

# The Human Genome MCB 149, Fall 2020

This course is designed for advanced undergraduates and focuses on our current understanding of the human genome and its functions. Lectures and discussions delve into topics drawn from the primary research literature. Students are expected to have a good understanding of basic concepts in genetics and molecular biology. Students will be expected to read and extract information from research papers. Prerequisites: MCB 140 or MCB 104. MCB 110 is strongly recommended.

## **SCHEDULE**

Three hours of lecture and one hour of discussion per week [3 units]

Lectures are on Mon, Wed 11 AM-12:30 PM

DISCUSSION Sections are on FRIDAY 11 AM-12 PM (Section 101) and Friday 12 PM-1 PM (Section 102)

## **FACULTY**

### **Professor Lin He**

Office Hours: Mon 12:30-1:30 PM (or by appointment)

These office hours are relevant only for the weeks during which Professor He lectures.

### **Professor Barbara Meyer**

Office Hours: Wed 12:30-1:30 PM (or by appointment)

These office hours are relevant only for the weeks during which Professor Meyer lectures.

## **GSI**

### **Anna Rogers**

Office Hours: Thurs 4:30-5:30PM

## **GUEST LECTURES:**

### **Professor Craig Miller**

Office Hours: Professor Miller will be available briefly after his lectures to answer questions.

### **Professor Mike Eisen**

Office Hours: Professor Eisen will be available briefly after his lectures to answer questions.

### **Professor Fyodor Urnov**

Office Hours: Wed 12:30-1:30PM

These office hours are relevant only for the weeks during which Professor Urnov lectures.

## MCB 149 Fall, 2020 – LECTURE SCHEDULE

Week	Date	Lec	Lecturer	Topic
1	Aug. 26	1	Miller	Human genome and genetics introduction
2	Aug. 31	2	Eisen	Human genomes - genome variation within our species
3	Sept. 2	3	Miller	Selective sweeps in the human genome
	Sept. 7	Holiday		Holiday
4	Sept. 9	4	He	Mouse models for human development and disease
	Sept. 14	5	He	Stem cells and mammalian pre-implantation development I
5	Sept. 16	6	He	Stem cells and mammalian pre-implantation development II
	Sept. 21	7	He	Limb development and disease I
6	Sept. 23	8	He	Limb development and disease II
	Sept. 28	9	He	Lung development and disease I
7	Sept. 30	10	He	Lung development and disease II
	Oct. 5	11	He	Mobile elements in the genome I FIRST WRITTEN ASSIGNMENT RELEASED
8	Oct. 7	12	He	Mobile elements in the genome II
	Oct. 12	13	Meyer	Genome editing principles and tools
9	Oct. 14	N/A	No class	FIRST WRITTEN ASSIGNMENT DUE AT noon
	Oct. 19	14	Meyer	Genome editing applications and ethics
10	Oct. 21	15	Meyer	Chromosome organization and structure
	Oct. 26	16	Meyer	Functions of long non-coding RNAs
11	Oct. 28	17	Meyer	Imprinting: Parent-of-origin effects on genome function
	Nov. 2	18	Meyer	Reprogramming differentiated cells into induced pluripotent stem cells and subsequent differentiation into tissues and animals
12	Nov. 4	19	Meyer	Reprogramming, induced pluripotency, organoids
	Nov. 9	20	Meyer	Cancer genetics and genomics

	Nov. 11	Holiday		Holiday
13	Nov. 16	21	Meyer	Cancer therapy
	Nov. 18	22	Urnov	Editing the human genome: understanding gene function
14	Nov. 23	23	Urnov	Editing the human genome: understanding noncoding DNA function
	Nov. 25	Holiday		Holiday
15	Nov. 30	24	Urnov	Editing the human genome in the clinic SECOND WRITTEN ASSIGNMENT RELEASED
	Dec. 2	25	Urnov	Human genome editing and the future of our species
R/R/R	Dec. 9	N/A		SECOND WRITTEN ASSIGNMENT DUE at noon

- **Course Structure**

Twice-weekly lectures will focus on topics drawn from the primary literature. At least one week before each lecture you will be given a paper or set of papers to read. These should be read before the relevant lectures.

In-depth discussion of topics drawn from lectures will occur in sections.

- **Assignments and Grading**

Grades will be based on the answers to two written take-home assignments and also class participation during lectures and discussion sections. Each written assignment will comprise 45% of the final grade, and participation will comprise 10% of the grade. The written assignments will be a combination of problems to solve based on lectures and questions to answer about specific research papers.

First written assignment will be available on October 7, 2020 and due on October 17, 2020 at noon. Second written assignment will be available on Monday November 30, 2020 and due on Wednesday December 9, 2020 at noon.

