Bi282H
Genetics and Molecular Biology

In this course we will examine the genetic and molecular mechanisms responsible for the inheritance of physical characteristics. We will begin with the key role of DNA as the hereditary material in cells. We will then learn how DNA directs the synthesis of proteins, including how that synthesis is regulated. Finally, we will explore the ways in which DNA is inherited and thereby passes molecular information to subsequent generations. This course will prepare you for the next term in the series, in which you will study development in complex organisms, the genetics of populations of simple and complex organisms, and evolution.

Staff

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Course Blackboard site

In the Course Documents section of Blackboard will be posted: the syllabus, lecture figures, lecture notes, and practice problems with answers (these will not be graded - see below).

Exams, assignments, and grading

There will be two one-hour midterm exams plus a comprehensive two-hour final exam. The one-hour midterm exams will take place in the evening in a location to be announced. They will be written as one-hour exams, but you will have two hours in which to complete the exams. Students are expected to make arrangements in their class and work schedules so that conflicts will not arise. The exams are not open book, but some factual information will be provided. Working the problems posted on Blackboard will be your best form of preparation for the exams, so you are encouraged to make a sincere effort in solving them.

Your grade for the course will be based upon the combination of your performance on the exams and your work in the labs. Scores will be determined in two ways for each student:

Method 1

	% total course points
2 1-Hour exams	30
Final exam	35
Lab	35
Total	**100**

Method 2

	% total course points
Higher 1-hour exam	25
Final exam	40
Lab	35
Total	**100**

Points for lab work will be calculated as follows:

	% total course points
Quizzes	19
Prelabs + Lab reports	16
Total	**35**

Letter grades will be assigned based on the higher of the two scores (calculated by method 1 or method 2) for each student. Letter grades are determined only after the total course points have been calculated, not for individual hour exams. Since grades are not assigned strictly on the basis of statistical distribution about a numerical mean, the opportunities to earn good grades in this course are not limited, and students are not in competition with each other for those grades.

P/N option: A grade of "P" is given when the calculated grade is "C-" or better; a grade of "N" is given when the calculated grade is "D+" or lower.

Exam re-grades: If you feel that a mistake has been made in the grading of your exam, you must write a logical explanation for why your answer merits a higher score, attach it to the exam, and submit both the explanation and the exam to your lab instructor. Well thought-out arguments will be considered, <u>but other questions on the exam may be re-graded</u> as well, and requests that we simply "look again" at an answer will not be honored. <u>Please do not abuse this system</u>. The deadline for submission of exams for re-grading is one week following receipt of the graded exam.

Early and make-up exams will not be administered. Please do not ask for exceptions. If you miss an exam for a valid reason (medical or family emergency), you must provide written documentation of the reason to avoid a score of 0. Your grade will then be based on the exams you have taken. A second missed exam will not be excused. Note that Club Sports events do not qualify as excusable absences.

Textbook and laboratory manual

The text for this course is *An Introduction to Genetic Analysis, 8th edition* by Griffiths et al. (Freeman). A required laboratory manual is available at the UO Bookstore. You must bring the manual to lab each week.

Class conduct

Class starts promptly at 10:00 and ends at 10:50. Please arrive on time and do not pack up before the conclusion of the lecture. Arriving late and leaving early is disruptive to others around you and to the speaker. Do not talk during lecture in a volume audible to anyone but the intended recipient. Ringing cell phones will not be tolerated in this class. You may be asked to leave the lecture hall or lab if you are responsible for repeated disruptions. A disruption during an exam will result in a 10-point deduction.

All work submitted in this course must be your own. Instances of suspected cheating or plagiarism on exams, quizzes, and reports will be referred to the Office of Student Conduct and Community Standards for consideration of sanction. You can view the student conduct code and the procedures for pursuing charges of academic dishonesty at:

http://studentlife.uoregon.edu/StudentConductandCommunityStandards/StudentConductCode/tabid/69/Default.aspx

Bi 282H Lecture Schedule, Winter 2013

Date	Topic	Reading	Lab Topic
	Week 1		
Jan. 7	**What is the genetic material?** Genes are made of DNA, but how do we know that?	228-231	
Jan. 9	DNA structure from Watson and Crick	231-236	
Jan. 11	DNA replication from Meselson and Stahl	237-242	
	Week 2		Chemical Nature of the Genetic Material
Jan. 14	DNA sequences can change: mutation	452-453; 457-466	
Jan. 16	**What are genes?** Genes are units of function: complementation analysis	100; 187-192	
Jan. 18	One gene - one enzyme: proteins are units of function	274-277	
	Week 3		DNA structure
Jan. 21	Martin Luther King day—no class		
Jan. 23	Connection between genes and proteins: co-linearity	277-278	
Jan. 25	Cracking the genetic code: Crick's deductions from frameshift mutants	278-281 Crick, et al.*	
	Week 4		Complementation
Jan. 28	Deciphering the codons in a universal code	281-282	
Jan. 30	**How do cells read the code—that is, how are genes expressed?** First, make an RNA copy: transcription **Exam 1—7:00-9:00 pm in location to be announced**	256-261	
Feb. 1	Knowing where to start and stop transcription	261-263	
	Week 5		Transcription and Translation
Feb. 4	Then, translate from nucleic acid language to protein language	282-291	
Feb 6	How do mutations in DNA affect protein function and phenotype?	Hartwell, et al.*	
Feb. 8	**How is gene expression regulated in prokaryotes (like *E. coli*)?** Gene regulation and bacterial diets: the *lac* operon	302-307	
	Week 6		Gene regulation
Feb. 11	Mutants reveal the components of the regulatory machinery	307-312	
Feb. 13	Positive and negative regulation: repressor, CAP, and their binding sites	312-315	
Feb. 15	**How is gene expression regulated in eukaryotes (like us)?** Yeast cells can regulate their mating type: a *vs.* α	328	

	Week 7		Early Development
Feb. 18	Genetic analysis of MAT regulatory circuitry: the α1/α2 hypothesis		
Feb. 20	**Regulated gene expression and embryonic development** Why mothers are important **Exam 2—7:00-9:00 pm in location to be announced**	576-577; 583-588	
Feb. 22	Master regulators and big decisions: head *vs*. tail in fruit flies	583-588 Nusslein-Volhard*	
	Week 8		Mitosis and Meiosis
Feb. 25	…and in humans…and even in plants	600-605	
Feb. 27	**How are genes transmitted to daughter cells?** Connecting DNA replication to nuclear and cell division: mitosis	80-93	
Mar. 1	Avoiding disaster by regulating the cell cycle	548-551	
	Week 9		Linkage Analysis and Recombination
Mar. 4	**How are genes transmitted to the next generation in diploids?** Producing haploid cells from diploids: meiosis	93-97	
Mar. 6	Patterns of inheritance: single traits (Mendel part 1)	28-35; 192-195	
Mar. 8	The chromosomal theory of inheritance	75-80, 40-42	
	Week 10		Transmission Genetics
Mar. 11	Patterns of inheritance: multiple traits (Mendel part 2)	36-39	
Mar. 13	**Locating genes within chromosomes by their patterns of inheritance** Inheriting genes en bloc: linkage analysis	116-123	
Mar. 15	Recombinant frequency and mapping	124-127; 134-135	
Mar. 18	**Final Exam—10:15am-12:15pm in location to be announced**		

*Reading posted on Blackboard