

## Anthropology 2D03

### DNA and the Anthropologist

Class Schedule: Monday, Wednesday and Thursday, 10:30 – 11:20. KTH B132

**Instructor:** Hendrik Poinar

Office: Chester New Hall room 537

Office hours: Monday 11:30 – 1pm

Readings: “Human Evolutionary Genetics”, 2<sup>nd</sup> edition (Jobling, Hollox, Hurles, Kivisild, & Tyler-Smith; ISBN 9780815341482). Available from Titles Bookstore. Additional required readings will be emailed or posted on Mosaic, or can be directly downloaded via the library subscriptions (<http://library.mcmaster.ca>) accessible to McMaster community members. You will need your MacID and password to log in.

#### **Course description:**

This course is an introduction to the fascinating many uses (and potential misuses) of DNA in anthropology, archeology and forensics. If this is your first introduction to DNA, that’s great, have no fear. My hope is that this will inspire you to learn about how ‘reading’ our DNA (or that of closely related ancestors or relatives) can teach us about our origins, how we identify the missing, why we have certain phenotypic characteristics etc. How does genetics play a role in shaping the current human condition (genes, race, medical genetics). Class format includes three 50 minutes lectures on Monday, Wednesday and Thursday at 10:30.

#### **Learning Objectives:**

At the termination of this course, you will be able to:

- Know the basics about DNA.
- Understand the basics of human genetic analyses.
- Know how one obtains DNA sequences from a variety of tissues/samples and the ethics thereof.
- Understand how DNA can be used to address the origins of modern humans.
- Understand the role that infectious diseases have played on our genes/genomes.
- Describe how ancient DNA from fossil remains has shed light on the evolution of key ancient pathogens and our relationships to/with Neanderthals.
- Understand the basics of forensic DNA typing.
- Understand the misconceptions of race from a genetics standpoint.

- Understand how changes in DNA sequences can be used to infer adaptation, domestication etc.

## WEEKLY SEMINAR SCHEDULE

### **Week 1 (Sept 5) - Topic: DNA, what is it, how do we access it and how do we use it?**

*Chapters 1 and 2 (Don't worry about mitosis- in 2.6)*

Mon – No classes! YAY!

Wed – Introduction to the course, what's all the fuss about DNA anyway??

Thur - What is DNA? What's a genome??

### **Week 2 (Sept 12<sup>th</sup>) - Topic: The Variation in our genome, how do we measure/use it?**

*Chapters 3, sections 3.1-3.4 and Chapter 4, sections 4.1-4.7. I'll speak about chapter 4 first.*

Mon – How do I get my DNA and where do I get it from (blood, saliva, poop??) ?

Wed – The AGCT of my sequence. Wait how do I go from DNA to a sequence.

Thur – Visit to the Farncombe Sequencing Centre – the machines that go bing.  
*(Ana to take class over?)*

### **Week 3 (Sept 19<sup>th</sup>) - Topic: Basics of evolutionary and population genetics**

*Chapter 5, sections 5.1, 5.3, 5.4; Chapter 6, Sections 6.1, 6.3, 6.4, 6.6*

Mon – What *is* this thing called evolution and why should an anthropologist care about it?

Wed – How are DNA sequences and in turn populations affected by evolution?

Thur –**Quiz 1 and recap of key points.**

### **Week 4 (Sept 26<sup>th</sup>) – Topic – DNA, our place on the family tree and our origins.**

*Chapter 7 (7.3, 7.4), Chapter 9 (9.1, 9.2, 9.3, 9.4)*

Mon – Lets compare sequences! Where do we fit on that evolutionary tree?

Wed – What's a phylogenetic tree? What do DNA trees say about our (human) origins?

Thur– Human genetic Diversity?? Huh?? A molecular clock, say what?

