

General Genetics – MCB 140 – UC Berkeley, Fall 2013

MWF 11 am to noon, 125 Li Ka Shing

Instructors: Fyodor Urnov, Gian Garriga, Dan Rokhsar

Course description

Prerequisites:

C100A/Chemistry C130 and 110 or consent of instructor (110 may be taken concurrently).

Course overview:

Genetics is an evolving discipline, and the class covers both classical and contemporary approaches to understanding the function of the genetic material during normal development and in disease. In contrast to introductory classes in genetics, which focus on discussion of facts and concepts, this upper-division class teaches students both those facts/concepts, and the experimental approaches that were used to get to them.

Topic listing:

To give students a firm grounding in the remarkable power of classic genetic analysis, the class begins with a discussion of work by the field's founders that established key principles of how trait differences are transmitted through generations. We study work by Mendel on peas, Morgan and his students on fruit flies, and Beadle and Tatum on filamentous fungi. The next section of the class focuses on tools originally developed by "classical" geneticists that are still in wide use today: forward and reverse genetic screens, suppressor genetics, and mosaic analysis. Finally, the course discusses extensively the advances that have become possible with the advent of next-generation technologies. We study human genetic variation, examine recombination patterns in the human genome, consider the genetics of human quantitative traits, and study the logic that underlies genome-wide association studies.

Syllabus – MCB 140, Fall 2013

Lecture	Month	Day	Date	Topic	Prof.
1	Aug	F	30	Genetics: the promise and the challenge	FDU
	Sept	M	2	Academic holiday	
2	Sept	W	4	Of peas and people (Mendel)	FDU
3	Sept	F	6	Processes with threads (mitosis and meiosis)	FDU
4	Sept	M	9	Chromosomes	FDU
5	Sept	W	11	Genes and chromosomes	FDU
6	Sept	F	13	Linkage: A brilliant undergraduate (Sturtevant)	FDU
	Quiz 1 in discussion section, Sept 16-20				
7	Sept	M	16	Classical genetics goes molecular: "fungal" genetics	FDU
8	Sept	W	18	Fungal genetics 2013	FDU
9	Sept	F	20	Sex and dosage compensation	FDU
10	Sept	M	23	Epigenetics	FDU
11	Sept	W	25	Plant genetics	FDU
12	Sept	F	27	Dog variation and genetics	FDU
13	Sept	M	30	Sequencing genomes	DR
14	Oct	W	2	Annotating and comparing genomes	DR
15	Oct	F	4	Variation and recombination at the nucleotide level I	DR
16	Oct	M	7	Variation and recombination at the nucleotide level II	DR
	Oct	W	9	Genetic screens: apoptosis in <i>C. elegans</i>	GG
	Oct	Th	10	Midterm I: covers lectures 1-13 6:30-9 PM, 50 Birge	
17	Oct	F	11	Effects of mutations on gene function	GG
18	Oct	M	14	Genetic engineering with transposable elements	GG
19	Oct	W	16	Rearrangements	GG

20	Oct	F	18	Enhancer genetics	GG
	Quiz 2 in discussion section, Oct 21-25				
21	Oct	M	21	Mosaic analysis	GG
22	Oct	W	23	Mosaics and cancer genetics	GG
23	Oct	F	25	Suppressor genetics	GG
24	Oct	M	28	Genetic pathways I	GG
25	Oct	W	30	Genetic pathways II	GG
26	Nov	F	1	Organelle genetics	GG
27	Nov	M	4	Mutation, drift, and migration I	DR
	Nov	W	6	No class; Midterm 2: covers lectures 14-26, 7-9:30 PM, 2040 VLSB	
28	Nov	F	8	Mutation, drift, and migration II	DR
	Nov	M	11	Academic holiday	
29	Nov	W	13	Genotype-phenotype correlation I	DR
30	Nov	F	15	Genotype-phenotype correlation II	DR
	Quiz 3 in discussion section, Nov 18-22				
31	Nov	M	18	Heritability and quantitative traits	DR
32	Nov	W	20	Heritability and quantitative traits II	DR
33	Nov	F	22	Heritability and quantitative traits III	DR
34	Nov	M	25	Topics in Genomics	DR
35	Nov	W	27	Topics in Genomics II	DR
	Nov	F	29	Academic holiday	
36	Dec	M	2	Reverse genetics: RNAi	GG
37	Dec	W	4	miRNAs	GG
38	Dec	F	6	Reverse genetics: homologous recombination in mice	GG
	Dec		9-13	Recitation week	
	Dec	M	16	Final 11:30 AM-2:30 PM	