BICD 100 Genetics
Spring 2021
E00

Professor: Emily Troemel
Lectures: Tuesday and Thursday 8 am – 9:20 am Pacific (all times below in Pacific)
Location: **Peterson 110**
Textbook: *Essentials of Genetics* by Klug, Cummings, Spencer, Palladino. Tenth Edition,

Goals: Genetics is central to modern biology. Genes provide the basis of inheritance for all life forms, from bacteria to humans. Genetic variation influences human biology and disease. We will explore how genes were discovered, how they are studied, and how they are used to analyze and manipulate biological function. We will use quantitative approaches to solving problems in classical genetics as well as discussing more modern genetic approaches.

Prerequisites. BILD 1 is required; review the relevant parts of BILD 1 if necessary.

Lecture, exam, assignment schedule (subjects may change during quarter)
Readings = Chapters from Klug et al, Essentials in Genetics, Tenth Edition (I cannot vouch for previous editions)

Lecture #, Date	**Topic**	**Reading**
1: Tues, 3/30	Background on DNA/RNA/protein, Chromosomes, Eukaryotic/prokaryotic, Intro to Mendel: monohybrid cross	Chapter 1, 3 (p31-36)
2: Thurs, 4/1	Mitosis and Meiosis, dihybrid cross	Chapter 2, 3 (p36-39)
Friday, 4/2	*Assignment #1 uploaded*	
3: Tues 4/6	Laws of probabilities, tri-hybrid crosses, Chi-square, pedigrees,	Chapter 3 (p39-49)
4: Thurs, 4/8	Modifications of Mendelian ratios (e.g. varying kinds of alleles, epistasis)	Chapter 4 (p53-64)
Friday, 4/9	*Assignment #2 uploaded*	
5: Tues, 4/13	Complementation tests, Modifications of Mendelian ratios cont. (e.g. epistasis continued, X-linked traits, sex-limited and sex-influenced traits),	Chapter 4 (p64-69)
6: Thurs, 4/15	Different types of pedigrees: X-linked/autosomal, dom./rec; review for midterm #1	Review previous reading
Friday, 4/16	*Assignment #3 uploaded*	
7: Tues, 4/20	*8:00-8:30am Midterm #1 – first 30 minutes of class; Covers lectures 1-6; 8:30am* Lecture: More modifications of Mendelian ratios (penetrance/expressivity, maternal effect, mitochondrial mutations)	Chapter 4 (p70-76)
8: Thurs, 4/22	Sex determination, dosage compensation	Chapter 5
Friday, 4/23	*Assignment #4 uploaded*	
9: Tues, 4/27	Chromosomes: variations in number and arrangement	Chapter 6
10: Thurs, 4/29	Gene mapping: recombination and linkage, 3-point crosses	Chapter 7 (p121-135)
Friday, 4/30	*Assignment #5 uploaded*	
11: Tues, 5/4	Bacterial genetics and gene transfer: conjugation, transformation	Chapter 8 (p144-154) Chapter 11 (skim)
12: Thurs, 5/6	Antibiotic resistance, Bacteriophage genetics, gene transfer by transduction	Chapter 8 (p154-159)
Friday, 5/7	*Assignment #6 uploaded*	
13: Tues, 5/11	*8:00-8:30am Midterm #2: Covers lectures 7-12* 8:30am Lecture: DNA structure, base composition rules,	Chapter 9
14: Thurs, 5/13	The genetic code, DNA mutations, DNA damage and repair	Chapter 10,12 (skim) Chapter 14 (p261-277)
Friday, 5/14	*Assignment #7 uploaded*	

15: Tues, 5/18	Regulation of gene expression, lac operon, RNA interference	Chapter 15, 16 (skim)
16: Thurs, 5/20	Cancer genetics: cell cycle, oncogenes and tumor suppressors	Chapter 19
Friday, 5/21	*Assignment #8 uploaded*	
17: Tues, 5/25	Guest lecturer postdoctoral fellow Evan Boyle, PhD from the Yeo lab: Recombinant DNA, Genomics, Genome Editing	Chapter 17,18 (skim)
18: Thurs, 5/27	Quantitative traits, heritability estimates, twin studies	
Friday, 5/28	*Assignment #9 uploaded*	
19: Tues, 6/1	*8am Midterm #3 – first 30 minutes of the class: Covers lectures 13-18*; 8:30am Guest lecture from Kaiser physician Mike Nelson, MD on clinical genetics; forward and reverse genetic analysis	Chapter 20
20: Thurs, 6/3	Genetics approaches to understanding the coronavirus	

