

BICD 100 Genetics

Spring 2021 F00/G00/H00

General Course Information

Course description and goals: an introduction to the principles of heredity emphasizing diploid eukaryotic organisms. Through this course, students will:

- develop an understanding of the nature of genetic variation and how it leads to phenotypic variation
- develop skills in the interpretation and analysis of data from genetic experiments
- learn about ways the genetics is used as tool to study biological processes and solve “real world” problems

Instructor: Professor Laurie Smith (she/her); lsmith@ucsd.edu

Instructional Assistants:

Madison Chew (m2chew@ucsd.edu) leads F03/G03/H03 Thurs. 7:00-7:50pm (Zoom only for now)

Lindsey Griffin (lagriffi@ucsd.edu) leads F05/G05/H05 Fri. 11:00-11:50am (in person in Center 119 and on Zoom)

Natasha Horne (nhorne@ucsd.edu) leads F02/G02/H02 Thurs. 6:00-6:50pm (Zoom only for now)

Kelly Kim (knk006@ucsd.edu) leads F01/G01/H01 Thurs 5:00-5:50pm (Zoom only for now)

Thisha Thiagarajan (tithiaga@ucsd.edu) leads F04/G04/H04 Fri. 9:00-9:50am (Zoom only for now)

Links for all discussion sections available on Canvas through ZoomLTI module.

“Lectures”: MWF 1:00-1:50pm in the Revelle North tent (masks required!). Students enrolled in F00 have the opportunity to attend in person on Mondays; G00 on Wednesdays; H00 on Fridays. In-person attendance is not required; students not attending in person can attend on Zoom – link available at ZoomLTI on Canvas (**password Mendel2021**). Attendance is not taken at these sessions. Class recordings will be posted as quickly as possible in the appropriate weekly module. These sessions will provide guidance and practice to support your success on exit quizzes and exams!

Discussion sections: All students are enrolled in a discussion section that meets once/week and is led by an Instructional Assistant. These sessions will focus on building your problem solving and data analysis skills, providing further support for success on exit quizzes and exams. Attendance will be taken and active participation is expected e.g. asking and responding to questions, participating in polls. Points earned via attendance and participation in the discussion section you are enrolled in will count towards your final grade (see more info on this below). You can miss one discussion section of the 10 without a point penalty.

Exams: there will be 3 exams of equal weight, each covering 1/3 of course material

Midterm 1 (on week 1-3 material): Tues. April 27 6:30-8:00 pm

Midterm 2 (on week 4-6 material): Tues. May 18, 6:30-8:00 pm

Final exam (on week 7-10 material; not cumulative): Thurs. June 10 11:30am – 2:30pm

Office hours: held multiple times every week on Zoom beginning in week 2. This is a fantastic opportunity to get your questions answered and find support for learning to solve problems and answer questions of the type you will see on exams (i.e. homework, class, and discussion section problems). See “Office Hours” in the General Course Information module on Canvas for the schedule and links.

Textbook: P. Meneely et al., Genetics: Genes, Genomes and Evolution (first and only edition). This excellent book will be a vital resource, because class time will be used mainly to work with students to apply concepts and information from the assigned readings rather than repeating the information. Some assigned homework problems will also be in this book. You will need the book to do well in this class!

Access to a digital version of this book is available now to all enrolled and waitlisted students via the Redshelf module on Canvas. If you are still enrolled in the class as of April 10 and have not “opted out” by then, your UCSD student account will be charged \$49.41 for access for the remainder of the qtr (180 days altogether). This is much lower than the price for any physical copy of the book I know of! If you choose to opt out: go into the Redshelf module on Canvas and click View Course Materials. Scroll down to the gray opt-out button and follow the prompts. If you are opting out because you want to buy a physical copy of the book instead, be sure to get the US edition (ISBN 978-0-19-871255-8 for paperback; 978-0-19-879536-0 for hardback) because all reading and homework problem assignments are based on this edition; I don’t have access to any other edition (e.g. the European edition available on Amazon) that would allow me to translate assignments to other editions. For any questions about billing for Redshelf access, contact the UCSD Bookstore at textbooks@ucsd.edu. For technical issues related to Redshelf access go to <https://solve.redshelf.com/hc/en-us>.

Entrance quizzes: “Lecture” sessions on MWF 1:00-1:50pm will be used primarily to work with students on developing problem solving and data analysis skills that will be vital for success on exams! To benefit from class sessions, students will need to do the assigned readings in advance. Reading assignments are specified in the Course Calendar and should be done before Monday class each week. To provide guidance on what you should be gleaning from reading assignments, and reward your reading efforts, you will take a 7-8 point “entrance quiz” on the weekly reading assignments on Canvas, due by 12:30pm on each applicable Monday (no entrance quiz week 1 or 10; or week 5 or 8 when we have midterms – there are no reading assignments for those weeks). Every student gets two attempts (1 hr/attempt, to give you time to hunt for info you need to answer the questions).

