

# **GENETICS LAB - BISC 2208**

## **Spring 2015 SYLLABUS**

Wed, 12:45-3:15  
1800 Science and Engineering Hall (SEH)  
Course CRN: 42018  
1 Credit

### **INSTRUCTOR**

Name: Dr. Mollie Manier

Campus Address: SEH 6000 (mail), SEH 6680 (office), SEH 6480A (lab)

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Office hours: Tues 2-3, Thurs 1-2 **or by appointment**, SEH 6680

### **COURSE DESCRIPTION**

Comprehensive overview of molecular and bioinformatic methods in genetics, including DNA extraction, nucleotide quantification, gel electrophoresis, plasmid structure, bacterial transformation and cloning, PCR, sequencing, genome annotation with the UCSC Genome Browser, Flybase, BLAST, gene and genomic structure, and gene prediction modeling.

### **COURSE PREREQUISITES**

General Biology (1111 and 1112), Genetics (2207; concurrent enrollment is ok) or instructor consent.

### **MATERIALS**

1. **Students will need a notebook and folder.**
2. For the annotation project (beginning Mar. 5), **students will need to bring their own laptops to class.** Notify the instructor by **Jan. 13** if you will need to use a lab laptop.

### **LEARNING OUTCOMES**

After completing this course, students should be able to:

1. Maintain an informative and scientifically responsible lab notebook.
2. Understand the functional relationships among DNA, RNA, protein, and cDNA.
3. Understand and carry out molecular techniques, including DNA extraction, cloning, PCR, gel electrophoresis, sequencing, and data analysis.
4. Understand a gene's structural characteristics, how genomics predicts the presence of genes on chromosomes, and the role that evolutionary theory plays in gene predictions.
5. Better understand the nature of scientific research and be adequately trained for supervised research in a lab setting.
6. Prepare and present a talk summarizing their experimental goals, methods, results and conclusions.

### **COURSE CONTENT**

This lab is comprised of two projects, each occupying approximately half of the semester, designed to provide an immersive experience in two classes of molecular genetic methods. For the first project, we will annotate portions of a *Drosophila* chromosome, validating and correcting gene predictions, identifying start and stop codons, exon and intron structure, and splice recognition sites. For the second project, we will design primers, extract DNA, PCR amplify a gene of interest, clone the PCR product, sequence it, and assess genetic polymorphisms. This project will provide a broad overview of methods and skills commonly used in molecular genetics. Both of these projects represent actual research and could potentially generate new discoveries.

**GRADING** (subject to change)

- Short assignments: 20%
- Lab notebook: 20%
- Lab report: 20%
- Annotation report: 20%
- Annotation presentation: 20%

Letter grades are established from percentages of points earned out of total points possible following ***standard GWU guidelines*** according to the following scale:

A	93-100%	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-66%
B-	80-82%	D-	60-62%
C+	77-79%	F	<60%

1. **Annotation Report**: Reports should be written for an educated reader, e.g., a visiting graduate student or genetics professor who has not read the lab about which you are writing, but who does understand genetics. Reports should use complete sentences and correct spelling and punctuation. Students may be required to make corrections or rewrite sections that are unclear or incorrect. Annotation reports will be due by midnight Friday, 2/27. I will take off one point for each hour it's late.
2. **Annotation Presentation**: Poster presentations will be 5 minutes long and will describe what you did and what you found. Posters will be projected in Powerpoint, and students will stand up and talk about their poster. This will happen 2/25.
3. **Short assignments**: Class time will be limited, so it is CRITICAL that students complete required assignments ahead of time and come to class fully prepared. For the second project, this will include copying that week's protocol into your lab notebook BY HAND. All assignments will be posted on Blackboard by Friday the week before class begins and may include an online quiz to be completed before class. The assignment may cover material from the previous lab.

4. **Lab Notebooks:** Lab notebooks must be neat, organized, and legible. They must be set up in a way that will allow another student (or you) to successfully repeat your experiment. It also represents a record of what you did, changes you made to the protocol, or things that went wrong and may provide an explanation of why something didn't work. It will also include any results along with your notes and conclusions. Lab notebooks will be handed in each week after class on Wednesday and returned by Friday.
5. **Lab Report:** The lab report describes your second project. It will include an Introduction, Methods, Results, and Discussion, as well as Literature Cited, if applicable. The Lab Reports are due to me by email by midnight on 4/29. I will take off 1 point for each hour it's late.

### **BLACKBOARD**

Protocols, pre-lab instructions and assignments, and post-lab assessment homework and other materials presented or assigned in lectures will be made available on Blackboard.

### **SUGGESTIONS FOR DOING WELL**

- Persevere through failure and frustration.
- Learn, memorize and practice good pipetting technique! Your experiments WILL FAIL unless you can pipette properly.
- Come to lab and arrive prepared and ready to work.
- Be thorough and fastidious in everything you do.
- Ask lots of questions. Collaborate with each other!

### **COMMON COURTESY ISSUES**

In order to make the learning environment positive and productive, please show common courtesy to your instructor and classmates. These include turning off your cell phone when you come into class, arriving on time to minimize disruption, and refraining from e-mailing and websurfing during class. **YOU WILL NOT DO WELL IF YOU DO NOT COME TO CLASS.** During oral presentations, keep laptops closed and phones out of sight.

### **POLICY ON RELIGIOUS HOLIDAYS**

Students should notify me by **Jan. 21** of their intention to be absent from class due to religious observance.

### **ACADEMIC INTEGRITY**

I personally support the GW Code of Academic Integrity: "Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information."

For the remainder of the code, see: <http://www.gwu.edu/~integrity/code.html>

Any student found guilty of violating the rules for academic integrity will, at a minimum, be awarded a grade of "F" for the assignment and/or the course. A report will also be filed with the Administration who will decide if further disciplinary action is warranted.

## **SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM**

### *DISABILITY SUPPORT SERVICES (DSS)*

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: <http://gwired.gwu.edu/dss/>. Please see me if you have any questions.

### *UNIVERSITY COUNSELING CENTER (UCC) 202-994-5300*

The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:

- Crisis and emergency mental health consultations.
- Confidential assessment, counseling services (individual and small group), and referrals.

<http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices>

### **COURSE SCHEDULE** (This may change):

<b>Week</b>	<b>Date</b>	<b>Topic/Activity</b>
1	1/14	Introduction to annotation
2	1/21	Annotation
3	1/28	Annotation; introduction to poster presentation and reports
4	2/4	Annotation
5	2/11	Annotation; draft of poster due
6	2/18	Annotation; submitting the annotation report
7	2/25	Annotation poster presentations; reports due 2/27
8	3/4	Primer design
9	3/9-3/13	SPRING BREAK
10	3/18	DNA extraction
11	3/25	PCR
12	4/1	Gel electrophoresis
13	4/8	Transformation
14	4/15	Select colonies, PCR
15	4/22	Sequence data
	4/29	Lab reports due