

## BIOL 3350.002 GENETICS SPRING 2020

Professor: Dr. Jennifer Cooper Office: N256  
Office hours: M 10:00 am - 12:00 pm Email: jcooper3@csustan.edu  
Th 12:30 pm -1:30 pm Write BIOL 3350 in the subject line of all emails

Tutoring for BIOL 3350 is free! Call the Tutoring Center (209) 667-3642 for an appointment.

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### COURSE PREREQUISITES

C- or above in all of the following courses: BIOL 1050, BIOL 1150, CHEM 1100, CHEM 1110, or transferred equivalents.

### COURSE DESCRIPTION

Introductory Genetics is a required course for all biology majors. This is an upper-division science course and it is expected that you have a strong grasp of the material covered in the pre-requisite courses. In this course we explore the three branches of genetics: Mendelian genetics (also called classical or inheritance genetics), molecular genetics (DNA replication, transcription and translation), and molecular biotechnology (molecular markers, gene cloning, DNA fingerprinting).

There is a substantial amount of information to be mastered in this course. To do well, one must devote the necessary time and effort. Experience indicates that to be successful, a minimum of 12 hours of effort is needed outside of class. **If you are not prepared to dedicate the time and effort needed for this course, you should reconsider your enrollment.**

### REQUIRED MATERIALS

- *Concepts of Genetics*. Klug, et al. 12<sup>th</sup> edition. Pearson, ISBN 9780134839707  
The campus bookstore is now offering only the **electronic** textbook. You may purchase hard copies elsewhere.
- Modified Mastering Genetics  
This is an online homework platform offered by Pearson, the textbook publisher. At the campus bookstore, you can purchase the e-text Access Card bundled with access to Modified Mastering Genetics. If you purchase your text elsewhere, you can purchase access to Modified Mastering Genetics on the Pearson website. Instructions are posted on the BIOL 3350 Blackboard page.
- I-clickers remotes are required, and will be used every class meeting. The Reef phone app cannot be used.

### CENSUS DATE

This course can only be taken for a letter grade. Students can drop the course prior to the census date of February 21. After this date, a student cannot withdraw without an appeals process documenting extraordinary circumstances.

### PERSONAL INTEGRITY AND CLASSROOM BEHAVIOR

It is assumed that you have read and understood the university's position on academic integrity and student discipline. **Cheating and plagiarism will be dealt with as severely as university and state regulations allow.** This includes receiving an F in the course, and being reported to University Judicial Affairs.

**Do not text in my class. It is rude.** Use of laptops is not allowed; take notes by hand. You may audio record the lecture.

### GRADING

Grades are determined by the points you earn during the course. I reserve the right to use +/- grades, rather than whole letter grades. Although your scores will be archived on **Blackboard**, I expect you to keep all graded scantrons for the term.

iClicker	150 points
Midterm Exam 1	120 points
Midterm Exam 2	120 points
Midterm Exam 3	120 points
Cumulative Final Exam	250 points
Mastering Genetics online homework	240 points

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## EXAMS

The **midterm exams** will focus on material covered in lecture since the previous exam; these exams are not cumulative. The **final exam** will be cumulative, focusing on material covered throughout the entire semester.

All exam questions will be given in a multiple choice format, and answers will be recorded on **882-E** Scantron forms. Erase thoroughly...**if the machine reads your erased answer as incorrect, the automatic score is the grade I record.** Don't mark your answer outside of the bubble...the machine may read your answer as incorrect. Students who arrive after the first exam of the day has been turned in will not be allowed to take the exam. If you must leave the room for personal reasons, you will not be allowed to finish the in-class exam. Your partially finished exam will be graded as it stands. If you miss an exam for any reason, you must take an alternate exam **before** the in-class exam is scheduled to take place. If you miss an exam unexpectedly, and do not have documentation of a legitimate reason for doing so, you will receive a 0 grade for the missed exam.

