

**BICD 100 Genetics**  
**Spring 2023**  
**A00**

**Professor:** Emily Troemel  
**Lectures:** Tuesday and Thursday 3:30 pm – 4:50 pm Pacific (all times below in Pacific)  
**Location:** **Center 101**  
**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, 4/4	Background on DNA/RNA/protein, Chromosomes, Eukaryotic/prokaryotic, Intro to Mendel: monohybrid cross	Chapter 1, 3 (p31-36)
2: Thurs, 4/6	Mitosis and Meiosis, dihybrid cross	Chapter 2, 3 (p36-39)
<i>Friday, 4/7</i>	<i>Assignment #1 uploaded</i>	
3: Tues 4/11	Laws of probabilities, tri-hybrid crosses, Chi-square, pedigrees,	Chapter 3 (p39-49)
4: Thurs, 4/13	Modifications of Mendelian ratios (e.g. varying kinds of alleles, epistasis)	Chapter 4 (p53-64)
<i>Friday, 4/14</i>	<i>Assignment #2 uploaded</i>	
5: Tues, 4/18	Guest lecturer: Dr. Vladimir Lazetic; 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, 4/20	Different types of pedigrees: X-linked/autosomal, dom./rec; review for midterm #1	Review previous reading
<i>Friday, 4/21</i>	<i>Assignment #3 uploaded</i>	
7: Tues, 4/25	3:30-4:00pm Midterm #1 – first 30 minutes of class; Covers lectures 1-6; 4:00pm Lecture: More modifications of Mendelian ratios (penetrance/expressivity, maternal effect, mitochondrial mutations)	Chapter 4 (p70-76)
8: Thurs, 4/27	Sex determination, dosage compensation	Chapter 5
<i>Friday, 4/28</i>	<i>Assignment #4 uploaded</i>	
9: Tues, 5/2	Chromosomes: variations in number and arrangement	Chapter 6
10: Thurs, 4/24	Gene mapping: recombination and linkage, 3-point crosses	Chapter 7 (p121-135)
<i>Friday, 5/5</i>	<i>Assignment #5 uploaded</i>	
11: Tues, 5/9	Bacterial genetics and gene transfer: conjugation, transformation; Antibiotic resistance	Chapter 8 (p144-154) Chapter 11 (skim)
12: Thurs, 5/11	Bacteriophage genetics, gene transfer by transduction; Review for Midterm #2	Chapter 8 (p154-159)
<i>Friday, 5/12</i>	<i>Assignment #6 uploaded</i>	
13: Tues, 5/16	3:30-4:00pm Midterm #2: Covers lectures 7-12 4:00pm Lecture: DNA structure, base composition rules,	Chapter 9
14: Thurs, 5/18	The genetic code, DNA mutations, DNA damage and repair	Chapter 10,12 (skim) Chapter 14 (p261-277)
<i>Friday, 5/19</i>	<i>Assignment #7 uploaded</i>	

15: Tues, 5/23	Regulation of gene expression, lac operon, RNA interference	Chapter 15, 16 (skim)
16: Thurs, 5/25	Cancer genetics: cell cycle, oncogenes and tumor suppressors	Chapter 19
Friday, 5/26	Assignment #8 uploaded	
17: Tues, 5/30	Guest lecturer postdoctoral fellow Aaron Smargon, PhD from the Yeo lab: Genome sequencing, Sequence Alignment, Genome Editing	Chapter 17,18 (skim)
18: Thurs, 6/1	Quantitative traits, heritability estimates, twin studies	
Friday, 6/2	Assignment #9 uploaded	
19: Tues, 6/6	3:30-4:00pm Midterm #3 – first 30 minutes of the class: Covers lectures 13-18; 4:00pm Guest lecture from Kaiser physician Mike Nelson, MD on clinical genetics	Chapter 20
20: Thurs, 6/8	Forward and reverse genetic analysis	

**FINAL EXAM: Monday, June 12, 3pm-5:50pm**

### LECTURES AND LECTURE SLIDES

Lectures will be podcast and a draft of lecture slides will be uploaded right before the lecture; these slides may be modified after the lecture as needed.

**Professor Office hours:** Emily Troemel, Tuesdays 9-9:50 am (except no OH the first week; and will be on Thurs 9-9:50am on Week 3)  
Bonner 4202

### Course web site will be on Canvas:

<https://coursefinder.ucsd.edu/> - you can login with your active directory login and password  
A draft of lecture slides will be posted to the website right before lecture, and may also be uploaded with updates/corrections after lecture as a pdf file for downloading.

**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 Piazza on Canvas for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the IA's, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email [team@piazza.com](mailto:team@piazza.com). Find our class signup link at: [https://piazza.com/ucsd/spring2023/bicd100\\_sp23\\_a00](https://piazza.com/ucsd/spring2023/bicd100_sp23_a00)

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 the opportunity. In the very rare event of emergency, contact Dr. Troemel by email at [etroemel@ucsd.edu](mailto:etroemel@ucsd.edu) and cc your IA. On all emails put BICD100 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, and cc your IA to keep them in the loop – in this way Dr. Troemel and the IA's can work as a team to better support you.

