

ANTH 505.13 Anthropological Genetics Winter 2018
Department of Anthropology & Archaeology | University of Calgary

Lecture: Monday 2pm – 4:45pm
Location: Craigie Hall E 114

Instructor: Amanda Melin
Email: amanda.melin@ucalgary.ca
Office Hours (Earth Science 710F): By appointment

Teaching Assistant
Pamela Narváez
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Office Hours (Earth Sciences ES 722): Friday 1pm

PREREQUISITES

Anth 201, Anth 311, and Anth 350 or one additional senior primatology course and consent of the Department. Courses in biological sciences may be substituted at the instructor's discretion. Advanced, prior knowledge of genetics is not expected for this course and we will cover a general introduction. However, this is a 500-level course and you are expected to seek out additional readings or assistance as needed to firmly grasp the basic biological principles we will build on. (It's a good idea to do this earlier, rather than later in the course!)

COURSE DESCRIPTION

This seminar course will examine the principles of evolutionary genetics with a focus on applications to current topics in Anthropology such as behavior, life history, adaptation, migration and disease. We will explore the contents of the primate genome as well as human and non-human primate genetic variation in an evolutionary framework and discuss the latest advances in molecular techniques and their applications to addressing fundamental questions in biology. Special topics may include sensory adaptations, gene flow and migration, and conservation genetics. Key concepts will be illustrated using examples pulled from literature on humans, non-human primates and other animals. We will use a textbook, as well as discuss primary literature and have several guest lectures by experts in evolutionary genomics.

QUESTIONS ABOUT COURSE MATERIAL

All questions about course material must be posted to the designated D2L page, and **not** via email to instructors or TA. This allows all students to review questions and answers. Questions must start with the Topic. Students are encouraged to answer classmates' questions and the TA/Instructor will check this page twice a week, and add to these answers as needed. Students providing **answers** must provide their names to be eligible for bonus marks (below). Office hours and before/after class are also a great time to ask questions.

LEARNING OBJECTIVES

With the successful completion of this course, you will be able to:

- Describe the components of the human genome
- Navigate publicly available genome browsers and search for genes of interest
- Explain different methods used for genetic investigations and analyses

- Be familiar with current topics in Anthropology being addressed with molecular methods
- Understand how concepts in evolutionary genetics are used to answer questions about human migration, diversity, adaptation and evolution
- Identify pitfalls and limitations of molecular-based approaches for answering questions about human and other primates
- Be able to read and understand technical data papers in the discipline
- Critically evaluate and discuss primary literature and review articles
- Write a well-organized, clear and structured essay

REQUIRED TEXT: Jobling et al. 2013 Human Evolutionary Genetics (2nd edition)

This book does a great job introducing many fundamentals and key concepts of the human genome and human genome variation. These principals are relevant for all downstream aspects of the course. Reading assignments are provided for each lecture. For additional context and help with broader concepts, you may wish to read the entire book.

Students will also be responsible for accessing and reading journal articles assigned to each lecture and be prepared to discuss them in class.

CLASSROOM NORMS

Norms will be discussed on the first day of class and will cover the following areas:

- Attendance and punctuality
- Questions and participation
- Use of technology: laptops and cell phones
- Exam attendance and conduct

ATTENDANCE AND COURSE MATERIALS

Students should make every effort to attend each class. There will be short quizzes on the current week's assigned textbook readings and previous week's lecture materials at the start of each class. **Students will be allowed to drop their two lowest quiz grades, including missed quizzes;** make-up quizzes are not permitted. If you do miss a class, get missed notes from your peers as the instructor will not provide notes on missed classes. We will exchange email and establish contacts on the first day of class.

GRADING

There will be weekly quizzes each class during the semester, excluding the first class. Participation in weekly critical discussions will also count towards the course grade, and there will also be a final written assignment. Finally, there is an optional bonus assignment, described below.

As this is an upper division course, to the greatest extent possible the multiple-choice questions will require basic knowledge of the information presented in class and (most importantly) a strong grasp of relevant underlying concepts.

Weekly quizzes (60% total): Quiz questions will be based on assigned readings for that week (i.e. to reward students for being prepared for class) and also on integration of the previous weeks' lecture and/or journal article materials (to reward to students for mastering content previously introduced). Each quiz will have **10 questions** worth one point each. I may draw from suggestions submitted in class or **posted before 2pm the following Friday** on D2L by students. Students will be allowed to drop their two lowest quiz grades, including missed quizzes.

Participation in Critical Discussion of Journal Articles (20%). Students will receive 2% per discussion session – 10 sessions total - for demonstrating they have carefully read the assigned papers and are prepared to discuss their methods, results and importance. **Students absent from class due to illness or other excused absence must notify instructor before class and will be permitted to submit a written discussion of the assigned articles.**

Course Assignment – 23andMe Personal Genomics (20% total).

