

BIOL 3350 GENETICS Spring 2015

Professor: Dr. Jennifer Cooper
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Office hours: Monday and Friday 2-3
Thursday 11-12
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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 15 hours of preparation and/or review are 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 TEXTS/MATERIALS

- *Concepts of Genetics*. Klug, et al. 10th edition. Pearson, ISBN 9780321732330
You are allowed to purchase the looseleaf rather than a hardbound text.
- Mastering Genetics access (bundled with text at bookstore...otherwise purchase access online)
- Use of laptops to take notes is forbidden; take notes by hand.

CENSUS DATE

Students must attend the first three class sessions or they will be dropped from the course.

This course can only be taken for a letter grade. Students can drop the course prior to the census date of February 23. After this date, a student cannot withdraw from the course without an appeals process.

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. Believe it or not, I can see you.

GRADING

Grades are determined by the points you earn during the course. Your grade will be determined by your combined performance in lecture and lab. I reserve the right to use +/- grades, rather than whole letter grades. A total of 1000 points are available. It is expected that students will keep track of their scores (including copies of all graded materials) for the duration of the term.

| | |
|--|------------|
| In-class exams (100 points each) | 400 points |
| In-class write and share (4, 40 points each) | 160 points |
| Mastering Genetics online homework | 200 points |
| Study group activities: | |
| Poster (participation 140 pts, presentation 100 pts) | 240 points |

IN CLASS EXAMS

The lecture exams will be given in a multiple choice format. The 4th exam is not cumulative. I do not recycle exam questions.

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 not be allowed to take the alternate exam, and your total exam points will be based on the average of your other in-class exams.

Exam answers will be recorded on Scantron 882-E forms. Erase thoroughly...**if the machine reads your erased answer as incorrect, the automatic score is the grade I record.** When you turn in your exam, you may be required to show photo identification.

WRITE AND SHARE

I provide a question for you to answer in a short essay. You will then be allowed to chat briefly with a partner, and quickly revise your essay before turning it in. Questions will be based on lecture or videos from the previous week. A random subset of 4 essays will be graded.

MASTERING GENETICS

There will be online homework assignments due each week. Students who register after the first homework assignments are due may **not** make up those missed assignments.

Assignments are usually posted several days in advance, and you are responsible for checking the site for new assignments. Assignments usually take 3-4 hours to finish, but each answer is submitted individually so you can do assignments in chunks. Start assignments as early as possible, because a computer or website malfunction that prevents you from finishing an assignment by the deadline will result in a zero grade for the unfinished portion.

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.

To register for Mastering Genetics visit the website <http://www.masteringgenetics.com/>

Click the "STUDENTS" button under the register option. You will be asked for a student access code. This is a printed code supplied inside the Mastering Genetics Student Access Kit, which was included with the purchase of your new textbook. If you bought your textbook used, then there is an option for you to purchase an access code online during the registration process at a cost of ~ \$70, cheaper than the campus bookstore (note: you do NOT need to buy access to Virtual Labs).

In Mastering Genetics, the name of this course is CSUSTAN BIOL 3350 Spring 2015 Cooper. To register for this course, enter the code MGENCOOPER33929

POSTER PRESENTATION (GROUP ASSIGNMENT)

Each student in the class will select a topic relating directly to genetics or evolutionary genetics, from a list of available topics provided by the instructor. All students who have chosen the same topic will work together to search for material on this topic, and create a **single** poster to present as a group at the end of semester Poster Session (during the Final Exam period).

I will create poster topics in BlackBoard, and each topic will have space for ~5 students. To assess how much each student is contributing to the poster project, I require that all work take place in BlackBoard in the wiki that I create for your group. This is where you earn those 140 participation points!

To find articles related to your topic:

- Go to the CSU Stanislaus library website (link on University homepage).
- Choose "Find Books and Articles", then choose "Databases A-Z", then choose "Biological Abstracts."
- Search on a combination of terms to find articles about the topic your group is researching. Review articles are especially informative, so you can also perform an advanced search and restrict your search to literature review articles.
- Click the "FIND IT!" link to access full-text article PDFs for more in depth research.

