the exercise is due) with any questions you have about the exercise**. Do not wait until the second week to start the exercise**. Also, I am always available by email to ask questions about the exercises. **You may not work together** with classmates on exercises. Please show all work.

For the oral presentation, it is a good idea to **practice your entire presentation** without any stops the night before your scheduled presentation – this ensures your talk is the correct length of time and develops good practice for all public speaking.

Finally, you should review material throughout the course rather than trying to cram everything in the night before the exams. **Ask for help** in taking notes, comprehending the material, or preparing any of the written or oral assignments – I am available during office hours, you can schedule an appointment outside of office hours, and I am always available by email.

**Accommodations for students with disabilities:** If you require accommodation due to a disability, please make an appointment during my office hours so that we may discuss your needs. Students requesting classroom accommodation must first apply for services through the Office for Students with Disabilities (OSD).
https://disabilities.ucsd.edu/students/index.html

**Academic Integrity**
All UCSD students are required to adhere to the Policy on Integrity of Scholarship.  Please take the time to read the Policy found here: http://senate.ucsd.edu/Operating-Procedures/Senate-Manual/Appendices/2. The policy applies to all work done in this class.  Your questions/summaries, writing, and homework should be your own work. **Plagiarism or cheating will result in an "F" for the assignment and may be reported to the Academic Integrity Office for further action.**

**COURSE SCHEDULE**
Available in a separate document on online; contains reading assignments and important deadlines.