## iCLICKERS

In every class period, you will use your iClicker remote to answer questions. Questions will test your comprehension of material discussed in previous class periods, and they will also reinforce your understanding of material currently under discussion. **The points you earn through iClickers will reward you for attending class and paying attention. Your engagement with these lower-stakes quiz questions will prepare you for the larger-stakes exams.** You are responsible for bringing your remote to class, and carrying fresh batteries, so that you are prepared to answer questions the moment you walk in the door. I will begin every class period with an iClicker question. Students who forget their remote, or who come to class late, will not be allowed to make up the questions that are missed.

## MASTERING GENETICS

There will be multiple online homework assignments, corresponding to the chapters we will cover in the course. Do not expect a perfect correspondence between lecture and homework; the homework focuses on problem solving and quantitative analysis, and thus will help prepare you for those challenges on exams. However, it will also touch upon some textbook material not covered in lecture, because I want you to have a passing familiarity with those facts or ideas, but if I don't discuss it in lecture then you will not be examined over it.

Detailed instructions for registering for Mastering Genetics have been posted to the BIOL 3350 Blackboard page, under Information & Syllabus. In Mastering Genetics, the name of this course is CSUSTAN BIOL 3350.002 SPRING 2020 Cooper. Assignments are already posted in Mastering Genetics. Assignments usually take 3-4 hours to finish, but each answer is submitted individually so you can do assignments in chunks. **Homework assignments are due two days before each midterm exam, by 11:59 pm. Please don't procrastinate...do one or two homework assignments every week.** If you experience technical difficulties while submitting an answer to a particular homework question, click the "Contact Publisher" link above the question within the assignment. Students who register after the first homework assignments are due may **not** make up those missed assignments.

**COURSE OBJECTIVES** Students who successfully complete this course will:

- Examine the scientific method as it relates to evaluating evidence and drawing logical conclusions.
- Examine fundamental genetic principles and the structural levels of genetic organization and evolution.
- Investigate the chemical basis of life with emphasis on structure and function of nucleic acids.
- Understand the cell cycle and how it relates to mitosis and meiosis, Mendelian transmission genetics and extensions of the basic Mendelian model.
- Investigate chromosome mapping in prokaryotes and eukaryotes.
- Describe the process of DNA replication, transcription and translation, and the various levels of mutation (chromosomal, nucleic acid, epigenetic).
- Understand gene expression in eukaryotes, especially during development and in oncogenesis.
- Explore the many fields of and methodologies of biotechnology, including gene cloning, DNA fingerprinting, stem cell research, genomics and bioinformatics, and genetic engineering.
- Explore the genetic foundations of behavior, population structure and evolution.

## STUDY RECIPE (FOR STUDYING ALONE)

This course has a reputation for being challenging, because some students are new to university-level biology. Students often complain that they study “all the time” but that their hard work doesn’t pay off in good grades. This is often because their study strategy simply needs tweaking. I have developed the perfect recipe for studying, based on our current understanding of the neurophysiology of learning and long-term memory formation. Using the recipe I provide below, you will maximize the benefit gained from each single minute of study time. If you also study the number of hours I recommend (15 hours outside of class [20 in summer semester]) then you will enhance your chances of earning the grade you want.

For each day’s lecture notes, you should do 4 “drive-bys” of the information. Your study environment should be isolated from external noise and distraction (no TV, no music, no kids, no throwing the ball for your dog).

