

CTY Genetics

Day	Session	Topic(s)	Objective(s)	Exercise(s)
28 Jun 19 Jul	AM	personal introductions go over syllabus, course policies pre-assessment Three Milestones in Genetics	intro to course get a sense of the class's background intro to Mendel, DNA structure, genomics	interview, tell class about partner
	PM	lab safety, intro to equipment, lab notebooks and lab reports effective scientific writing Essay: What interests you about genetics?	learn purpose of notebooks and reports learn scientific writing skills	Read guidelines Discussion
	SH	edit each other's essays (guided)	<u>learn scientific writing/editing skills</u>	
29 Jun 20 Jul	AM	Different tiers of genetics, genetics approaches Genetics in the world	molecular to population, forward vs reverse Model organisms Drug resistance in bacteria artificial selection	read and discuss article? read and discuss article? demo of Biomorphs
	PM	biological atoms, molecules, bonds nucleic acid structure structure of chromosomes DNA replication and RNA transcription	review covalent, polar covalent, hydrogen double helix, polarity, DNA vs RNA nucleosomes, euchromatin, heterochromatin Okazaki, telomeres, types of RNA	lab 1a-build nucleotide, DNA models replication animation lab 1b-manipulate double helix models
	SH	<u>film about Rosalyn Franklin (Photo 51)</u>		
30 Jun 21 Jul	AM	what is a gene? protein products Types of mutation Concept of genetic variability, alleles, environment Major techniques for DNA investigation (purification, digestion, quantification, PCR, gel electrophoresis)	Basic genome structure translation redundancy of genetic code, effects of muts	Intro to genome databases practice translation w/genetic code tasting paper practice RFLP analysis (rape case)
	PM	purification, quantification, characterization of DNA	handle DNA	lab 2a-Purification of DNA from wheat germ Lab 2b-Quantification by UV spec Lab 3a-Alu DNA lab- part I: sample collection and set up PCR
	SH	SGD , WormBase exercises , BLAST [need computers]		

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1 Jul 22 Jul	AM	viral and bacterial genetics	viral genome structure and function conjugation, transformation gene regulation	transduction, Jeopardy! Game
	PM	bacterial transduction		lab 3b-lab-electrophoresis of Alu PCR staining and analysis lab 4a-set up bacterial transduction
	<u>SH</u>	write up Alu lab results, begin transduction lab report		
2 Jul 23 Jul	AM	mitosis, IN DEPTH meiosis	review, extension of prior knowledge	chromosome structure exercise
	PM	visualizing mitosis, meiosis		lab 4b- analysis of transduction Lab 5-lab-onion root tip observations, Lab 6a-lab-Sordaria genetics lab, part I [lab 8a-set up yeast dihybrid cross?]
4 Jul 25 Jul	<u>SH</u>	(Sun) meiosis questions/problems, finish transduction lab report		
5 Jul 26 Jul	AM	Mendelian genetics- part I	Mendel's work in more detail Dominant vs. recessive traits (autosomal) Monohybrid crosses/Punnett squares Statistical analyses Pedigrees	Practice problems Coin toss exercise, analysis Practice problems
	PM	Lab exercises in Mendelian genetics	Value of large populations, chi squared	lab 7- what makes a gene recessive?
	<u>SH</u>	Genetics problems- monohybrid crosses and pedigree analysis Write up recessive gene results		
6 Jul 27 Jul	AM	Mendelian genetics- part II	Dihybrid crosses Punnett squares, Forked Line, Probability Epistasis Linkage, Recombination, and Mapping	Practice Problems Practice problems
	PM	Scoring dihybrid crosses Write up yeast dihybrid cross results In depth on 3-factor mapping [TA]*	hands-on w/ dihybrid crosses	lab 8b-Yeast dihybrid cross analysis Visit to Van Doren Lab
	<u>SH</u>	Genetics problems- dihybrid crosses, mapping genes		

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7 Jul 28 Jul	AM	Extensions of Mendel's Ideas- part I	Incomplete and Codominance Variable expressivity and penetrance	
	PM	Codominant Alleles in CSI	Gene interactions and epistasis Pleiotropy Learn about blood group analysis in forensics	lab 9-Simulated blood-typing activity
	<u>SH</u>	Practice problems, notebook check		
8 Jul 29 Jul	AM	Extensions of Mendel's ideas-part II	Sex-linked traits Genetic mosaicism Nondisjunction errors with sex chromosomes	Practice problems
	PM	Human karyotyping lab		lab 10-Human karyotyping lab
	<u>SH</u>	Case study: scandal in the Russian Royalty?		
9 Jul 30 Jul	AM	Population genetics	Allele freq., genotype freq. Hardy-Weinberg	read about Dr. Shuldiner's research
	PM	Guest lecture by Dr. Shuldiner?	Exposure to populations genetics research in the Amish population	
11 Jul <u>1 Aug</u>	<u>SH</u> (Sun)	Written summary of lecture H-W practice problems	practice scientific writing	
12 Jul 2 Aug	AM	Transgenics	Bacterial transformation Transposons Viral infection Homologous recombination Gene guns	hangover flies video clip
	PM	Investigation of transgenic organisms	examples of GFP, other transgenes	lab 6b-sordaria genetics, part II, lab 11a-bacterial transformation, field trip to Carnegie/Biology?
	<u>SH</u>	Ethics discussion- gene therapy, eugenics Write up Sordaria genetics results		read hand-outs
13 Jul 3 Aug	AM	Epigenetics	methylation of DNA, imprinting acetylation of histones small RNAs (XIST, miRNAs) prions and cytoplasmic inheritance	Jeopardy! Game
	PM	lab work with transgenics		lab 11b-Anaylsis of transformation
	<u>SH</u>	write up and submit transformation lab report work on group presentations [computers]		choose topic, prepare outline

14 Jul	AM	modern genetics techniques	overexpression and deletion screens	Design a screen
4 Aug			microarray analysis	
	PM	primer on literature searches-library	deep sequencing	
		work on group presentations[computers]	literature searching	go to library, internet searches
	<u>SH</u>	study for post-assessment		
		work on group presentations[computers]		
15 Jul	AM	post-assessment		
5 Aug				
	PM	group presentations	learn details about human genetic disorders	
			Analyze research papers	
	<u>SH</u>	Lab notebook check		
16 Jul**	AM	group presentations	learn details about human genetic disorders	
6 Aug			Analyze research papers	
	PM	Parent-teacher meetings		

Blue writing indicates student work that is due

Green writing indicates times that students will need access to computers with internet/ online resource access

Orange writing indicates need to decide on specific content

*Dr. Handwerger leaves early for doctor's appointment

**class meets for two hours only, as per published schedule