We have moved into a personal genomics era, in which individuals can now spend surprisingly small amounts of money to obtain dense genome-wide single nucleotide polymorphism (SNP) data (eventually this will move to whole genome sequencing), either on their own or as part of medical treatment. From these data, and benefitting from published evolutionary and population history (of the sort that will be emphasized throughout this course), it is in turn possible to obtain detailed ancestry information (report on genetic risk for certain common diseases may also be available).

3% of the paper grade will be based on participating in the peer-editing session on April 2nd. The grade assigned to the assignment itself will constitute the remaining 17%. Late papers – submitted after April 9th, will be decreased by one letter grade per day late. (E.g. an A- paper submitted on April 10th will receive a B-).

Students will submit a report on **either**:

1) the student's own individual genomic data and profiles, based on reports from a company offering a personal genomic service, i.e. 23andMe or AncestryDNA. **NOTE THAT THIS IS OPTIONAL.** For those who choose this option, you will receive genotypes for ~1 million of your SNPs spread across the genome and reports through a web-based presentation of the analysis of those data, which then updates going forward as relevant new scientific studies are published. When you order the service, a "kit" that contains a tube for saliva collection arrives. You send that back by return mail and create an online account. **You will have the choice to make your results publically available in anonymous, aggregated form, which may be used in research. This is optional and to interact directly with the company's informed consent procedures.** They notify you when the results are ready for your review. In the meantime, you can choose (optionally) to answer phenotypic questions about yourself, which is then able to be used with your permission as part of a huge customer database, to advance our knowledge of SNPs associated with complex traits. By reviewing your own genetic information and profile, you will solidify your understanding of the key evolutionary and medical genetics concepts that we cover throughout the semester. The information may also be of personal value to you. Finally, we will spend a period at the end of the semester to discuss these results (anonymously) and this experience, and the future outlook for personal genomics. **Note, depending on the reports you choose, you may learn new information of relevance to your health and ancestry that are surprising or impactful.**

ASSIGNMENT for option 1: **3-5 page report (not including references or figures); 11 point Arial font, 1 inch margins, 1.5 line spacing.** Discuss one or two personally interesting or valuable results from your genetics profile, explained in the context of your family or personal history (i.e., why is the result interesting or valuable to you?), **and situate discussion of this**

information using information about evolutionary processes and methods you have learned over the course lectures and textbook of the semester. Provide screenshots of the relevant 23andMe/ AncestryDNA pages from your profile as part of your report. It is not required, but you may enhance your report by also reading, discussing, and referencing relevant articles from the primary literature (journals only – no webpage citations).

If you wish to participate in the personal genomics opportunity, you need to order the service during (or before) the FIRST WEEK of the class, and then return your saliva sample immediately after it arrives, because the genotyping process can take several months and you will want to have your results before the end of the semester. Proof of submission date should be submitted to the instructor by email. Again, participation is completely optional, and there is an alternate assignment, based on papers that have been published by 23andMe (see below for details), so that those who do not order the personal genomics service are not disadvantaged.

OR

2) Alternatively, for students who chose to not order their own personal genotyping service, you may write a **3-5 page report (not including references or figures); 11 point Arial font, 1 inch margins, 1.5 line spacing**, describing the methods and results from one or more of the multiple papers published by 23andMe based on their analysis of the genotype and phenotype data from their database of customers, again drawing links to concepts covered in the course (papers to choose from will be indicated on D2L).

In either option, the assignment should be printed and handed in, in class on April 2, 2018. We will exchange papers for peer editing and instructor/TA feedback and you will submit a revised version on April 9th. In the final lecture of the semester, students will be invited to discuss the outlook for the personal genomics future.

Bonus Assignment (up to 3% final grade): - This optional assignment will **be due on last day of class**. Students may earn an additional 1%, 2% or 3% towards their overall course grade by submitting a transcript of their answers to student questions posted on D2L. Grades will be assigned based on both quality (correctness, thoroughness), consistency (answering throughout course) and quantity of questions answered. Assignments should be printed and handed to the instructor at the beginning of class, with the student ID in the top right-hand corner.

