

Genomics and Society: BIOL061L KS-01

Spring 2022

Professor Findley Finseth

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Class: Tuesday & Thursday, 9:35-10:50; Scripps Humanities Bldg 119

Zoom: ID: 956 7665 3912

Lab: Tuesday 1:30-3:30; Keck Science B39

Zoom: ID: 957 5918 0375; Passcode: 821577; [link](#)

Office Hours: TBA and by appointment

Overview:

Genomics has revolutionized the study of medicine and biology, but has also generated complex controversies. This non-majors course (Natural Science) course will provide a foundation in the scientific principles governing the structure, function and evolution of genomes, as well as highlight key genomic technologies. Along the way, we will also place these topics in a broader ethical and social context. The course will focus on the ways genomics intersects with human society and include topics such as personalized genomics, ancestry detection, and agricultural genomics. This course does not count towards Biology-related majors.

Course Goals:

Understand discovery-based and hypothesis-based approaches to solve genomics problems and explain genomics phenomena.

Gain an understanding of the foundational concepts and principles of genomics and how these concepts relate. Specifically, we will focus on genome structure, function, inheritance, and variation and how these concepts interact to produce phenotypes.

Design, analyze, interpret, and communicate genomic experiments.

Read and interpret primary (scientific literature) and secondary (popular science, news articles, podcasts) resources that address genomics topics.

Engage with the applications of genomics technologies and gain an appreciation for how these both impact society and generate complications and controversy.

Become aware of the role of genomics in society and be empowered to contribute to societal discussions and decisions in this area.

Increase scientific literacy. Improve your skills in investigating scientific questions of interest and critically challenge information present to you as "scientific".

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Format:

This course has two lecture sections and one 2-hour lab each week. The course will be divided into ~ 1 topic/chapter per week (though some topics will require more time). Each topic will have lectures focusing on the scientific principles, along with discussions or activities exploring the societal applications and related ethical issues of that topic. Labs will allow for hands-on experience with the topic. Labs will usually be computer-based, explore genomics tools and technologies, and allow you to apply quantitative reasoning to analyze and interpret genomic data. In lab, you will have opportunities to develop genomics questions and design (and execute) experiments to address those.

Textbook:

Human Genetics: Concepts and Applications, Ricki Lewis, Thirteenth Edition

Ebook or hard/rented copy should be fine. Available at the book store or online. Because we are dealing with genomics, much of the relevant material is new. Therefore, I recommend the 13th edition over previous editions.

Additional scientific and media articles will be assigned throughout the course and available on the course website for that week.

Flexibility:

These are unprecedented, complicated times. If you need additional time, help, or other accommodations, please don't hesitate to ask. I will be generous with deadlines if you let me know **in advance** (or as soon after as possible) of due dates.

Class readings

Material covered in class will include readings from the textbook and some additional resources (popular science articles, podcasts, etc.). Reading guides for the textbook readings will be posted by the Monday of each week. These will help guide and target your reading. Prioritize reading the assigned pages before class.

Grading scale:

Grading will be assigned as follows, and will only be adjusted to increase a student's letter grade.

90-100%	A, A-
80-89.99%	B+, B, B-
70-79.99%	C+, C, C-
60-69.99%	D+, D, D-
<60%	F

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Point distribution:

Exam 1:	15%
Exam 2:	15%
Problem Sets:	15%
Lab Assignments:	20%
Lab Final project:	20%
Participation:	15%

Exams:

There will be two exams and no final exam. Exams will focus on the scientific principles covered in the course. While Exam 2 will focus on material covered in the second half of the course, you will need to have a solid foundation in the earlier material in order to perform well on Exam 2.

Problem sets:

There will be 6 problem sets throughout the course, each worth ~3% of your grade. You are encouraged to work in study groups on problem sets, but please write your answers in your own words. Problem sets are designed to help you study the material and work through conceptual issues without a time limit. Your lowest problem set grade will be dropped. Problem sets are due Thursday, at the beginning of class for the weeks posted on the schedule.