FINAL EXAM: Thursday, June 10, 8am-11am

LECTURES AND DISCUSSION SECTIONS
Lectures will be given by Zoom and will be video recorded so they will be available for students after class on Canvas (go to Zoom LTI PRO, Cloud Recordings tab)> Powerpoint slides will also be uploaded to Canvas. Discussion sections will also be via Zoom and will be video recorded – see Canvas for details. For lectures, join URL:
https://ucsd.zoom.us/j/97821876205?pwd=L3VGaDJ2UVBlU09uaGtHdTYxV3NTZz09

Professor Office hours: Emily Troemel, Tuesdays 10-10:50 am (except no OH the first week)
https://ucsd.zoom.us/j/95711861903

Contact: Your instructional assistants (IAs) and fellow students are your best resource for information and you should first attempt to answer your questions through them. Use the discussion board on Canvas or email your IAs. This is important! The IAs are excellent at answering questions, and in fact, are usually better than most professors at providing a response that will help you learn. Because of the class size, it is difficult for Dr. Troemel to respond to emails individually. Ask questions in class! You will have opportunity using the Chat function in Zoom. In the very rare event of emergency, contact Dr. Troemel by email at etroemel@ucsd.edu. On all emails put BICD 100 in the subject line to indicate that the email pertains to this course. In any email to Dr. Troemel, include your UCSD username, and PID.

Course web site will be on Canvas:
https://coursefinder.ucsd.edu/ - you can login with your active directory login and password
Lecture slides will be posted to the website right after lecture as a pdf file for downloading.

Sections and Instructional Assistants:
Discussion sections will be held by IAs once a week, except the first week. The IAs will lead a discussion based on the Assignments (posted the previous week) to help participating students arrive at the correct answers. The IAs will not provide the answers themselves. To get the most out of Discussion sections, it is therefore critical to have first worked through the Assignments alone or in study groups and then to participate in the discussion during the Discussion sections.

Section	Day	Time	Building	Room	IA	IA email
E01	W	11:00 AM	RCLAS	R207	Erin Zeider	ezeider@ucsd.edu
E02	W	12:00 PM	RCLAS	R128	Rita Wan	xwan@ucsd.edu
E03	W	3:00 PM	RCLAS	R132	Courtney Cheng	c4cheng@ucsd.edu
E04	F	9:00 AM	RCLAS	R113	Peter Berube	pberube@ucsd.edu
E05	F	10:00 AM	RCLAS	R161	Peter Berube	pberube@ucsd.edu

IA office hours (None the first week):

IA	Day	Time	Location
Courtney Cheng	Mon	3-3:50 pm	Zoom – see Canvas
Erin Zeider	Mon	6-6:50 pm	Zoom – see Canvas
Rita Wan	Wed	1-1:50pm	Zoom – see Canvas
Peter Berube	Thurs	11-11:50am	Zoom – see Canvas

Textbooks/Online Resources
The required textbook is *Essentials of Genetics* by Klug, Cummings, Spencer, Palladino, Tenth Edition. A textbook, as well as the Study Guide and Solutions Manual, has been put on reserve as a hard copy at the Biomedical Library Building.

How to do well in this course:
- Attend lectures and take your own notes. Don't just 'follow along' with a printout, or rely on someone else's notes. Active note taking is the key to effective learning! This is still true with video lectures. For tips, see this video: https://youtu.be/1IIUVU-d1DM
- Attend and participate in discussion sections.
- Work through the assignments.
- Come to office hours. Talk to the instructor and IAs: we are here to help you.
- Genetics is a problem solving science. It is essential to spend time solving problems in classical Mendelian and human genetics. The exams will have such problems, in addition to questions that test your knowledge of overall content of the class.
- Work through the problems in the textbook and on the Mastering Genetics Online portal. Don't just look up the answer in the solutions manual.

SYNCHRONOUS/ASYNCHRONOUS INSTRUCTION
Lectures can be watched asynchronously. However, you are strongly encouraged to attend lectures live, as there will be opportunities to ask questions during lecture. Furthermore, by taking notes and actively thinking through the quiz questions posed in class, you increase your chances of understanding the material and doing well on the exams.

Discussion sections can also be watched asynchronously, but again, attending these live will provide opportunities to ask questions, and will enable you to receive help on the Assignments before they are due (see below). You are strongly encouraged to attend the Discussion section where you are signed up, in order to get to the know the IA and form a community. However, attendance is not mandatory, and if you would like to attend another section, please contact the IA of that section to determine if they have bandwidth for an additional student.

The three midterms and the final must be taken synchronously (i.e. during the times specified here in the syllabus).