GRADE BREAKDOWN

A+ 100-94.9%	A 94.8-89.9%	A- 89.8-84.9%
B+ 84.8-79.9%	B 79.8-74.9%	B- 74.8-70.9%
C+ 70.8-66.9 %	C 66.8-62.9%	C- 62.8-58.9%
D+ 58.8-54.9%	D 54.8-49.9%	F 49.8% and less

TENTATIVE SCHEDULE OF COURSE TOPICS

*May be subject to modifications

DATE	TOPIC	TEXT CHAPTERS	ASSIGNED PAPER(S) for Discussion
Jan 8	Introduction to course; Evolutionary concepts, history of human genetics	Ch 1 and p160	n/a
Jan 15	Organization of the human genome	Ch 2	Discussion 1) Millan 2017; Carbone et al 2014 (summary in “Something to swing about” News and Views)
Jan 22	Sources of variation in the genome	Ch 3	Discussion 2) Zarrie et al 2015; Janiak et al 2017
Jan 29	Phenotypic effects of genome variation	Chapter 3 (esp. 43-46, 57-62) & Chapter 15	Discussion 3) Fan et al 2016; Siepel and Arbiza 2014
Feb 5	Genomics technologies and methods *this class will be held on the Foothills campus; meet at the information desk in HSC building across from parking lot 6 for lecture and tour*	Ch 4	Guest lecture Dr. Duytschaever; Lab tour and overview of projects in Melin lab and technologies used
Feb 12	Simple and complex traits	Chapter 3 (43-6), Chapter 15 (483-4)	Discussion 4) Schmitt et al 2017; McManus et al 2017
Feb 19	Spring Break – no classes		
Feb 26	Comparative genomics	Ch 5(160-1), Ch 7(237-238), Ch 8(265-71)	Discussion 5) Rogers and Gibbs 2014; Melin et al. 2016
Mar 5	Evolutionary theory and population genetics	Chapter 5, 16(523-26)	Discussion 6) Lee et al 2017 (Activity!); Martin et al 2017 (Human variation).
Mar 12	Human variation	Chapter 5(147), 9(300-2),14	Guest lecture by visiting professor Dr. Kawamura and colleagues.
Mar 19	Recent human evolution	Chapter 6 (6.1, 6.2, 6.7, 6.8), 10(335-8), 15(500-3) Ch 15 500-507	Discussion 7) Veilleux et al (In Review); Wallberg et al 2017; Yi et al 2010.
Mar 26	Ancient DNA and human evolution	Chapter 4 (123-8), 8(272-3), 9(303-13)	Discussion 8) Marciniak and Perry 2017; Simonte et al 2016; Slon et al 2017.
Apr 2	Guest lecture on Microbiome (Written assignment due)	Reading assignment TBA	Assignment exchange and editing workshop. Discussion 9) Personal genomics outlook discussion
Apr 9	Epigenetic modification and evolution (Revised assignment due; bonus assignment due)	20, 29, 56, 85-8; 483-5	Discussion 10) Bitar and Berry, Lowden et al 2016

COMMUNICATION ETIQUETTE (e.g., Email, D2L Questions)

- Please use your university account for email. If forwarded to another service (e.g. gmail), and account visible use an account with an appropriate name (Example of an unacceptable email: sexy mama@gmail.com).
- Use a clear subject line that includes the course name/section and the topic of the email such as “ANTH 505 Question about my schedule”
- Please be respectful (i.e., not too casual) when addressing me in an email. Use an appropriate greeting (acceptable: “Dear Prof Melin”; unacceptable: “Hey there”). Please proof-read, spell check and use complete sentences.
- On D2L please try to keep the question(s) short and to the point. Questions may be anonymous. Show that you have made an effort to find the answer first in the text and lecture material (or even an outside source). State what you know in relation to what you are having a difficult time understanding. Replies should be tactful, supportive and helpful. Responses should **not** be anonymous and can be used for the bonus assignment (see section on bonus assignment).
- Allow 48 hours for an email response, excluding weekends and holidays. I will check D2L twice weekly and moderate discussions as needed.

REMINDER – Instructor will NOT answer questions about course content by email – these questions should be posted to D2L.

*Please note: I may choose not to respond to emails that do not follow the format outlined above so please be thorough and respectful when addressing me with a concern and in return, and I will try my very best to get back to you as soon as possible to accommodate your needs.

PLAGIARISM AND CHEATING

Plagiarism: “to steal and pass off the ideas or words of another as one’s own” (Webster’s). Plagiarism will not be tolerated and will automatically result in a failing grade for the submission. Any student caught plagiarizing will also be subject to additional University sanctions. Students are expected to be familiar with the Department of Anthropology and Archaeology’s policy on intellectual honesty

DEFERRED EXAMS:

A student who is absent from a test for legitimate reasons must discuss an alternative course of action with the instructor. The instructor at their discretion may transfer the percentage weight for the test to the final examination, if there is a final examination in the course, set another test, etc. An instructor will normally make this decision on the basis of verbal information provided by the student. In the event that an instructor feels that they cannot judge the veracity of the information provided, Students must be aware that they are responsible for payment of any charge associated with the medical assessment and documentation as this service falls outside the realm of services provided by the Provincial Health Care Plan. Deferral of the registrar scheduled final exam requires Registrar approval.