**Week 5 (Oct 3<sup>rd</sup>) - Topic: TIME TRAVEL! Ancient DNA, Neanderthals and Denisovans....**

*Chapter 4 (section 4.10), Chapter 9 (Section 9.5).*

Mon – Getting DNA from old, dead things! Cool!

Wed – Wait, what? Our ancestors had sex with ....?

Thurs –What is a species and what does neanderthal sex suggest about hominid species?? **Quiz 2**

**Week 6 (Oct 10<sup>th</sup>) – READING WEEK- ENJOY YOUR THANKSGIVING BREAK!**

**Week 7 (Oct 17th) Topic: And where did we go again?**

*Chapter 11 (sections 11.1, 11.2, 11.3); Chapter 13 (sections 13.2)*

Mon – Out of Africa a few times!

Wed – Are we there yet?

**Thu– MIDTERM !! (In class).**

**Week 8 (Oct 24th) Topic: How have we adapted to our environment?**

*Chapter 15 (sections 15.3, 15.4, 15.6)*

Mon – Mountains of madness.

Wed – Got milk?

Thur – Review - Anthropology and Adaption.

**Week 9 (Oct 31) Topic: DNA stories about bugs and beds.**

*Readings to be provided*

Mon – Infections jumping from animals to humans!

Wed – Lice and us!

Thur - Origins of HIV! **Quiz 3**

**Week 10 (Nov 7) Topic: DNA and the study of ancient diseases!**

*Readings to be provided*

Mon – How do we study diseases of the past?

Wed – What ‘caused’ the Black Death?

Thur – Disease of the New World, Europeans to blame??

**Week 11 (Nov 14) Topic: Forensics!**

*Chapter 18 (Section 18.1, 18.2, 18.4)*

Mon – Fingerprinting and the age of CSI!

Wed – Genetic profiling, databases, good or bad?

Thur – **Quiz 4**

**Week 12 (Nov 21) Topic: DNA and domestication!**

*Readings to be provided*

Mon – Dogs, dogs dogs!

Wed - Corn on the cob!

Thur – **Guest speaker**

**Week 13 (Nov 28) Topic: DNA and Race...**

*Readings to be provided*

Mon - DNA and race, who’s the ‘most’ evolved (professors of course!)?

Wed - The dark ages of DNA and the mismeasure of men and women....

Thu – **Quiz 5 FINAL PAPER DUE**

**Week 14 (Dec 5<sup>th</sup>) RECAP!**

Mon/Wed – Review of all material.

**Learning Assessments:**

Quizzes

20% - there will be 5 quizzes on select days (see weekly outline above). They will consist of multiple choice and/or short answer – covering the topics discussed in the week(s) since the previous quiz. Four will count, the lowest grade will be dropped.

There are no makeups for quizzes. But you can throw one out (if you take all 5).

|                                      |   |
|--------------------------------------|---|
| Midterm exam (Oct 20 <sup>th</sup> ) | 25% - This will be a multiple choice, short answer and one long answer exam based upon the material we have read and has been presented in class. Both in class material and textbook will be used.                         |
| Final exam                           | 35% - This final will be again a combination of multiple choice, short and long answer based upon the material we have read AS WELL AS the material which has been presented to you by me in class. This is a 2 hour final. |
| Paper:                               | 20% - a three page written paper on a topic within molecular anthropology that sparks your fascination. Due on the last week of class (in class). Details to be presented to you after midterm.                             |

### **Academic dishonesty**

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g., the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at [http://www.mcmaster.ca/senate/academic/ac\\_integrity.htm](http://www.mcmaster.ca/senate/academic/ac_integrity.htm)

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g., the submission of work that is not one's own for which other credit has been obtained. (*Insert specific course information, e.g., style guide*)
2. Improper collaboration in group work. (*Insert specific course information*)
3. Copying or using unauthorized aids in tests and examinations.

*(If applicable)* In this course we will be using a software package designed to reveal plagiarism. Students will be required to submit their work electronically and in hard copy so that it can be checked for academic dishonesty.