

# Human Genome and Disease (I) BIO 109A, BIOC 109A/209A, HUMBIO 158

Winter 2019

Tuesdays/Thursdays, 3:00-4:20pm

Li Ka Shing Center (LKSC), TBA

**Instructor:** Professor Renu Heller (rheller@stanford.edu)

**TA & Course Admin:** Oscar Matus(omatus@stanford.edu)

**Office Hours:** By appointment

## Description:

This course focuses on the Human Genome and on biotechnologies applied to understanding the genetic control of this fundamental information. Specifically, we will explore how genomic information can be applied to biomedical research, drug discovery, and human health.

Biomedical research is now moving beyond genetic sequencing and genome wide association studies to focus on discovering DNA variants involved in the causal mechanisms of disease. Knowledge of genetic variation can inform our understanding of how genes and their products interact in elaborate networks and can thus allow for the use of such variants of potential inheritable disease. Covered in this course will be the implications of genomic marker research and their real-life applications, including many cutting-edge therapies in the pipeline. This is a survey course with original contributions from leading thought experts from Stanford and industry in the field of genetics. We will also emphasize the importance of effectively communicating scientific findings with the general public.

This year, the course will encompass diseases such as sudden cardiac death, ALS, Parkinson's, autophagy, HIV, Hepatitis, pain, diabetes and the impact of novel biotechnologies.

## Grading:

One Writing Assignment (50% of course grade)

### *(1) Research Proposal*

(a) You will write a research proposal that utilizes a therapeutic approach for the disease(s) discussed. Goal: apply your knowledge to the therapy of the disease (b) Must include:

- (i) What disease would you like to explore in your proposal? Why?
- (ii) How would you approach understanding the disease?
- (iii) What parts of the physiology would you interrogate treating the disease?
- (iv) What methods would you employ to explore your question?
- (v) What are the different results you would expect? Why?
- (vi) What would be your conclusions from each?

- (vii) What therapy would you target?
- (viii) More personally, what would you like to see as a therapy for this disease soon?  
I.e. Now that you know about the disease (at least, you've been introduced), if you knew someone with the disease, what would be your aspirations for therapies for it?

**Paper due date: Thursday 03/14/19:**

- Electronic submission to Canvas's Dropbox by end of class (4:20PM) • PAPER COPY DUE IN CLASS

Research Proposal Outlines (25% of course grade)

You must submit 1-2 page outline of your research proposal answering:

- What disease would you like to explore in your proposal? Why?
- How would you approach understanding the disease?
- What parts of the physiology would you interrogate treating the disease?
- What methods would you employ to explore your question?
- What are the different results you would expect? Why?
- What would be your conclusions from each?
- What therapy would you target?
- More personally, what would you like to see as a therapy for this disease soon?  
I.e. Now that you know about the disease (at least, you've been introduced), if you knew someone with the disease, what would be your aspirations for therapies for it?

**Outline due date: Thursday 02/14/19**

- Electronic submission to Canvas's Dropbox by end of class (4:20PM) • PAPER COPY DUE IN CLASS

Attendance and Participation (25% of course grade)

Attendance for all lectures is MANDATORY. Any missed lecture without proper documentation or official excuse in advance of the missed class will result in a lowered course grade. Since this class relies heavily upon student participation, we will require that you submit **three** questions pertaining to the speaker's lecture on Canvas DURING class time: the assignment prompt will not take submissions past 4:30 PM. This will count as your attendance for that day. When you ask in class one of your submitted questions, mark it with an asterisk on the sheet. Over the course of the quarter, asking a question during class on at least **ten** different days will count as your participation grade (that is - we want you to actively participate in at least half of the classes).