

Genetics Bio 3070

Fall 2019

Instructor: Dr. E. M. Golenberg-1375, 3123 Bio. Sci. Bldg.

Class Hours: M, W, F. 11:30-12:20. Deroy 0146

Discussion Section as Selected

*Office Hours: M 2:00-3:00, F 12:30-1:30 3123 Bio Sci Bldg., W 1:30-2:30 1167 Bio Sci Bldg, or
by appointment*

*Text: William S. Klug, Michael R. Cummings, Charlotte Spencer, Michael Palladino, Darrell
Killian.*

Concepts of Genetics, 12th Edition

Web Site: Use Canvas

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Course description and objectives

This course deals with the transmission and expression of genetic information. Upon successful completion of this course a student will be able to:

- Use the principles of chromosome transmission to predict patterns of inheritance
- Evaluate scientific data using the rules of probability
- Understand how the structure of DNA enables it to function as genetic material
- Explain the relationship between genotype and phenotype
- Understand the molecular basis of mutation, and its role in genetic variation
- Explain how the genetic code enables protein synthesis directed by genetic information
- Understand how genomes are replicated, repaired, organized and packaged
- Describe the modes of gene regulation in prokaryotes and eukaryotes
- Extract genetic information from public databases

Course Prerequisites

Students are required to have completed Bio 2200 (Microbiology) and Bio 2600 (Cell Biology) with a C- or better in both.

Tentative Lecture Schedule

Week	Date	Topic	Chapters
1	W, Aug. 28 F, Aug. 30	Introduction, Cell Division and Chromosomes	1 and 2
		Chromosomes, Meiosis, Mendelian Genetics	2, 3
2	W, Sept. 4 F, Sept. 6	Mendelian Genetics	3

		Dihybrid Crosses, Probabilities	3
		Hypothesis testing, Pedigree Analysis, Allelic Affects	3, 4
3	M, Sept. 9 W, Sept. 11 F, Sept. 13	Pedigree Analysis, Allelic Affects	4
		Epistasis, Complementation, Genetic Networks and Interactions. Chromosomal Theory of Inheritance	4, 5
	W, Sept. 11	Last Day for Tuition Cancellation - Full Term Courses/Census Date	
	Th, Sept. 12	Instructor Approval Required to Withdraw from Classes. In Academica: select "Course Withdrawal" from the Registration Menu under Student Resources; ***SMART Check*** is required.	
4	M, Sept. 16 W, Sept. 18 F, Sept. 20	Chromosomal Theory of Inheritance	4, 5
		Sex Linkage, Crossing Over, Chromosomal Mapping,m Three Point Mapping	5
5	M, Sept. 23	Exam 1	
	W, Sept. 25 F, Sept. 27	Mapping functions, Mitotic Crossing Over,	5
		Tetrad Analysis, Synteny Analysis	5, Additional Material on Tetrad Analysis posted on Blackboard
		Genetic Analysis and Mapping in Bacteria and Phages	6.1-6.6
6	M, Sept. 30 W, Oct. 2 F, Oct. 4	Bacterial Mapping	6.1-6.6
7	M, Oct. 7 W, Oct. 9	Polyploidy, Polysomy, Chromosomal aberrations	7, 8

	F, Oct. 11		
		Deletions, Duplications, Inversions, Translocations	8
		DNA as material of heredity	10
8	M, Oct, 7 W, Oct. 9 F, Oct. 11	DNA Structure, Measurement and experimental manipulation of DNA	10
		DNA Replication, Telomere replication	11
		Replication, Recombination model, Gene Conversion	11
9	M, Oct. 14	Genome packaging in viruses, prokaryotes, eukaryotes	12
	W, Oct. 16	Exam 2	
	F, Oct. 18	Setting the Problem. What is a gene in the DNA genome? Transcription	13
10	M, Oct, 21 W, Oct. 23 F, Oct. 25	Genetic Code, Second Genetic Code	13
		Second Genetic Code, Translation	13, 14, 21.3
		Translation Mutation and Repair	14, 21.3 15
11	M, Oct, 28 W, Oct. 30 F, Nov. 1	Mutation and Repair	15
12	M, Nov. 4 W, Nov. 6	Prokaryotic Gene Regulation	16