Exit quizzes: You will take an 8 point “exit quiz” every Friday (available 2:00pm-11:59pm - 20 minutes). You will get only one attempt on these however the lowest quiz score will be dropped. Quiz questions will be drawn from problems/questions we worked on during lecture sessions and discussion sections that week (slightly modified from the original). If you “got it” in class, you are ready for the quiz. If not, please utilize office hrs to improve your grasp of that week’s material before taking the exit quiz! Exit quiz questions will be similar to exam questions, so the weekly exit quiz routine is getting you ready for success on exams.

Homework: A homework assignment will be posted at the beginning of each week, in the appropriate weekly module on Canvas, with the answer key. Completed homework will not be submitted. The homework gives you the opportunity to develop the problem solving and data analysis skills you will need for success on the exams. It is vital to hold yourself accountable for doing the homework independently. Collaboration with other students on the homework is encouraged if you find this helpful, but be sure you are learning to solve the problems yourself! If the strategy or rationale for answering a question on the homework is eluding you, come to office hours! *One homework problem, in modified form, will be included on each exam.*

Weekly workflow in a nutshell (but see Course Calendar for exceptions e.g. when there is no reading assignment or entrance quiz or exit quiz):

1. Do assigned reading for the week and submit your entrance quiz by Monday at 12:30pm
2. Attend class MWF 1:00-1:50pm
3. Attend and actively participate in your discussion section Thurs. PM or Fri. AM
4. Do the weekly homework (any day of the week, after corresponding material addressed in class)
5. Attend OH to improve your grasp of the week's material as needed
6. Take exit quiz between 1:50pm and 11:59pm Friday

Grading: your final grade will be determined by what percentage of the total available points (500) you earn. Points are available as follows:

115 points (23%) for midterm 1 (covering material from weeks 1-3 of class)

115 points (23%) for midterm 2 (covering material from weeks 4-6 of class)

115 points (23%) for final exam (covering weeks 7-9 of class; not cumulative)

45 points (9%) for discussion section attendance/participation (5 pts/week with one "free" absence)

46 points (~9%) for entrance quizzes (6 quizzes; 7-8 points each)

64 points (~13%) for exit quizzes (9 quizzes of 8 points each; lowest score dropped automatically)

500 points total

These guidelines will be used to assign grades:

>450 points (90%) A (A-, A or A+)

>400 points (80%) B (B-, B or B+)

≥ 325 points (65%) C (C-, C or C+)

>250 points (50%) D

If necessary, these cutoffs will be adjusted downward so that at least 60% of students receive an A or a B, but they will not be adjusted upward for any reason.

Academic integrity:

The aim of your instructor and IAs is to foster all students' ability to excel with integrity, and we expect that the work on all credit-bearing assignments will be your own. All exams and quizzes are open book, open note, and open device - you are free to consult readings and notes as you wish, however you may not give or receive help on quizzes or exams. If Prof. Smith has a good reason to think you have received or given assistance from another person on a quiz or exam, she will file a report with the UCSD Academic Integrity Office (AIO). A student confirmed to have engaged in academic dishonesty will receive an F as their final grade, in addition to the disciplinary actions determined as appropriate by the AIO.

	<i>Reading assignments by chapter section/subsection</i>	<i>Date</i>	<i>Event (bold shows where points are earned)</i>	<i>class topic</i>
Week 1: familiar ground	<u>Chapter 5</u> : all sections and boxes except Box 5.2 <u>Chapter 7</u> : 7.1; 7.2; 7.5 (skip Box 7.6); 7.6	Mon. March 29	1pm class session	Single gene traits w-dominant/recessive alleles
		Wed. March 31	1pm class session	Pedigrees and laws of probability
		Thurs Apr. 1- Fri. Apr. 2	discussion sections	
		Fri. April 2	1pm class session	X-linkage and X-inactivation
		Fri. April 2	Week 1 exit quiz	
Week 2: the modern lens through which we see genetics	<u>Chapter 6</u> : 6.5 <u>Chapter 7</u> : 7.3 <u>Chapter 2</u> : 2.4 (skip ALX1 subsection); 2.6 <u>Chapter 3</u> : 3.2 subsections "back to the nucleus" and "homologous chromosomes" only; 3.3; 3.5	Mon. April 5	Week 2 entrance quiz	
		Mon. April 5	1pm class session	meiosis and non-disjunction
		Wed. April 7	1pm class session	chromosomes, genes and genomes
		Thurs Apr. 8- Fri. Apr. 9	discussion sections	
		Fri. April 9	1pm class session	chromosomes, genes and genomes, cont.'d
		Fri. April 9	Week 2 exit quiz (Canvas)	
Week 3: genetic variation and its phenotypic consequences	<u>Chapter 3</u> : 3.4 <u>Chapter 4</u> : 4.4; 4.5 <u>Chapter 15</u> : 15.1 (skip box 15.1); 15.4 pgs. 624-628 only; 15.5	Mon. April 12	Week 3 entrance quiz (Canvas)	
		Mon. April 12	1pm class session	mutation and sequence variation
		Wed. April 14	1pm class session	genetic basis of cancer
		Thurs Apr. 15- Fri. Apr. 16	discussion sections	
		Fri. April 16	1pm class session	the awesome power of genetics (APOG)
		Fri. April 16	Week 3 exit quiz (Canvas)	
Week 4: allelic relationships and gene interactions	<u>Chapter 8</u> : all sections (skip Boxes 8.1 and 8.2 but include Tool Box 8.1) <u>Chapter 5</u> : review Box 5.1	Mon. April 19	Week 4 entrance quiz (Canvas)	
		Mon. April 19	1pm class session	allelic relationships beyond dominant/recessive
		Wed. April 21	1pm class session	independently assorting genes
		Thurs Apr. 22- Fri. Apr. 23	discussion sections	
		Fri. April 23	1pm class session	complementation and epistasis
		Fri. April 23	Week 4 exit quiz (Canvas)	
Week 5: more things Mendel didn't see	none required, but a recent, short, easy-reading article from The Scientist, posted in the week 5 module, is relevant to Wednesday's class and this week's discussion section material	Mon. April 26	no entrance quiz	
		Mon. April 26	1pm class session	pleiotropy, incomplete penetrance, variable expressivity
		Tues. April 27	MIDTERM 1 6:30-8:00 pm	
		Wed. April 28	1pm class session	epigenetics
		Thurs Apr. 29 - Fri. Apr. 30	discussion sections	
		Fri. April 30	1pm class session	extranuclear inheritance
		Fri. April 30	Week 5 exit quiz (Canvas)	