Lab Assignments:

Each lab will have an assignment due. These will usually take the form of worksheets and may be individual- or group- based. For some labs, the assignments will need to be completed as an "exit ticket". For others, the assignments need to be completed as homework and will be due prior to the beginning of the next lab.

Lab Final Projects:

The course will culminate in student research projects that use genomics tools to design, execute, and analyze a genomics experiment that has relevance for society. Students will develop a question based on a framework they will be introduced to in the lab. They will then interrogate that question with genomic data, analyze the data, and prepare a presentation. Lab projects will be highly collaborative and group work is encouraged. We will start with guided activities and build to you being the scientists by developing your own questions and analyses. These projects will be presented during the final lab section in a conference-style symposium.

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Participation:

Class participation points are awarded to encourage your active class participation and engagement. Both frequency and quality of participation will factor into your score. Because the class may be interrupted due to COVID-related disruptions, there are numerous ways to participate. Ways to participate include:

- *Attending and engaging in class*
- *In-class polling*
- *Discussion holistic assessments*
- *Spotlight scientists*
- *Attending and engaging with office hours*

Attending and engaging in class: I will take attendance in class. Please come to class ready to participate and respectfully interact with others. Students that miss more than five classes (in-person or Zoom) will not pass the course.

In-class polling: We will regularly answer prompts with a live polling application (e.g., Polleverywhere or Canvas quizzes). In most cases, you will receive half a point for each question attempted and an additional half point for each question answered correctly. You do not need to attend every class and/or get all answers correctly to receive full credit. This will allow us to keep up with attendance and engagement.

Discussion holistic assessments: We will be discussing numerous sensitive topics in the class. In order to have meaningful discussions, everyone will need to participate and engage, while being respectful of others. We will use several different discussion formats during the class. You may be asked to present a topic, facilitate a discussion in a group or for the whole class, or simply listen and answer questions. We will assess discussion participation using periodic holistic assessments.

Spotlight Scientists: Science and society benefit greatly from a community that approaches problems from a variety of creative ways, with each scientist bringing their own unique background and experience to the table. Throughout the semester, we will hear podcast stories/interviews related to topics covered in class from different scientists representing a range of identities. After listening, you will be asked to complete a short response.

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Attending and engaging in office hours: I am happy to answer your questions or just talk during the scheduled office hours and by appointment. Office hours are a great chance to ask questions, discuss your grant ideas/frustrations, or just chat about things in the class you are finding interesting. Just stop by to hear what your colleagues are thinking about! Generally, the office hours prior to problem sets being due function as problem-solving sessions (I highly recommend attending!). Bring a friend in the class with you to ask questions as a group. At the beginning of the semester, we'll do a poll to find the most useful time for the scheduled office hours.

Late work

Assignments are expected to be turned in on time. However, I understand that situations beyond our control can sometimes cause delays. Therefore, each student is allowed two freebies, where they can turn assignments in up to three days late with no penalty. If you need to use a freebie, please alert me and I will mark it down. After your two freebies have been used, a grade penalty will apply for every 24 hours late (-10% day 1, -25% day 2, -50% day 3, no credit day 4+).

If you are ill or in quarantine/isolation and you are feeling well enough to work, we will find a way for you to complete your assignments remotely. If you are not well enough to work, we will craft a plan together (and in communication with the DoS office, if necessary). The earlier you can let me know of any potential disruptions in your work, the better.

Communication policy:

Please communicate with me via email. I will do my best to respond to you within 24 hours, or by mid-day Monday if contacted over the weekend.

Inclusivity and equity

We aim to build a climate of inclusion, equity, and respect where we welcome the contributions of all students in order to build an effective learning space. We strive to establish an environment where every student can feel comfortable wrestling with new and challenging concepts. We also recognize that science is a human endeavor and is greatly improved by working collaboratively with scientists from diverse backgrounds and expertise. We do not tolerate acts of harassment or discrimination conducted by anyone. Please contact me and/or your college's Dean of Students or Student Affairs Office if you have any concern.

