

## BIOL 3350 INTRODUCTORY GENETICS FALL 2012

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### COURSE PREREQUISITES

1 year of college biology and 1 year of college chemistry.

### 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. 10<sup>th</sup> edition. Pearson, ISBN 9780321732330  
You are allowed to purchase the ebook rather than a physical text.
- Mastering Genetics access (bundled with text at bookstore...otherwise purchase access online)

### CENSUS DATE

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

This course cannot be taken for credit. It can only be taken for a letter grade. Students can only drop this course prior to the census date of September 19.

### 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.

I will not be making PowerPoint lectures available for student download. You are responsible for taking notes during lecture.

Lecture exam 1	100 points
Lecture exam 2	100 points
Lecture exam 3	100 points
Lecture final exam (cumulative)	200 points
In-class short essays (5, peer graded)	100 points
Mastering Genetics online homework	275 points
<b>Study group activities:</b>	
Bi-weekly online chat study sessions, 25 points each <b>graded</b> session	125 points

### LECTURE EXAMS

The lecture exams will be given in a multiple choice format. The final exam is cumulative; that means that it will include material covered in the previous exams. 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.

## **MASTERING GENETICS**

I will post a copy of the syllabus and all other course materials on Mastering Genetics.

There will be 1-2 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 ~ \$50, cheaper than the campus bookstore (note: you do NOT need to buy access to Virtual Labs). If you prefer to purchase an electronic textbook, this option is also made available to you during the registration process.

In Mastering Genetics, the name of this course is CSUSTAN BIOL 3350 Fall 2012 Cooper. To register for this course, enter the code MGENCOOPER85717

## **STUDY GROUPS**

You will be randomly assigned to a study group at the beginning of the semester. Study groups will consist of 4 students. You will work very closely with your study group members throughout the semester... you will sit as a group in lecture, you, you will work as a team to play games, and you will participate in online chat study sessions weekly. Part of your grade is dependent on your teamwork, **thus every group member must do their share of the work!**

## **ONLINE CHAT STUDY SESSIONS**

Study groups will use the online tool **COLLABORATE** to meet weekly for study sessions. Study groups will be assigned their own chatroom with a unique URL. You will be given a live tutorial in lecture on how to use **COLLABORATE**.

Study sessions must last 2 hours each. It is up to each study group to organize their schedules so that they may participate. A total of 15 chat sessions must be performed over the fall semester. I will randomly grade 5 of these sessions (25 points each), assessing the performance of the group as a whole. To earn full points, each group member must **actively participate** for the full 2 hours. "Active participation" means focusing on genetics the entire session, and frequently contributing to the chat by directing the discussion, quizzing group members, answering questions, or asking for clarification of a concept. Groups will be downgraded if they: 1) waste time gossiping or making irrelevant comments; 2) waste time transitioning between tasks; 3) fail to complete a total of 15 chat study sessions. If you happen to miss participating in a graded session I will not downgrade your group, but **you** will not be able to make it up and **you** will receive zero points for that session. I will not announce grading bouts.

**Appropriate chat session study material:** MG quizzes and videos, reviewing lecture notes

**Inappropriate chat session study material:** MG homework assignments

Each study group will nominate a study group leader. The leader will report on the performance of each group member in study sessions, and provide a copy of each study session dialogue. This position is worth 20 points extra credit.

### **ATTENDANCE AND PARTICIPATION**

Regular attendance is vital to your success in this course. Therefore, I will be taking roll at the beginning of lecture every single day. **Each absence is worth 5 points, and each tardy arrival is worth 2 points.** These points are deducted from your semester total of points earned (out of 1000 possible). The only excused absences are personal medical issues, court dates, and military service, and documentation must be presented (physician's note, jury duty slip, etc).

Do not text in class. It is rude. Use of laptops to take notes is forbidden; take notes by hand.

### **PERSONAL INTEGRITY**

It is assumed that you have read and understand the university's position on academic integrity and student discipline. Students are expected to conduct themselves responsibly and will treat instructors and their fellow students with courtesy and respect. Inappropriate behavior (including, but not limited to, cheating and/or **plagiarism**) will be dealt with as severely as university and state regulations allow.