### 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
A01	M	2:00 PM	WLH	2209	Berry, Anne Marie
A02	M	3:00 PM	WLH	2209	Berry, Anne Marie
A03	M	4:00 PM	WLH	2209	Chieng, Sinclair
A04	M	7:00 PM	WLH	2215	Zhao, KaiKai
A05	W	2:00 PM	WLH	2214	Li, Yingyin (Katie)
A06	W	8:00 PM	WLH	2209	Pellecchia, Lorenzo
A07	F	11:00 AM	HSS	2321	Suman, Ethan
A08	F	2:00 PM	WLH	2114	Xiao, Martin

### IA office hours (None the first week):

IA	Time	Location	Email
Berry, Anne Marie	Mon, 5pm	Art of Espresso	<a href="mailto:amberry@ucsd.edu">amberry@ucsd.edu</a>
Li, Yingyin	Wed, 9am	Fairbanks coffee cart by Revelle	<a href="mailto:yil097@ucsd.edu">yil097@ucsd.edu</a>
Chieng, Sinclair	Wed, 1pm	Great Hall (Café Ventanas)	<a href="mailto:schieng@ucsd.edu">schieng@ucsd.edu</a>
Pellecchia, Lorenzo	Wed, 6:30pm	Middle of Muir (MOM)	<a href="mailto:lpellecc@ucsd.edu">lpellecc@ucsd.edu</a>
Suman, Ethan	Tue, 5pm	Art of Espresso	<a href="mailto:esuman@ucsd.edu">esuman@ucsd.edu</a>
Xiao, Martin	Fri, 12:30pm	LGBT resources center – student center A	<a href="mailto:h1xiao@ucsd.edu">h1xiao@ucsd.edu</a>
Zhao, KaiKai	Mon, 6pm	Audrey's Café at Geisel East	<a href="mailto:k7zhao@ucsd.edu">k7zhao@ucsd.edu</a>

### Textbooks/Online Resources

The required textbook is *Essentials of Genetics* by Klug, Cummings, Spencer, Palladino, Tenth Edition. This book is available as print copy reserve at Geisel library for users to review. The Essentials of Genetics Study Guide is available in Ares for your course. Students should be able to access it there digitally, or as an eBook through Canvas as part of the Inclusive Access program. As part of the Inclusive Access program, your digital course materials are provided by the UC San Diego Bookstore through Canvas and are free for the first two weeks of class. After two weeks, your student account will be charged a special reduced price unless you opt out. If you decide to opt out you must complete the process by April 15th, 2023, 11:59PM PDT and you will be responsible for sourcing the materials elsewhere.

Instructions for how to opt out can be found here:

<https://solve.redshelf.com/hc/en-us/articles/360013142634-How-to-Opt-Out>

### 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. Don't just look up the answer in the solutions manual.

## **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 on paper and will be given in the first 30 minutes of class after every 6 lectures. The questions on these midterm exams will be similar to questions on the Assignments (see below) and the lecture Quiz questions. The final exam will be comprehensive for the entire course and will be given Monday, June 12, 2023, 3-5:50pm. 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. Assignments will be available 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.

## **CLICKER USE**

You will need an i-clicker. New and used i-clickers are available at the Price Center bookstore. Make sure to get an i-clicker and not a different system (such as H-ITT or PRS). Both i-clickers 1 and 2 are fine. For more information, visit: <https://blink.ucsd.edu/faculty/instruction/tech-guide/clickers/index.html>

Clickers will be used for rapid feedback to foster interactive learning in a large classroom setting. Clicker questions will be used during class time to make students think and discuss with each other how the material fits within the bigger picture of genetics.

To obtain as much credit for clicker use as possible, please register your i-clicker ASAP, and no later than Friday, April 7, on the class web-site. Here is information on registering clickers:

<https://blink.ucsd.edu/faculty/instruction/tech-guide/clickers/before-class/plan-course.html>

Using a clicker constitutes up to 2% extra credit toward your grade. These points are based entirely on clicker use, not on whether you get the answers right. Clicker point counting will begin in week 2 of the quarter, and you will get a point if you answer 75% or more of the questions. Because it is only extra credit, it is not possible to get clickers credit for classes that you missed (even for an illness). Cheating with clickers by having someone other than yourself using your clicker during class is considered a breach in academic honesty and will result in the loss of all clicker points for the quarter for both yourself and the person bringing your clicker, as well as any additional disciplinary actions as indicated by the policy to maintain academic honesty. Correct clicker use will be monitored by the instructor and IAs during class. The last Clicker question in class will sometimes be a 'muddy point' question to determine which area needs more attention.

## **QUIZ QUESTIONS**

Similar versions of Clicker questions will be available in Canvas Quizzes (with some modifications) to receive credit for correctness after lecture and for 24 hours afterward (e.g. 5pm Tues through 5pm 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.

### **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%

90% of total points is guaranteed A- or better

80% of total points is guaranteed B- or better

70% of total points is guaranteed C- or better

60% of total points is guaranteed D or better

Below 60% is an F

### **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 be 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.**