Week 6: gene identification via mapping and its use in treating genetic disease	<u>Chapter 9</u> : 9.1; 9.2 except "comparing linkage with syteny" subsection (skip Boxes 9.1, 9.2 and Toolbox 9.1); 9.3 subsection "markers used for genetic maps" only (skip Boxes 9.3 and 9.4); chapter section 9.4	Mon. May 3	Week 6 entrance quiz (Canvas)	
		Mon. May 3	1pm class session	genetic recombination and linkage analysis
		Wed. May 5	1pm class session	mapping with DNA markers; human disease gene ID
		Thurs May 6 - Fri. May 7	discussion sections	
		Fri. May 7	1pm class session	gene therapy
		Fri. May 7	Week 6 exit quiz (Canvas)	
Week 7: Population genetics	<u>Chapter 16</u> : 16.1 through 16.5; 16.7 (skip Communicating Genetics 16.1, all the boxes, and 16.5 subsection "frequency dependent selection")	Mon. May 10	Week 7 entrance quiz (Canvas)	
		Mon. May 10	1pm class session	Hardy-Weinberg equilibrium; DNA forensic analysis
		Wed. May 12	1pm class session	selection
		Thurs May 13- Fri. May 14	discussion sections	
		Fri. May 14	1pm class session	inbreeding
		Fri. May 14	Week 7 exit quiz (Canvas)	
Week 8: genetics of the past, present, and future	nothing required but these videos are interesting and helpful for Friday's class: https://www.ted.com/talks/jennifer_doudna_how_crispr_lets_us_edit_our_dna?language=en#t-736294 and https://www.youtube.com/watch?v=SuaXDVBt7kQ&feature=youtu.be	Mon. May 17	no entrance quiz	
		Mon. May 17	1pm class session	human migration and evolution
		Tues. May 18	MIDTERM 2 6:30-8:00 pm	
		Wed. May 19	1pm class session	microbial genetics and antibiotic resistance
		Thurs May 20- Fri. May 21	discussion sections	
		Fri. May 21	1pm class session	genetic engineering; genome editing
Week 9: genetic underpinnings of complex traits	<u>Chapter 2</u> : 2.5 and Toolbox 2.3 (technical background for this week's topic) <u>Chapter 10</u> : 10.1; 10.2 incl. Box. 10.1; 10.3 (skip Box 10.2); 10.4 first paragraph only; 10.5 incl. Box 10.3 but can skip "Inheritance and complex traits"; 10.6; 10.7; 10.8	Mon. May 24	Week 9 entrance quiz (Canvas)	
		Mon. May 24	1pm class session	quantitative traits and heritability
		Wed. May 26	1pm class session	genome-wide association studies (GWAS)
		Thurs May 27- Fri. May 28	discussion sections	
		Fri. May 28	1pm class session	personal genomics
		Fri. May 28	Week 9 exit quiz (Canvas)	
Week 10: how are former BICD 100 students using genetics knowledge in their careers?		Mon. May 31	Memorial Day holiday (no class; no entrance quiz)	
	<u>Chapter 10</u> : Box 10.2	Wed. June 2	1pm class session	genetic testing and counseling with Monica Datta*, Genetic Counselor, Kaiser Permanente
		Thurs June 3 - Fri. June 4	discussion sections	
		Fri. June 4	1pm class session	career panel: Fernanda Delgado Young*, M.D., UCSF; Brian Lew*, Criminalist, SDPD Crime Lab; Jessica Lettes*, Bioinformatics Scientist, Invitae *BICD 100 student between 2008-14
		Fri. June 4	no exit quiz	
		June 10th 11:30am-2:30pm	final exam	