### **COURSE OBJECTIVES**

Students who successfully complete this course will:

- Examine the scientific method as it relates to evaluating evidence and drawing logical conclusions.
- Describe the topics studied in genetics.
- Examine fundamental genetic principles and the progression of 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.
- Understand Mendelian transmission genetics and extensions of the basic Mendelian model.
- Investigate chromosome mapping in prokaryotes and eukaryotes.
- Understand the various levels of mutation (chromosomal, nucleic acid, epigenetic).
- Describe the process of DNA replication, transcription and translation.
- 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. 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 lab or 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. Don’t read entire textbook chapters... that is a waste of time. Only use your textbook the way I have described below. 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.** Indicate with a special mark each time I move on to a new PowerPoint slide. 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 anatomical structures 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 each slide and remind yourself of what you learned the day before.
  - Return to your notes on slide 1, cover 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 slide.
  - Don’t stop until you have actively challenged yourself on every slide 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.**
  - This study session should be accomplished the day following drive-by 3. Repeat every step described for drive-by 3, paying careful attention to the mistakes highlighted in that study session. Highlight new mistakes with a different color.
  - The more often you repeat this session, the more you reinforce the neural pathway for retrieving the long-term memory of each fact.

**All assignments are due at 5pm on the date specified.**

<b>Week</b>	<b>Lecture</b>	<b>Mastering Genetics</b>
Aug 20	Study Group assignments Intro to Mastering Genetics and THM Collaborate tutorial	Sun: Intro due
Aug 27	Ch. 2 Mitosis and Meiosis Ch. 3 Mendelian Genetics	Thurs: Ch 2 HW due Sun: Ch 3 HW due
Sept 3	<b>Monday: LABOR DAY HOLIDAY NO CLASS</b> <b>Wednesday: In-class essay #1</b> Ch 4 Extensions of Mendelian Genetics	Sun: Ch 4 HW due
Sept 10	Ch 5 Chromosome Mapping	Thurs: Ch 5 HW due
Sept 17	Ch 7 Sex Determination and Sex Chromosomes <b>Wednesday: EXAM 1 and CENSUS DATE</b> Ch 8 Chromosome Mutations	Tues: Ch 7 HW due Sun: Ch 8 HW due
Sept 24	Ch 9 Extra-nuclear Inheritance Ch 10 DNA Structure	Thurs: Ch 9 HW due Sun: Ch 10 HW due
Oct 1	Ch 11 DNA Replication and Recombination <b>Wednesday: In-class essay #2</b>	Thurs: Ch 11 HW due
Oct 8	Ch 12 DNA Organization into Chromosomes <b>Friday: EXAM 2</b>	Tues: Ch 12 HW due
Oct 15	Ch 13 The Genetic Code and Transcription Ch 14 Translation and Proteins	Tues: Ch 13 HW due Sun: Ch 14 HW due
Oct 22	<b>Monday: In-class essay #3</b> Ch 15 Mutation, DNA Repair and Transposition Ch 16 Prokaryotic Gene Regulation	Thurs: Ch 15 HW due Sun: Ch 16 HW due
Oct 29	Ch 17 Eukaryotic Gene Regulation Ch 18 Developmental Genetics	Tues: Ch 17 HW due Sun: Ch 18 HW due
Nov 5	Ch 18 cont. <b>Wednesday: EXAM 3</b> Ch 19 Cancer and Cell Cycle Regulation	Sun: Ch 19 HW due
Nov 12	<b>Monday: VETERAN'S DAY NO CLASS</b> <b>Wednesday: In-class essay #4</b> Ch 20 Recombinant DNA Technology	Sun: Ch 20 HW due
Nov 19	Ch 21 Genomics, Bioinformatics, Proteomics <b>Wednesday: Online Exercise NO CLASS</b> <b>Friday: THANKSGIVING HOLIDAY NO CLASS</b>	Tues: Ch 21 HW due
Nov 26	Ch 22 Genetic Engineering and Biotech Ch 24 Genetics of Behavior	Thurs: Ch 22 HW due
Dec 3	Ch 24 cont. Ch 25 Population and Evolutionary Genetics <b>Friday: In-class essay #5</b>	Tues: Ch 24 HW due Sun: Ch 25 HW due
Dec 10	<b>In-class review session</b>	
<b>Dec 12</b>	<b>Final Exam in classroom 8:30 a.m.-10:30 a.m.</b>	

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
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