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Academic accommodations:

The Claremont Colleges value diversity and inclusion; we are committed to a climate of mutual respect and full participation. As such, our goal is to create learning environments that are equitable, inclusive and welcoming. If you anticipate or experience any barriers to learning related to a disability or condition, please contact your home institution to formally establish accommodations. They will work with you to discuss your experiences and range of options to ensure your full participation in this course and others. Once accommodations for this class have been formalized, it works best if we have an early-semester chat about ways to adjust the class to meet your needs.

Please note that a student's home campus is responsible for establishing and providing accommodations. Below is a list of coordinators on the campuses:

- CMC: AccessibilityServices@cmc.edu
- Scripps: ars@scrippscollege.edu
- Pitzer: gabriella_tempestoso@pitzer.edu
- HMC: access@g.hmc.edu
- Pomona: disability@pomona.edu
- Claremont Graduate University: disabilityservices@cgu.edu
- Keck Graduate Institute: student.accessibility@kgi.edu

Academic honesty:

Academic misconduct and dishonesty will not be tolerated, and violations will be reported to your Dean of Students. Please ask for an extension if you find yourself stressed and contemplating plagiarism – the college's penalties are severe and I am bound to them, so please ask for help instead.

Title IX statement

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources at <https://www.7csupportandprevention.com/>. Please note that other faculty and staff may not have the proper formal training to handle such situations and may not be able to provide confidentiality.

Lecture schedule: The schedule below provides an **approximate** timeframe. Both topics and timelines are **subject to change**.

Week	Week of:	Tues lecture*	Thursday lecture*	Tues lab**	PS due?***
1	17-Jan	Introduction	The information in a human genome [Ch 1]	No Lab	
2	24-Jan	Single Gene Inheritance [Ch4]	Single Gene Inheritance [Single gene diseases]	Single gene case study	
3	31-Jan	Complex Traits [Ch 7.1; polygenic traits]	Complex Traits [Genomics and Race]	Complex Traits	PS1
4	7-Feb	Complex Traits [Ch7.2; GWAS]	Matters of Sex [Background reading; Ch 6]	GWAS	
5	14-Feb	Matters of Sex [Genomic basis of sexual orientation]	Chromosomes [Chapter 13, 23]	Genetics and Sex	PS2
6	21-Feb	Chromosomes [Prenatal genetic testing]	Genomes [Ch 14]	Prenatal genetic testing	
7	28-Feb	Genomes [Legacy of human genome]	Population genomics [Ch 15, 18]	Direct-to-consumer comparisons	PS3
8	7-Mar	Population genomics [Ancestry testing]	Exam 1	Exam review	
9	14-Mar	SPRING BREAK	SPRING BREAK	SPRING BREAK	
10	21-Mar	Human Ancestry and Evolution [Ch 17]	Human Ancestry and Evolution [Paleogenomics]	Student projects: Developing questions/literature searching	
11	28-Mar	Genetics of Identity [Ch 18]	Genetics of Identity [Forensics and privacy]	Student projects: Experimental design	PS4
12	4-Apr	Cancer genetics and genomics [Ch 20]	Cancer genetics and genomics [Precision medicine]	Student projects: Executing experiments I	
13	11-Apr	DNA Technologies [Ch 21]	DNA Technologies [Gene drive/CRISPR]	Student projects: Executing experiments II	PS5
14	18-Apr	Genetics of Immunity [Ch 19]	Genetics of Immunity [Vaccine Development]	Student projects: Analyzing data/ stats/ figures	
15	25-Apr	Reproductive Technologies [Ch 22, 23]	Reproductive Technologies [ARTs]	Student projects: Finalizing presentations	PS6
16	2-May	Eugenics*	<Reading day>	Student projects: Student presentations	
	Finals	Exam 2			

*Additional background reading/resources may accompany all topics and will be posted on the course site for the week.

** Lab assignments will be due approximately weekly and posted on the course website.

*** Problem sets are due on Thursdays of the indicated week, unless stated otherwise