1. **Take detailed notes in lecture.** Don’t try to write every single word on the slide; instead, **listen to what I am saying** and write abbreviated summaries and main ideas based on what comes out of my mouth.
2. **DRIVE-BY 1 (LEARNING AND REFLECTION):** This study session is for **learning and understanding** the material I introduced in lecture, using **thinking and reflection**.
  - This study session should be accomplished the same day as the lecture (ie. don’t have a sleeping period in between the lecture and the study session).
  - It should last a minimum of 1 hour, but will probably take 2-3 hours.
  - In the first 15 minutes, read through the notes and remind yourself of the general topic.
  - The remaining time should be spent in carefully reviewing each slide in turn, with your textbook open to the pages covering that material.
  - Read about every concept or process in the notes, and then read about it in the textbook. **Use your own words to describe concepts and processes.** When you do this, you are stimulating the language centers in the brain, which seem to be evolutionarily linked to learning in humans.
  - Think about the examples provided, and see if you can think of other examples.
  - Try to draw relevant images or flowcharts of processes.
  - Don’t stop until you have completed processing every slide of that day’s lecture notes.
3. **DRIVE-BY 2 (CONSOLIDATION):** This study session is for **consolidating your understanding** of the lecture material, and forming a clear connection in your mind between concepts, processes, and structures.
  - This study session should be accomplished the day following the lecture.
  - It should last a minimum of 1 hour. You will not use your textbook for this session, except to clarify your understanding of a particular fact.
  - In the first 15 minutes, review the notes and remind yourself of what you learned the day before.
  - Return to the first topic, cover the notes with a sheet of paper, and write down what you can remember (definitions, concepts, drawings). **You must use your own words to describe concepts and processes**, writing as much as you can possibly squeeze out of your memory. Don’t cheat by glancing at the notes! This process is called **“active challenging”** and it quite literally builds a neural and biochemical pathway in your brain. We use this process when we form long-term memories. The action of writing and drawing (not typing) seems to amplify the effect.
  - Uncover your notes and compare them with your memory work. Use a colored highlighter to highlight any mistakes or misunderstandings. Then move on to the next topic.
  - Don’t stop until you have actively challenged yourself on every topic of that day’s lecture notes.
4. **DRIVE-BY 3 (LONG-TERM MEMORY FORMATION):** This study session is for **building the long-term memory** of the lecture material.
  - This study session should be accomplished the day following drive-by 2. Repeat every step described for drive-by 2. **For each concept, craft a new description using your language skills...you are not trying to memorize phrases!** Pay careful attention to the mistakes highlighted in that study session. Highlight new mistakes with a different color.
5. **DRIVE-BY 4 (LONG-TERM MEMORY RETRIEVAL):** This study session is for **reinforcing the long-term memory** of the lecture material. Do it a few days before your exam. **LONG-TERM MEMORY RETRIEVAL IS THE ACTION PERFORMED DURING EXAMS.**

<b>Week of</b>	<b>Lecture topic</b>	<b>Text</b>	<b>Assignment</b>
1/27	Introduction Mitosis and Meiosis	Ch 2	Begin using the Study Recipe
2/3	Mendelian Genetics	Ch 3	
2/10	Extensions of Mendelian Genetics	Ch 4	
2/17	Chromosome Mapping <b>2/21 Census date</b>	Ch 5	Homework Ch 2-5 due Monday Exam 1 Wednesday
2/24	Sex Determination and Sex Chromosomes	Ch 7	
3/2	Chromosome Mutations	Ch 8	
3/9	Extra-nuclear Inheritance	Ch 9	
3/16	DNA Structure DNA Replication and Recombination	Ch 10 Ch 11	Homework Ch 7-10 due Wednesday Exam 2 Friday
3/23	<b>SPRING BREAK NO CLASS</b>		
3/30	DNA Organization into Chromosomes	Ch 12	
4/6	The Genetic Code and Transcription	Ch 13	
4/13	Translation and Proteins	Ch 14	Homework Ch 11-14 due Friday
4/20	Mutation, DNA Repair and Transposition	Ch 15	Exam 3 Monday
4/27	Gene Regulation	Ch 16-17	
5/4	Developmental Genetics	Ch 18	
5/11	Recombinant DNA Tech and Biotech Population and Evolutionary Genetics	Ch 20-22 Ch 25	Homework Ch 15-18, 20-22, 25 due Friday
<b>5/18</b>	<b>CUMULATIVE FINAL EXAM 8:30 a.m.-10:30 a.m</b>		

### **CAMPUS COUNSELING SERVICES**

Overwhelmed by the stress of juggling classes and work? Our campus offers excellent counseling services to support you!  
Library 185; Phone (209) 667-3381; Web <http://www.csustan.edu/Counseling>

### **STUDENT HEALTH CENTER**

You have already paid for access to health care on campus. Services include: birth control, flu shots, immunizations, pharmacy, check-ups, HIV testing, TB tests, and doctor's notes for when you are sick!  
Phone (209) 667-3396; Web <http://healthcenter.csustan.edu>