	F, Nov. 8	Exam 3	
	Sun., Nov. 10	Last Day to Request Course Withdrawal	
13	M, Nov. 11 W, Nov. 13 F, Nov. 15		
		Eukaryotic Gene Regulation	17
14	M, Nov. 18 W, Nov. 20 F, Nov. 22		
		Epigenetics	19
14.75	M, Nov. 25		
	W, Nov. 27 F, Nov. 29	No Class	
15	M, Dec. 2 W, Dec. 4 F, Dec. 6	Recombinant DNA Technology- DNA Cloning and Libraries	20
		PCR Sequencing, NGS	
		Transgenics Knockouts	
16	M, Dec. 9	Exam 4	
	M, Dec. 16 10:15-12:15	Cumulative Final Exam (<u>Bring Narrow Scantron</u>) Note the unusual time!!!!	

Lecture topics: The above schedule is tentative in the sense that we may take more or less time on a given topic depending on how well students who attend the lecture appear to understand. This will primarily affect the final part of the schedule as not all topics may be covered. Alternatively, if we do have time, the class may determine which additional topics

will be covered. **If we do not cover a given portion of the material before an exam, you will not be tested on that material even if it is written that way on the syllabus.**

Exams: Genetics, perhaps more than any other course in biology, is based on conceptual problem solving. To be sure, you must know facts to solve the problems, but the emphasis must be on the process of understanding rather than on the facts alone. As such, the tests are designed to assess your problem solving ability. All exams, except for the cumulative final, will have questions that require problem solving or short written paragraphs. This will be different from what you are used to from other classes. You must prepare yourself by working the problems at the end of each chapter. The test questions will be similar in style to such problems. Additionally, we have posted some old tests on the web page for your use. Please come prepared for the examinations. **You may not use a cell phone or smart watch in any capacity during an exam. You may not borrow calculators in the middle of an exam.**

The final exam will be multiple choice. The questions will still be on the level of problem solving or conceptual synthesis. The final will be cumulative in that all of the material studied during the semester may be covered. **Be sure to bring a narrow scantron sheet with you to the final.**

Exams will not be rescheduled for individual students who request a change in time due to personal or professional conflicts or any unforeseen reason, the single exception being a university-recognized religious conflict or a university varsity team event in which the student is actively participating (is on the varsity team). These conflicts must be brought in writing by the end of the second week of classes.

You may not drop any midterm exam. However, the score of your lowest exam (including missed exams) will be replaced by the average of all four original midterm exams scores. You may not drop the final.

Regrading: Errors do occur in grading exams. If you feel that such an error has occurred on your exam, please bring it in for regrading. On an accompanying piece of paper, write which question you wish to be regraded and explain explicitly why you believe it is misgraded. However, we will only regrade exams up to two weeks from the time that we return them to the class.

Grading: You will have four intermediate examinations during the semester, each covering the material from the lectures preceding the exam. Each exam will have a possible 150 points. The final examination will deal with all of the material covered in the course. It will have a maximum score of 200 points. The grades on each exam will be standardized against the second highest grade in the class. All scores will be adjusted by adding the number of points necessary for the second highest class score to equal 150 (or 200 for the final). For example, if the second highest score is 133, then all scores will be adjusted by adding 17 points to the raw score. If two people tie for the top score on any exam, that score will be used to standardize the class grades. Thus students will have a total possible score of 800 points from the exams.

You must understand that working out the problems at the end of each chapter is one of the best ways of learning the material and preparing yourself for examinations. We encourage you to work or study together in groups, as explaining material to other people clarifies the concepts in your own mind. Finally, make the most of the discussion sections with your TAs.

