

# MOLECULAR BIOLOGY CAPSTONE BIOL412

Fall 2016, Mondays: 12-3, SSMB141

**Instructor:** Ana Zimmerman; [zimmermana@cofc.edu](mailto:zimmermana@cofc.edu); Office hours: Tues 12-1; I also have an open door policy so please feel free to drop by anytime or schedule an appt.

This course is a combination of a laboratory based research project in Phage Genomics and an in-depth study of scientific literature related to the History of Molecular Biology.

## Student Learning Objectives and Outcomes:

The major goals and objectives of our laboratory research project are to:

- 1) design and conduct an independent research project for which the goal is to generate novel data that is both useful and can be contributed in an appropriate scientific format (i.e. NCBI; phagesdb.org) to a scientific audience outside of the College of Charleston;
- 2) learn a suite of laboratory techniques which are applicable to molecular biology research;
- 3) troubleshoot experiments, recover from setbacks, and work as a research team with your peers;
- 4) collect, analyze, discover, interpret and communicate meaningful mathematical patterns in data;
- 5) experience how science is actually done in order to contribute to actual progress in a field of interest.

The major goals and objectives of our scientific literature learning are to:

- 1) learn how to find, read, interpret and present original research articles (we will read original papers, present them to the class, discuss and critique the papers);
- 2) develop our abilities to publicly speak on molecular biology research;
- 3) to attend actual research seminars in the field of molecular biology;
- 4) to create an open venue to engage in meaningful discussions on ethics, careers, and the potential promise of molecular biology in our lives.

**Expectations:** Students should have a desire to be engaged and take ownership in their learning experiences. Students are encouraged to share their thoughts in class discussions, ask questions, have fun, and generally contribute to a cooperative learning environment.

**Grading:** Class participation is the most important part of any successful capstone course. In the laboratory it is essential to actively work independently to accomplish independent projects. When we discuss scientific papers, it is important that everybody participates in trying to understand the papers. Reading primary literature takes a lot of practice I don't expect you to know everything - I don't know everything either. I do expect you to try. When we have guest speakers, it is important that everyone participates in the discussion and asks questions. 50% of your grade will be based on the laboratory research project and 50% will be based on the Scientific Literature component of this course.

Grading: Scientific Literature Component of Course	Percent of grade:
paper presentations and critiques	10%
participation in discussion of assigned scientific articles	10%
book club narrative (a popular science book to be selected on student interest)	10%
attendance at outside seminars and critiques	10%
two in-class quizzes	10%

**Research seminars:** You are required to attend 5 seminars outside of our class meeting during the course of the semester. You may choose which seminars you attend. Please attend as many as you like beyond the course requirements. I will let you know about a variety of seminars that are open to all students in the Charleston area throughout the semester. For each seminar that you attend, you will need to turn in a short seminar report. The topics of each seminar must fall broadly in the realm of molecular biology.

**Oral Presentations:** Each student will give two oral presentations. The first presentation will be on a paper from a list I will generate based on student interest at the beginning of the semester. The second will also be on a primary research paper you choose, related to the recent advances in Molecular Biology.

Grading: Laboratory Research Component of Course	Percent of grade:
Participation	20%
Laboratory Notebook	10%
Laboratory Skills Assessments (Weekly Quizzes and Attaining Research Benchmarks)	10%
Scientific Poster	10%

### TENTATIVE SCHEDULE OF LAB ACTIVITIES

**PROJECT BENCHMARKS MUST BE COMPLETED BY THE INDICATED DEADLINES IN ORDER TO ENSURE TIMELY GENOME SEQUENCE**

DATE	DEADLINES	ACTIVITIES	
WEEK ONE	HHMI information	<b>Capture</b> <ul style="list-style-type: none"> <li>Learn basic lab techniques</li> <li>Collect soil samples</li> <li>Direct and enrichment plating</li> </ul>	<b>Tame</b> <ul style="list-style-type: none"> <li>Plaque isolation</li> <li>Plaque purification and titer</li> </ul>
WEEK TWO	Begin on Phage Isolations		
WEEK THREE	Identification of phage plaque	<b>Dissect</b> <ul style="list-style-type: none"> <li>DNA purification</li> <li>DNA restriction digest and QC gel</li> <li>Electron microscopy</li> </ul>	<b>Communicate</b> <ul style="list-style-type: none"> <li>Posters</li> <li>Presentations</li> <li>Celebrations</li> </ul>
	Notebook turn in		
WEEK FOUR	Purification of phage		
WEEK FIVE	High Titer Lysate collected		
WEEK SIX	DNA Purification and Quantification		
TO BE DETERMINED BASED ON RESULTS THUS FAR	DNA Quality Control Gel and Restriction Digest		
	EM Preps of Phage		
	DNA at Sequencing Facility CELEBRATION!!!		
	Upload info to phagesdb.org		
	Notebooks Due Final Presentations		

## **ATTENDANCE**

OBVIOUSLY YOUR WORK CANNOT GO ON WHEN YOU ARE NOT PRESENT. EXCUSED ABSENCES (EITHER EMERGENCY OR KNOWN IN ADVANCE) MUST BE OFFICIALLY DOCUMENTED. UNEXCUSED ABSENCES WILL RESULT IN LOWER PARTICIPATION GRADES.

## **RELIGIOUS HOLIDAYS, STUDENT ATHLETES, AND STUDENTS WITH DISABILITIES**

STUDENTS WITH SPECIAL REQUIREMENTS ARE ENCOURAGED TO SEEK OUT ACCOMMODATIONS FROM THE COLLEGE AND ARE ENCOURAGED TO NOTIFY YOUR INSTRUCTOR (DR. ZIMMERMAN) SO THAT YOUR NEEDS CAN BE MET.

## **ACADEMIC DISHONESTY**

CHEATING OF ANY KIND, INCLUDING PLAGIARISM, WILL NOT BE TOLERATED. IF YOU THINK IT'S A BAD IDEA, IT PROBABLY IS. IT WOULD BE MOST UNFORTUNATE FOR EVERYONE INVOLVED AND AS A FACULTY MEMBER OF THE 2016-2017 COLLEGE OF CHARLESTON HONOR BOARD I WOULD REALLY NOT LIKE TO SEE ANYONE IN MY CLASS IN AN HONOR BOARD HEARING THIS SEMESTER. THE HONOR BOARD HEARINGS ARE NOT FUN FOR ANYONE INVOLVED SO LET'S KEEP IT FUN. MORE IMPORTANTLY, OUR INTEGRITY IS THE ONLY THING WE TRULY OWN. HAVING INTEGRITY IS A REWARD OF BEING A GOOD PERSON AND IT IS FUN, EVEN MORE FUN THAN MOLECULAR BIOLOGY, FOR WHICH THE FUN NEVER ENDS.

## **FINALLY**

PLEASE BE ASSURED THAT I WANT EACH AND EVERY STUDENT TO REACH THE GOALS THAT THEY SET FOR THEMSELVES. IF YOU FIND YOURSELF HAVING UNDUE DIFFICULTY WITH ANY PORTION OF THE MATERIAL IN THIS COURSE PLEASE MAKE AN APPOINTMENT WITH ME FOR ADDITIONAL HELP.