It is easy to use Microsoft PowerPoint to prepare a poster presentation, simply by adding components (text boxes, images) to a single slide. You must format the slide as a custom size and indicate how large a print you want your final poster to be. **Your poster must be a minimum of 42 x 48 inches in size.** It must be printed on a large format printer at a professional printing service (Kinko's, Staples, etc). **Color printing is not required, but your poster will be assessed by other students and color posters tend to achieve higher assessments.**

On campus, the ASI Marketing Department also prints posters, and their color printing service is often much cheaper than off-campus. However, their turn-around time may be longer. Although I provide some rough guidelines for pricing below, talk to your print shop ahead of time to find out at what size they print posters, cost, and how long it takes.

Follow these guidelines to create a good scientific poster:

- The main goal of a poster is to relate the main points of your topic with as little effort as possible on the part of the audience to read, interpret, and understand. Only present the main points.
- Use a suitable font size (can be read from about four feet away).
- Include a Title, and the list of student authors.
- Sections should have appropriate labels.
- Clearly explain the ideas with short, concise sentences. **Use bullet points instead of paragraphs when you can.**
- Graphics are required (figures, special equations, photos). Graphics should be high resolution, and should convey the most important ideas in the paper.
- For each figure, use an explanatory caption. You can outline each figures with a colored box, and outline the relevant paragraph/list in the Results or Discussion with the same color...this will help readers associate figures with text.
- Include a short list of your sources (journal articles, OMIM, NCBI, Center for Evolutionary Psychology, news media).
- **Do NOT plagiarize sources. Re-write everything in your own words.**
- Although each student will probably focus on producing a different section of the poster, every person must be fully prepared to discuss every section of the poster on presentation day. **Be prepared for me to approach you and ask you to explain a section prepared by one of your group members!**

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, not including homework assignments) 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):** This study session is for **learning and understanding** the material I introduced in lecture.
 - 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.
 - Think about the examples provided, and see if you can think of other examples.
 - Try to draw relevant images or flowcharts of processes. Define terms in your own words.
 - 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 **write and draw** 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 drawing and writing (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, paying 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. **LONG-TERM MEMORY RETRIEVAL IS THE ACTION PERFORMED DURING EXAMS.**

Note: If I ever get really, really behind in lecture, and the Mastering Genetics homework is due for a chapter that I haven't begun to discuss, give me a heads up. I might postpone the due date.

| Week | Lecture topic | In-class activity |
|-------------|---|-------------------------------|
| 1/27-1/29 | Introduction Ch. 2 Mitosis and Meiosis | |
| 2/3-2/5 | Ch. 3 Mendelian Genetics | Thursday: Write and Share 1 |
| 2/10-2/12 | Ch 4 Extensions of Mendelian Genetics | Thursday: Write and Share 2 |
| 2/17-2/19 | Ch 5 Chromosome Mapping EXAM 1 on Thursday | |
| 2/24-2/26 | CENSUS DATE February 23 Ch 7 Sex Determination and Sex Chromosomes | Thursday: Write and Share 3 |
| 3/3-3/5 | Ch 8 Chromosome Mutations | Thursday: Write and Share 4 |
| 3/10-3/12 | Ch 9 Extra-nuclear Inheritance Ch 10 DNA Structure | Thursday: Write and Share 5 |
| 3/17-3/19 | Ch 11 DNA Replication and Recombination EXAM 2 on Thursday | |
| 3/24-3/26 | Ch 12 DNA Organization into Chromosomes | Thursday: Write and Share 6 |
| 3/31-4/2 | Tuesday: CESAR CHAVEZ DAY NO CLASS Ch 13 The Genetic Code and Transcription Ch 14 Translation and Proteins | Thursday: Write and Share 7 |
| 4/7-4/9 | SPRING BREAK | |
| 4/14-4/16 | Ch 15 Mutation, DNA Repair and Transposition | Thursday: Write and Share 8 |
| 4/21-4/23 | Ch 16 – 17 Gene Regulation EXAM 3 on Thursday | Thursday: Write and Share 9 |
| 4/28-4/30 | Ch 18 Developmental Genetics Ch 19 Cancer and Cell Cycle Regulation Thursday: DRAFT POSTER DUE | Thursday: poster share |
| 5/5-5/7 | Ch 20 – 22 Recombinant DNA Tech and Biotech Ch 24 Genetics of Behavior | Thursday: Write and Share 10 |
| 5/12-5/14 | Ch 25 Population and Evolutionary Genetics EXAM 4 on Thursday | |
| 5/21 | Poster session in regular classroom 8:30 – 10:30 | |