Discussion/Quiz Sections: Attendance at the quiz/discussion sections is mandatory. You will be assigned homework problems that are recommended to help you learn the material and to prepare you for the exams. During the discussion period, you will have time to ask your TA questions about the material. You also will be given in-class problems to work on. You will work in groups of twos or threes. Your TA will assign the groups each week so that you will work with different people in your section each week. You will be allowed to use your textbook and notes to help you. You may ask the TA for directions, but not answers. You will turn in the exercises at the end of each discussion section. You will be graded on them and the top 10 exercise grades will be used for grades. If you miss an exercise for any reason, you may not make it up. Students may earn up to 100 points total. Behavior that is not conducive to learning or is distracting to other students, such as (but not limited to) chronic unexcused tardiness, leaving early, disruptive behavior, cell phone conversations, etc., may result in the deduction of points at the discretion of the TA.

Honors Laboratory: The laboratory will be graded on an accumulation of points from proper participation in the lab, lab notebooks and from two lab exams. If you miss an exam for any reason outside of the accepted university exceptions, there will not be an opportunity to make it up. Additionally, if you are not diligently working or completing the lab, the TA may take points off your weekly grade. This is totally at the discretion of the TA. Additionally, we will collect your lab notebooks at five unannounced times. You can earn up to 10 points per notebook review. You will have a two laboratory exams during the semesters each worth 50 points. Students may earn up to 150 points total. **(Note: The 150 points do not include points earned from the discussion section portion of your activities (problem sheets)).**

You must have a lab notebook with you for each lab. The notebook must be bound (e.g., a composition book). In the notebook, you must prepare complete notes of protocols or other information necessary to do the day's experiment **before you enter the lab**. You are to enter the data from your observations into the lab notebook. You may not make up labs that were missed. Missing any lab will hurt your grade. You may not miss more than three labs in total to complete this course. If you miss four or more labs, for whatever reason, you must either withdraw from the class or get an F in the course.

The total point distribution is as follows:

Component Possible Points
Lecture Exams 4 X 150 = 600

Final Exam 200

Discussion/Quiz Grades 100

Total Course Grade 900

(Honors Section as above plus 150 points for lab: Total Course Grade 1050)

The final letter grade will be determined by a straight scale as follows:

Total Points Final Grade

92%- 100% A

90%- <92% A-

88%- <90% B+

82%- <88% B

80%- <82% B-

78%- <80% C+

72%- <78% C

70%- <72% C-

68%- <70% D+

62%- <68% D

60%- <62% D-

<60% F.

Withdrawal Policy You may withdraw from the class and receive your tuition back through September 11. From September 12 through November 10, you may withdraw with signature through Academics and receive a grade of WF or WP (withdrawal failing, withdrawal passing). Your grade (WP or WF) will be determined by your test grade or grades at the time. The discussion section grade up until that time will not be used to calculate your standing grade. Note that if you did not take an exam that was given up until the time of withdrawal, your score for that exam is 0. The WP grade will be given for grades of 60% and higher. The WF grade will be given for grades of less than 60%.

Students with disabilities: If you have a physical or mental impairment that may interfere with your ability to successfully complete the requirements for this course, you are invited to contact Educational Accessibility Services (577-1851) to discuss appropriate accommodations on a confidential basis.

CHEATING POLICY: A student found to be cheating during an exam or quiz (using a "cheat sheet", looking at another's paper, allowing another to look at yours, or answering questions in another's name) will receive a zero for that test with no opportunity to drop or replace that score. A second episode of cheating will result in a grade of F for the course and may also result in initiation of university disciplinary action.

ADD/DROP/INCOMPLETE POLICY: Add forms will not be signed after the second week of class. Please note that "incomplete" grades will not be issued to students in poor standing who are seeking an alternative to a late drop. See above for new withdrawal policy.

N.B. Some material or emphases will be given in lecture that are not in your book. You will be responsible for this material in addition to the material in your book. Also, please note

that we will be happy to help students understand the material that they are having trouble with during office hours. However, we do not view office hours as a substitute for lectures.