Biol105 Genetics Syllabus - Winter, 2015
Section 40523
Media Theater M110, Tuesday & Thursday, 8:00-9:45 am

Quick Info:

- Instructor: Susan Strome, Sinsheimer 351, sstrome@ucsc.edu
- TAs: Adam Aharon (aaharon@ucsc.edu), Chad Cockrum (ccockrum@ucsc.edu), Andrew Knutson (akknutso@ucsc.edu), Michelle Tjia (mtjia@ucsc.edu)
- All course info is online at https://sites.google.com/a/ucsc.edu/genetics/
- Homework must be turned in Monday, by 2:30 PM or at the beginning of Discussion Sections that meet earlier on Monday.
- Discussion Sections are 70 min in Nat Sci Annex 103:
  - Mon 8:00 AM and 9:30 AM with Andrew Knutson
  - Wed 11:00 AM and 2:00 PM with Adam Aharon
  - Wed 5:00 PM and 6:30 PM with Michelle Tjia
  - Fri 2:00 PM and 3:30 PM with Chad Cockrum
- Office Hours: Tues 3:30-4:30, Wed 1:00-2:00 and 2:00-3:00 PM in Sinsheimer 301
- Exams: Midterm Exam Thurs Feb 5 in class, Final Exam Tues March 17 8:00-11:00 AM

Textbook: Genetics – From Genes to Genomes, 5th edition by Lee Hartwell et al. (McGraw-Hill, 2015). To save you money, the UCSC Genetics instructors arranged with McGraw-Hill to create a custom version of the textbook containing just the chapters the UCSC Genetics instructors use. That book is available through the bookstore for $133. You may share or borrow books from each other, or check out reserve copies from the science library.

Discussion Sections: Our course is fortunate to have 4 graduate student TAs to work with students in Discussion Sections. You should already have signed up for a Discussion Section online. TAs will go over particularly difficult material from the previous week, offer some extra practice solving problems, and answer your questions. Discussion Sections are not mandatory but are highly recommended.

Problem Sets: Each Thursday of a non-exam week, a Problem Set covering the week's material will be assigned. You should work through the Problem Sets, individually or with other members of the class, before your Discussion Section meets. Students with Monday morning Discussion Sections must turn their Problem Sets in to the TA at the beginning of Discussion Section. All others must turn them in to the Genetics drop box outside Sinsheimer by 2:30 PM Monday. Your scores on Problem Sets will factor into your final grade (see below). Problem Sets must be turned in by the Monday deadline to earn points toward your final grade. The lowest Problem Set score will be dropped.

Working in Small Groups: The best way to learn the language and mechanics of genetics is to discuss and work through genetics problems with others. Furthermore, the very best

way to learn a difficult concept is to teach it. To promote discussion and cross-teaching, I will provide several opportunities during each class session for students to discuss with 2-3 other class members a problem or issue related to our topic of the day. I may ask groups to turn in their solution and/or to discuss the topic with the rest of the class. I encourage all of you to work in study groups outside of class. Since the course is not graded on a competitive curve (see below), there is no penalty to any student for helping fellow students do well in this course.

Clickers: We will be using iClickers in this class - everyone should have a clicker by Thurs Jan 8. I will ask you to answer questions, choose among possible solutions to problems, and give me feedback on your comprehension of concepts. Having immediate feedback will allow YOU to identify confusions and will allow ME to gauge whether we need to work more on a particular topic/concept or instead can move on. Clicker participation will count toward your final grade (see below). See instructions for iClicker registration on the Clickers page of our course web site.

Textbook: Lee Hartwell and colleagues have written an excellent genetics textbook, now in its 5th edition. It is lively, current, weaves in the new and exciting frontier of genomics, and deals with important genetic issues that face society today. As you read it, pay special attention to the **terms in bold** (many of which are defined in the glossary at the back of the book), the Essential Concepts at the back of each chapter, and the Solved Problems at the back of each chapter. Note that short answers are provided for the odd-number problems at the back of the textbook. The textbook provides a good overview and some good examples of material I cover in lectures. Occasionally, I will rely entirely on the textbook to teach a particular subject area. Assigned reading and figures are fair game on exams.

Web Site: I have created a web site at https://sites.google.com/a/ucsc.edu/genetics/ to post lecture outlines, reading assignments, weekly problems, exams, keys to exams, supplementary information, notes to the class, and other miscellaneous items.

Webcast Class Sessions: Our class sessions will be recorded using UCSC's new webcast/lecture capture system. The captured lectures can be viewed at http://webcast.ucsc.edu. Among the cool new tools, the new system allows viewers to jump to specific slides in the lecture and search for text on the slides.