EXAMS
There will be a midterm after every 6 lectures for the first 9 weeks of the class for a total of three midterms during the quarter. These midterms will be given through Gradescope and will be given in the first 30 minutes of class after every 6 lectures. The questions on these midterm exams will similar to questions on the Assignments (see below) and the Quiz questions during lecture. The final exam will be comprehensive for the entire course and will be given Thurs, June 10, 2021, 8am-11am. These exams will be open book, but you CANNOT work with classmates and are expected to solve the problems individually.

ASSIGNMENTS

Class assignments will be posted on the class website on Friday by noon during the quarter (see schedule). In general they will be due the following Fri 5pm, and the answers will be discussed in Discussion sections held those Wednesdays or Fridays. Assignment #1 will be submitted through Canvas, and subsequent Assignments through Gradescope. The IAs will lead a discussion based on the Assignments to enable participating students to arrive at the correct answers. The IAs will not simply provide the answers. To get the most out of Discussion sections, it is therefore critical to have first worked through the Assignments alone or in study groups and then to participate in the discussion during the Discussion sections.

Late assignments will not be accepted, but you can drop your lowest grade assignment.

QUIZ QUESTIONS DURING CLASS

To facilitate learning/understanding of the material presented in lecture, there will be quiz questions posed during lecture through Zoom polling (similar to Clickers in the past). Similar versions of these questions will be available in Canvas Quizzes to receive credit for correctness after lecture and for 24 hours afterward (e.g. 9:30am Tues through 9:30am Wed). Quiz questions cannot be answered after the 24 hour period, but you can drop the lowest three quiz grades. Once started you will have 15 minutes to take the quiz.

The last question in class will be a 'muddy point' question to determine which area needs more attention. These questions will be part of ungraded surveys in Canvas.

QUESTIONS FROM STUDENTS DURING CLASS

Students can pose questions in the Chat function in Zoom (please keep questions concise), and Prof. Troemel will look through these questions when there are breaks during lecture (e.g. during quiz questions mentioned above), and will address questions after breaks. If a question is too complicated to ask in the Chat, you can use the "Raise hand" function in Zoom and ask it verbally.

MAKE-UP EXAMS

There will be no make-up exams. For students with an excused medical absence an exam, the other exams will count for the remaining 90% of the grade (this excuse must be provided within 3 days of the midterm during a Zoom meeting with Prof. Troemel, and must be from a physician visit within 12 hours of the exam). The final exam must be taken on the exam date. **No early or late exams will be given for any reason**. For students with an excused medical absence from the final, a make-up final will be administered as an oral exam by the professor within the first 3 weeks of the next quarter. If a student misses two exams they automatically receive a failing grade.

GRADING

Midterm exams (3) – given after 6 lectures throughout the course
20% each for total of 60%
Final exam (1) – quarter-end comprehensive
30%
Assignments (10) – short-answer every week
5%
Quiz questions during lecture – 4-5 questions/class
5%
At the end of the quarter, I will average the point total for the top 5 students in the class and assign that average a value of 100%. Any student with a point total of at least 90% of that

average will receive a grade of A- or better. A score of 80% is guaranteed a B- and a score of 70% is guaranteed a C-.

REGRADE POLICY

Regrade requests should be made in writing to your section IA, within 3 days of the exam being returned and specifying the basis for the request in writing. As a rule we will correct clerical errors in grade computation. If your answer was not clear in the first place, additional clarification will not get you a regrade. Remember that requests for a regrade may result in a loss of points, if extra points were given in error in the original grading.

ACADEMIC INTEGRITY

Information about UCSD policies on academic integrity can found at:
https://academicintegrity.ucsd.edu/
Integrity of scholarship is essential for an academic community. The University expects that both faculty and students will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind. Instructors, for their part, will exercise care in planning and supervising academic work, so that honest effort will be upheld.

Students' Responsibilities

Students are expected to complete the course in compliance with the instructor's standards. No student shall engage in any activity that involves attempting to receive a grade by means other than honest effort; for example:
No student shall knowingly procure, provide, or accept any unauthorized material that contains questions or answers to any examination or assignment to be given at a subsequent time.
No student shall complete, in part or in total, any examination or assignment for another person.
No student shall knowingly allow any examination or assignment to be completed, in part or in total, for himself or herself by another person.
No student shall plagiarize or copy the work of another person and submit it as his or her own work.
No student shall employ aids excluded by the instructor in undertaking course work or in completing any exam or assignment.
No student shall alter graded class assignments or examinations and then resubmit them for regrading.
No student shall submit substantially the same material in more than one course without prior authorization.
Suspected cases of academic dishonesty will be reported to the Academic Integrity Coordinator and the Dean of Student Affairs.

If a charge of academic dishonesty is upheld, the penalty will be a failing grade for the course.