BI 610 Genetics, Fall 2013

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Course description
This course aims to teach you how to approach biological questions from a genetics perspective and use genetic techniques to analyze gene function. We will illustrate the use of model organisms including yeast, *C. elegans* (worms), *Drosophila melanogaster* (flies) and mice. We will cover both forward genetics (function-driven gene discovery) and reverse genetics (gene-driven functional analysis). The course is designed for Ph.D. students in the Molecular Biology program. All students are expected to have an appropriate background and pre-existing exposure to life sciences research.

Course meeting
MW 11:00-12:20pm Streisinger 225 (Novick Room)
F 11:00-11:50pm Streisinger 225 (Novick Room)
Attendance on all three days is mandatory

Use of Blackboard
This course will make extensive use of the Blackboard website: http://blackboard.uoregon.edu/. Lectures, assigned research papers, and practice problems will be posted on Blackboard.

Assigned readings
The strongly recommended textbook is *Advanced Genetic Analysis, 1st edition* by Philip Meneely. We will also read review articles and original research papers that will be posted on Blackboard.

Practice problems
You will learn best by working through problems that will be posted on Blackboard. These will not be graded but should be taken seriously, since they will develop your understanding of the concepts discussed in the text and lecture. They will also prepare you for the midterm and final exams. We will spend several class periods prior to each exam working through problems together.

Mini research proposal
The ability to prepare thoughtfully conceived and well-crafted research proposals is required to be a successful independent scientist. Many of you will prepare such a proposal for CHEM 610 next quarter, for your proposal exam, and for fellowship and grant applications throughout your career. For this class, you will not prepare a full proposal. However, you will individually conceive a genetics-based project that would follow from the paper you select to present (see below). You will outline the elements of a strong proposal in a 2-page text. Details will be provided midway through the course.

Student presentations

In groups of 3, you will present a 30' oral presentation on a genetics-based research paper that you select (with my input). You will analyze the paper in terms of a grant proposal that could have led to the study. I will provide more guidelines later.

Final grades
There will be one midterm exam and a final exam. All exams will be closed book.
Your final course grade will be calculated by:

Participation: 25%
Midterm: 20%
Mini research proposal: 15%
Student presentation: 15%
Final exam: 25%

Letter grades
Letter grades will be assigned based on a final percentage score weighted as described above. No "curving" adjustments will be applied.

Percentage Grade	Letter Grade
95-100	A+
90-94	A
85-89	A-
80-84	B+
75-79	B
70-74	B-
65-69	C+
60-64	C
55-59	C-

Course outline: BI610 Fall 2012

Date	Topic	Reading
M 9/30	1. Modern genetics: analyzing gene function in vivo	Meneely, chapter 1 Doug and Bill (handout)
W 10/2	2. Sources & types of mutation	Griffiths,1-12, 452-456, 461-463.
F 10/4	Discussion 1 of ASSIGNED PAPER(s)	the directed mutation controversy
M 10/7	3. Functional consequences of mutations	Meneely, section 4.4
W 10/9	4. Use of model organisms, animal husbandry	Meneely, chapter 2
F 10/11	Discussion 2 of ASSIGNED PAPER(s)	Lou Gehrig's disease
M 10/14	5. Intro to forward genetic screens	Meneely, chapter 3
W 10/16	6. Genetic screens in YEAST,	Art & Design of Genetic Screens:

	WORM, and FLY (contd)	worm review, yeast review
F 10/18	Discussion 3 of ASSIGNED PAPER(s)	yeast aging screen
M 10/21	7. More complex screens	Art & Design of Genetic Screens: fly review
W 10/23	8. Identifying the genes	Meneely, sections 4.1-4.3 and Chapter 5
F 10/25	Discussion 4 of ASSIGNED PAPER(s)	fly touch sensation screen
M 10/28	9. Introduction to research proposals in-class problem-solving	be sure to have gone through the practice problems!
W 10/30	10. in-class problem-solving	
F 11/1	REVIEW FOR EXAM	bring questions!
M 11/4	**MIDTERM EXAM!**	
W 11/6	11. Identifying genes responsible for human variation	genome-wide associating mapping
F 11/8	Discussion 5 of ASSIGNED PAPER(s)	genome/exome sequencing
M 11/11	12. Reverse genetics and gene-by-gene screens	Meneely, Chapters 6 & 7
W 11/13	13. Manipulating individual cells within a multicellular organism	Meneely, Chapter 9 Lee and Luo review
F 11/15	Discussion 6 of ASSIGNED PAPER(s)	cell competition
M 11/18	14. Pathways: epistasis analysis and suppressors	Meneely, Chapter 11 & Chapter 10.1-10.3
W 11/20	15. Pathways (contd): enhancers and in-class problem-solving	Meneely, sections 10.4-10.5
F 11/22	in-class problem-solving	be sure to have gone through the practice problems!
M 11/25	in-class problem-solving/ REVIEW FOR EXAM	
W 11/27	**Class cancelled**	
F 11/29	THANKSGIVING HOLIDAY	
M 12/2	**STUDENT PRESENTATIONS (2)**	
W 12/4	**STUDENT PRESENTATIONS (2)**	
F 12/6	**STUDENT PRESENTATIONS (2)**	Class begins 30 minutes early
Th 12/12	**FINAL EXAM!**	