

BSCI410 Fall 2016 Syllabus

This is an advanced course in genetics. Students will acquire a high level of understanding of gene structure and function and modern approaches to the genetics of humans and model organisms. Students will understand the nature of genetic information and its transmission, and will be able to apply their understanding to novel situations. Students will understand modern methods of genetic analysis, including molecular methods, and will be able to apply their understanding to a large variety of biological problems. Students will understand how to obtain genotype information, and will be able to say what it implies, and what it does not imply. Students will learn how to critically evaluate new research results in genetics.

Specific Topics Covered:

Inheritance

- Mendelian patterns and meiosis
- Genes and Mutations
- Genetic Interactions

Analysis

- Techniques for genotyping and alteration of genomes
- Types of genetic marker and gene mapping
- Basic probability for genetics

Genomics

- Genome organization and structure
- Bioinformatics
- Genome evolution

Genetic Analysis (in humans and model organisms)

- Linkage analysis
- Natural genetic variation
- Genome-wide association studies
- Personal genomics
- High-throughput genomic data

Model Organisms

- Saccharomyces cerevisiae*
- Caenorhabditis elegans*
- Drosophila melanogaster*
- Arabidopsis thaliana*
- Mus musculus*

Gene Expression

- DNA replication, recombination and repair
- Transcription
- Post-transcriptional regulation of gene expression
- Epigenetics

BSCI410 Fall 2016 Syllabus

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Web site: stevemount.org/BSCI410/

Schedule: ongen.us/410-2016

Canvas: myelms.umd.edu/courses/1198982

Class: Tuesday and Thursday, 11:00 - 12:15 pm BPS 1250

Required Text: **Meneely Second edition**
Genetic Analysis: Genes, Genomes and Networks in Eukaryotes
Oxford University Press
ISBN 978-0-19-968126-6 (cloth)

Recommended Text: **Hartwell, Hood, Goldberg, Reynolds and Silver. 5th edition**
Genetics: From Genes to Genomes
ISBN 978-0073525310
Supplemental materials are not recommended and will not be used.

Additional online materials will be made available via Canvas.
Some additional materials may be required.

- **Topics and content:** A list of what will be covered, assignments, and what we expect you to learn will be made available on a Google doc available via ongen.us/410-2016
- **Quizzes:** Online quizzes will be posted (typically, one for each module), to aid (and verify) mastery of each module's content. **The due date for each quiz (relative to the date of the associated lecture) will vary**, but will never be earlier than 72 hours after all of the content, including the quiz itself, is released. You can and should begin review before the quiz is posted!
- **Study Guide:** A list of vocabulary, questions, exercises, etc..
A separate guide will be available for each exam. It is designed to be useful for study, working (at least partially) with your groups online.

Students will be able to edit the study guide. Your contribution to the study guides will not be evaluated, but online review should help you do well on the exams.

- **Groups:** There are ten groups (Apple, Banana, Cherry, Grape, Kiwi, Lemon, Mango, Orange, Pear and Strawberry). Each student has been placed in **two** groups. There are no group assignments *per se* but review documents will be shared with groups on Google Drive.

- **Office Hours:** Hours are by appointment. If you would like to come to office hours, please contact me by email. I also answer questions posed by email. Scheduled office hours and answers to questions through email may be shared with the class. Please let me know if you prefer that your appointment or question not be shared (your name will never be shared).

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<u>Grading:</u>	Exams (3 hour exams, 2 halves of final) x 100pts	500 pts
	Your lowest exam score will be dropped.	-100 pts
	Online quizzes and miscellaneous assignments	<u>100 pts</u>
	Total	500 pts

450 guarantees an A of some type (A- rather than B+)

400 guarantees a B

350 guarantees a C

300 guarantees a D

In-Class Exams (3 at 100 pts each)

Three hour exams will be given in the classroom (September 22, October 20 and November 17). These will be closed-book and taken without online access. Each exam will cover material from the preceding portion of the course. Exam preparation will include group answers to study questions. If you have to miss an exam for any reason inform Dr. Mount as soon as you know that you will miss the exam. Make-up examinations will generally be provided only in the case of valid reasons occurring on the day of the examination. University policies will be followed (see www.ugst.umd.edu/courserelatedpolicies.html)

Your lowest exam grade will be dropped. In order to facilitate equal weighting of the three exams, each exam will be normalized to a mean of 80 and standard deviation of 10, and the normalized score will be used to calculate your grade.