Exams: There will be 2 exams, a Midterm and a Final. The Midterm will be designed to take an hour, but will be administered during our class time slot, so that you will have plenty of time. The Final will be partially comprehensive and designed to take ~90 min, but will be administered during a 3-hour time slot. Both exams will cover the material (in-class material, reading assignments, and problems) from the weeks preceding the exam week. The comprehensive component of the Final will be on using the genetic tools you learn throughout the semester. Each exam will be composed of problems similar to those given

in class, assigned in problem sets, and discussed in Discussion Sections. They will include a mixture of multiple choice, calculation-based, and short answer questions. Because the problems on the exam will be similar (but not identical) to the in-class and assigned problems, participating in class discussions and doing the assignments is the best way to study. Exams will also include 1 or more questions (up to 10% of the exam) that will be more challenging than those on the problem sets and will require deeper, more creative thinking about the material. Earning an A requires a deep understanding of the material, the ability to apply it to new situations, and not making careless mistakes. A mediocre understanding will likely earn a C, and spotty or poor understanding will likely earn a D or F.

Exam Scores: The Midterm is worth 100 points, and the Final is worth 140 points. Both exams are mandatory. Students who miss the Final (for whatever reason) will receive a score on it of "0" and a final course grade calculated using that score. Any student with a passing grade before the Final Exam and a justifiable absence should petition, as soon as possible, with the MCD Biology Curriculum Committee for the final grade to be converted to an Incomplete (I). To remove an I, the student must file a petition and the completed course work by the deadline on the last day of the following quarter. If an I is not removed by the deadline, it will lapse to F or NP, depending on the grading option in effect.

Problem Set Scores, Clicker Points, and Extra Credit Points: Problem Sets are worth 6 points each. Your lowest Problem Set score will be dropped before calculating your final grade. Clicker points are assigned based on participation in class (clicking in an answer to at least half of the questions), not getting the right answers. Extra Credit questions will be asked in ~half of the classes – these will be on assigned reading and particularly challenging concepts. Answers will be entered via clicker or on index cards.

Maximum points are:

Midterm Exam	100 points
Final Exam	140 points
Problem Sets (highest 7 scores among 8 problem sets)	42 points
Clicker points (for clicking in to >half of the daily questions)	15 points
Total	297 points

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Grading scale: If students as a whole do well in this course, then the scale below will be used. Thus, students are not competing for good grades and instead are encouraged to help each other do well.

As: 90 - 100%
Bs: 80 - 89.9%
Cs: 70 - 79.9%
Ds: 60 - 69.9%
Fs: <59.9%

If the scale above results in too few A's, B's, and C's, then a curve will be used to assign at least 10% A's, at least 20% B's, and at least 30% C's,

Cheating: I encourage students to study and work on problem sets together, but I expect students to work on exam questions on their own. Students caught copying or cheating will be assigned an F and reported to the university. Be aware that having academic misconduct on a student's university record could jeopardize his/her future career goals.

Withdrawal: The last day to withdraw from this class is Feb 17. After that, an Incomplete will be granted only if you are passing the course and have a medical excuse; a note from a health professional will be required.

My Big Learning Goals for You

- Learn the jargon and how to speak the language of genetics

- Understand genotype -> phenotype relationships
  (genes) (usually proteins)

- Learn how chromosomes behave during mitosis & meiosis
  - understand the differences between homologs, sister chromatids, and non-homologous chromosomes
  - master the different alignments for mitosis, meiosis I, and meiosis II and realize what those alignments accomplish

- Appreciate how investigators map the locations of genes on chromosomes
  - cross-over events
  - using RFLPs as chromosomal markers

- Learn how recombinant DNA technology is used to clone genes and investigate genetic problems

- Understand how complementation and epistasis tests are performed and why

- Appreciate how genes control development and human health, and how disease genes segregate in families

Schedule of Classes and Exams			
Week 1	Tues, Jan 6	Refresher on genes, alleles, and crosses	Chap. 2
	Thurs, Jan 8	Probabilities, proteins, and pedigrees	Chap. 2
Week 2	Tues, Jan 13	Variations in dominance	Chap. 3
	Thurs, Jan 15	Epistasis and complementation	Chap. 3 & 7
Week 3	Tues, Jan 20	Chromosomes and mitosis	Chap. 4 & 11
	Thurs, Jan 22	Chromosomes, meiosis, and ploidy	Chap. 4 & 12
Week 4	Tues, Jan 27	Sex chromosomes and sex determination	Chap. 4 & 11
	Thurs, Jan 29	Dosage compensation and X-linked traits	Chap. 4
Week 5	Tues, Feb 3	DNA mutations and altered proteins	Chap. 7 & 18
	Thurs, Feb 5	Midterm Exam on Weeks 1-4	
Week 6	Tues, Feb 10	Linkage and recombination	Chap. 5
	Thurs, Feb 12	Mapping genes	Chap. 5
Week 7	Tues, Feb 17	Cloning and molecularly analyzing genes	Chap. 9 & 18
	Thurs, Feb 19	Fruit flies: development and maternal-effect genes	Chap. 18
Week 8	Tues, Feb 24	The genetics of cancer	Chap. 19
	Thurs, Feb 26	Worms: vulva development as a model for cancer	Chap. 18
Week 9	Tues, March 3	RFLPs for mapping, diagnosis, and paternity	Chap. 10
	Thurs, March 5	Mice: gene knock-outs and disease models	Chap. 17 & 18
Week 10	Tues, March 10	Gene therapy and uses of stem cells	Chap. 18
	Thurs, March 12	Epigenetics and RNAi	Chap. 11
Final Week	Tues, March 17	Final Exam 8:00-11:00 AM	