**Academic Dishonesty**

Academic dishonesty is not acceptable at UC Berkeley. Academic dishonesty is any action that may result in creating an unfair academic advantage for oneself or unfair academic disadvantage for another member of the academic community. Therefore, any exam, quiz, paper, and/or homework assignment submitted by you that bears your name should be your own original work. In all of your assignments, including your homework or drafts of papers, you

may use words or ideas written by other individuals in publications, web sites, or other sources, but only with proper attribution. 'Proper attribution' means that you have fully identified the original source and extent of your use of the words or ideas of others that you reproduce in your work for this course, usually in the form of a footnote, parentheses or quotations. If you are not clear about the expectations for completing an assignment or taking a test or examination, be sure to seek clarification from the instructors or GSI beforehand. Cheating and plagiarism are forms of academic dishonesty and are NOT TOLERATED under any circumstance. Any evidence of academic dishonesty will result in a score of zero (0) on that assignment or exam, and will be reported as soon as possible to the Center for Student Conduct (<http://sa.berkeley.edu/conduct>[Links to an external site.](#)). This will result in a permanent scar on your academic record. In 2015, UC Berkeley launched the Turnitin service (<https://asuc.org/honorcode/index.php> [Links to an external site.](#)) to support academic integrity and the campus honor code. Turnitin is an opt-in tool enabled through bCourses that allows Instructors and GSIs to check student assignments for originality. We will use Turnitin in this course for all written assignments. The consequences of cheating and academic dishonesty are substantial, including a formal discipline file, possible loss of future internship, scholarship, or employment opportunities, and denial of admission to graduate or medical school.

### **Letters of recommendation**

Any of the three instructors may be approached for a letter of recommendation. So that we may prepare effective evaluations we ask that you follow the procedure outlined here. Be sure to attend at least 2 of the instructor's office hours. In addition, ask your GSI to write a brief note about your participation in section and email it to the instructor. Sometime after the end of the course, request an interview with the instructor and bring a copy of your complete transcript, your CV (resume), your statement of purpose, the career center confidentiality waiver form, and any recommendation forms that need to be completed.

### **Mental Health**

If you are experiencing stress, anxiety, or other forms of distress during the semester, we hope to be a resource for you. Please reach out to the GSI or one of the Professors if you need support. There are also many resources available to you. All registered Berkeley students are eligible to use Counseling Psychological Services. You do not have to purchase the Student Health Insurance Plan to use these services. The first five counseling sessions are free for registered Berkeley students. Counselors can provide support in academic success, life management, career and life planning, and personal growth and development.

### **UC Berkeley, Counseling Psychological Services:**

- Please call (510) 642-9494 or stop by the office on the 3rd floor of the Tang Center to make an appointment with a counselor.
- Drop-in counseling for emergencies: Monday - Friday, 10:00AM - 4:30PM

- After hours counseling: In the case of emergencies at night or on weekends, call (855) 817-5667 for free assistance and referrals. Request to speak with a counselor.
- For emergency support: Call UCPD 911 or (510) 642-3333

#### **24 Hour Crisis Hotlines:**

- Alameda County Crisis Line: (offers confidentiality, TDD services for deaf and hearing impaired callers and translation in 140 languages) Call 1-800-309-2131
- National Crisis Help Line: Call 1-800-273-TALK
- National HopeLine Network: Call 1-800-SUICIDE

We also ask that you look out for your fellow peers. If you see any of the signs below that may indicate your classmate may need assistance, please use the resources above or reach out to the GSI or Professors.

- Withdrawing from other people
- Changes in weight or eating patterns
- Changes in sleeping patterns
- Fatigue or lack of energy
- Increased anxiety or irritability
- Feeling worthless or hopelessness

#### **Safe, Supportive, and Inclusive Environment**

Whenever a faculty member, staff member, post-doc, or GSI is responsible for the supervision of a student, a personal relationship between them of a romantic or sexual nature, even if consensual, is against university policy. Any such relationship jeopardizes the integrity of the educational process.

Although faculty and staff can act as excellent resources for students, you should be aware that they are required to report any violations of this campus policy. If you wish to have a confidential discussion on matters related to this policy, you may contact the Confidential Care Advocates on campus for support related to counseling or sensitive issues. Appointments can be made by calling [\(510\) 642-1988](tel:5106421988).

The classroom, lab, and work place should be safe and inclusive environments for everyone. The Office for the Prevention of Harassment and Discrimination (OPHD) is responsible for ensuring the University provides an environment for faculty, staff and students that is free from discrimination and harassment on the basis of categories including race, color, national origin, age, sex, gender, gender identity, and sexual orientation. Questions or concerns? Call [\(510\) 643-7985](tel:5106437985), email [ask\\_ophd@berkeley.edu](mailto:ask_ophd@berkeley.edu), or go to [http://survivorsupport.berkeley.edu/Links to an external site.](http://survivorsupport.berkeley.edu/Links%20to%20an%20external%20site)