Cumulative Final Exam (2 sections at 100 pts each)

The final exam will cover the last quarter of the course (100 pts.) and an integration of material from the entire course (100 points). Each half will be normalized to a mean of 80 and standard deviation of 10.

Dropping the lowest exam score (-100 pts)

The lowest normalized grade from the three exams and the two halves of the final will be dropped. This will be done automatically.

Online assignments (100 pts total)

Assignments will be of different types. Many will be **simple quizzes**. Some will be more like an **exam** and might, for example, check your knowledge of material that you should have learned in BSCI222. Others will be more like online **homework**, and will be completed as you explore online resources to help you find what we'd like you to find. Most, but not all, of the online assignments will use the quiz tool in Canvas.

All of the assignments in this category will be worth 5 points.

We expect everyone to pass every quiz, and grades will primarily reflect having done the work rather than performance on the assignment. Any quiz never attempted will receive no credit (0 out of 5). There will be about 20 assignments. If there are less than 20, every student will be given the points necessary to bring the total possible points for online assignments to 100. If there are more than 20 assignments, each student's lowest assignment grade(s) will be dropped.

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The chapters from Meneely are listed because the class is organized around that text.

You will also be responsible for additional readings as specified with each module.

This is a **tentative** schedule subject to change.

The list of readings is not intended to be complete; details are accessible via ongen.us/410-2016

Week (Tues.)	Meneely chapter	Topic
8/30		00 Overview, preliminaries; informatics
9/01	Ch. 1	01 Informatics and online resources
9/06	Ch. 1	02 Genetic Analysis
9/08		03 Transmission genetics (Mendel's laws)
9/13	Ch. 2	04 Model organisms: general, nomenclature, yeast
9/15	Ch. 2	04 Model organisms: worms, flies, Arabidopsis, mouse
9/20		05 Genomes, Chromosomes and Epigenetics (Techniques)
9/22		Exam Sept. 22
9/27	Ch. 3	05 Techniques (and post-transcriptional regulation of gene expression)
9/29		06 Probability
10/4	Ch. 4	07 Identifying mutants (genetic screens)
10/6		08 Replication, repair and recombination
10/11	Ch. 4	09 Classifying Mutants – mapping and complementation
10/13	Ch. 4	09 Classifying Mutants – types of allele
10/18	Chs. 4-5	10 Linkage mapping; tetrad analysis
10/20		Exam Oct. 20
10/25	Chs. 4-5	10 Linkage mapping: humans and model organisms
10/27	Chs. 4-5	10 Linkage mapping: humans and model organisms
11/1	Ch. 6	11 Reverse Genetics
11/3	Chs. 7, 9	12 Parallel genetic analysis (complex traits)

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11/8	Chs. 8-9 Ch. 10	13 Genome-Wide Association Studies (complex traits)
11/10	Ch. 8,10	13 Genome-Wide Association Studies and Natural Variation
11/15	Ch. 3	14 Techniques revisited (genome-wide methods)
11/17		Exam Nov. 17
11/22	Box 4.1 Chs. 6.3, 14.1-14.3	15 Spatio-temporal analysis
11/29	Ch. 11	16 Genetic Interactions
12/1	Ch. 12	17 Epistasis and genetic pathways
12/06	Ch. 13, 14	18 Systems Biology (pathways, networks, systems and phenotypes)
12/08		Final review
	Final:	Exam Monday, December 14, 8 am

Honor Code: The Code of Academic Integrity of the University of Maryland will be enforced in this course. University policies are summarized here: www.ugst.umd.edu/courserelatedpolicies.html

Unless there are specific instructions to the contrary, online quizzes should be taken without consulting any materials.

The Student Honor Council proposed and the University Senate approved an honor pledge that reads:
“I pledge on my honor that I have neither given nor received any unauthorized assistance on this examination”

This statement is understood to apply to all online quizzes and in class exams.

Electronics Policy: Use of laptops or smartphones during class is acceptable (even encouraged). However, cell phones are to be in silent mode at all times during class, and you should refrain from any activities that distract students around you.

Exams must be taken without reference to the internet. **You will not be permitted to have any electronics of any kind at your seat during exams.** No phone, no laptop, no calculator, no tablet, watch or any other device with store memory or internet access. You will be able to leave things in the front of the room where they are visible, either in a bag or on the table. Students found to have electronics at their seat will fail the exam.