If a deferred exam is administered, the format of the exam may be different than the original exam.

ACADEMIC ACCOMMODATIONS

<http://www.ucalgary.ca/access/accommodations/policy>

Students needing an Accommodation because of a Disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities

Students needing an Accommodation based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the instructor of this course.

ACADEMIC INTEGRITY

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Calgary is a strong signal of each student's individual academic achievements. As a result, the University treats cases of cheating and plagiarism very seriously. Non-academic integrity also constitutes an important component of this program.

For detailed information on what constitutes academic and non-academic misconduct, please refer to the following link: <http://www.ucalgary.ca/pubs/calendar/current/k-2-1.html>

All suspected cases of academic and non-academic misconduct will be investigated following procedures outlined in the University Calendar. If you have questions or concerns about what constitutes appropriate academic behavior or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources.

Where there is a criminal act involved in plagiarism, cheating or other academic misconduct, e.g., theft (taking another student's paper from their possession, or from the possession of a faculty member without permission), breaking and entering (forcibly entering an office to gain access to papers, grades or records), forgery, personation and conspiracy (impersonating another student by agreement and writing their paper) and other such offences under the Criminal Code of Canada, the University may take legal advice on the appropriate response and, where appropriate, refer the matter to the police, in addition to or in substitution for any action taken under these regulations by the University

TEACHING EVALUATIONS / USRI (Universal Student Ratings of Instruction)

At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference, please participate! Website: <http://www.ucalgary.ca/usri/>

Writing Across the Curriculum

Writing skills are not exclusive to English courses and, in fact, should cross all disciplines. The University supports the belief that throughout their University careers, students should be taught how to write well so that when they graduate their writing abilities will be far above the minimal standards required at entrance. Consistent with this belief, students are expected to do a substantial amount of writing in their University courses and, where appropriate, members of faculty can and should use writing and the grading thereof as a factor in the evaluation of student work. The services provided by the Writing Support, part of the Student Success Centre, can be utilized by all undergraduate and graduate students who feel they require further assistance

Emergency Evacuation Assembly Points: In the event of an emergency that requires evacuation, please refer to the following link to become familiar with the assembly points for the class: <http://www.ucalgary.ca/emergencyplan/assemblypoints>

Freedom of Information and Protection of Privacy Act:

The University of Calgary is committed to protecting the privacy of individuals who work and study at the University or who otherwise interact with the University in accordance with the standards set out in the Freedom of Information and Protection of Privacy Act. Please refer to the following link for detailed information: <http://www.ucalgary.ca/legalservices/foip>

The Department of Anthropology and Archaeology's FOIP (Freedom of Information and Privacy) policy requires all reports/examinations to be returned to students during class time or the instructor's office hours. Any term work not picked up will be placed in the Anthropology and Archaeology Office (ES620) for distribution. Any student not wishing to have their work placed in the office must make alternative arrangements with the course instructor early in the term.

Safewalk Information: Campus Security, in partnership with the Students' Union, provides the Safewalk service, 24 hours a day to any location on Campus including the LRT, parking lots, bus zones and University residences. Contact Campus Security at (403) 220-5333 or use a help phone, and Safewalkers or a Campus Security Officer will accompany you to your campus destination.

Faculty of Arts Program Advising and Student Information Resources: Have a question, but not sure where to start? Arts Students' Centre

The Faculty of Arts Students' Centre is the overall headquarters for undergraduate programs in the Faculty of Arts. The key objective of this office is to connect students with whatever academic assistance that they require.

In addition to housing the Associate Dean, Undergraduate Programs and Student Affairs and the Associate Dean for Teaching and Learning, the Arts Students' Centre is the specific home to:

- program advising
- the Faculty's Co-operative Education Program
- the Arts and Science Honours Academy
- the Faculty's Interdisciplinary Programs
- a Student Help Desk

Location: Social Sciences Room 102

Phone: 403.220.3580

Email: ascarts@ucalgary.ca

Website: arts.ucalgary.ca/undergraduate/

For registration (add/drop/swap), paying fees and assistance with your Student Centre, contact Enrolment Services at (403) 210-ROCK [7625] or visit them at the MacKimmie Library Block.

Contacts for Students Union Representatives for the Faculty of Arts:

arts1@su.ucalgary.ca

arts2@su.ucalgary.ca

arts3@su.ucalgary.ca

arts4@su.ucalgary.ca

Ombudsman's office: <http://www.ucalgary.ca/ombuds/>