

# Molecular Biology Laboratory

## BIOL305L - FALL 2018 - SYLLABUS

### **LABORATORY MEETING TIME:**

Wednesday 8:30-11:30 pm in RHSC 145

The first lab. will be on Wednesday, August 29<sup>th</sup>

Please bring your laptop/tablet to every lab

**INSTRUCTOR:** Jessica McCoy, Ph.D.

Office: 65 Coming Street, Room 102

E-mail: [mccoyja@cofc.edu](mailto:mccoyja@cofc.edu)

Office hours: Mondays from 11-noon. Or by appointment.

**COURSE DESCRIPTION:** This course will provide students with a thorough review of common techniques and concepts that are used in the molecular biology Laboratory. *Co-requisite or prerequisite:* BIOL 312, MATH 250 or equivalent course in statistics or permission of instructor. <http://catalogs.cofc.edu/undergraduate/biol-312l-molecular-biology-laboratory-1.htm>

### **Learning outcomes:**

1. Knowledge and practice of basic laboratory safety
2. Practical skills:
  - a. Learn to isolate and purify DNA from different sources.
  - b. Be able to perform and analyze a PCR reaction
  - c. Be able to manipulate RNA in the laboratory including isolation, quantification, and detection of a specific mRNA using RT-PCR
  - d. Be familiar with modern DNA sequencing methods and genome determination
3. Be able to use readily available databases for the modern molecular biology lab
4. Learn to write scientific reports
5. Learn to read and discuss scientific literature in a journal club setting
6. Know how to work cooperatively in a molecular biology lab

### **Content information**

- There is no book or manual to buy for the lab.
- Course materials, including the syllabus, study guides, handouts, protocols and accompanying papers, etc. will be made available through OAKS.
- Instructions for lab reports and other assignments will be available on OAKS Some of the quizzes will be given on OAKs.

- Make sure to check the OAKS site frequently. If you are not familiar with OAKS, please let me know. Instruction is also available from the Library.

### **Student behavior in the lab.**

- Be on time and familiar with the lab experiment for that day: the faster we start, the sooner we are done.
- Turn off (or put in silent mode) cell phones and other devices that beep. Do not talk on the phone or text message. Do not use Facebook or conduct web searches not associated with assignments during the lab. section.
- Students are expected to behave properly in the lab: no chit-chatting, no rough playing, no playing with expensive instrumentation and potentially dangerous materials.
- Students are expected to help with cleanup after their lab.
- Students should not leave the lab classroom until the instructor has indicated that the lab activity is over.
- Do study, ask questions, and be courteous to your colleagues.
- **Bring your enthusiasm – it is contagious.**

### Tips for Success:

- Attend all labs
- Be an active participant
- When confused, ask for help – from the instructor and friends,
- DO NOT FALL BEHIND before this becomes a reality, get help ASAP

### **Lab attendance policy,**

Regular attendance is positively correlated with success in any course. Class attendance and participation is, therefore, strongly encouraged. Based on the instructions below, a student who misses two lab periods will be dropped from the course with a grade of WA.

FROM <http://catalogs.cofc.edu/undergraduate/attendance.htm>

“Since lab. attendance is a crucial part of any course, students are expected to attend all laboratory meetings in which they enroll. The professor determines whether absences are excused or unexcused, whether make-up works will be permitted (if possible), and how the number of unexcused absences count in determining the basis for a grade of "WA." If attendance is used for grading purposes, the professor is responsible for keeping accurate attendance records. Each student, whether absent or not, is responsible for all the information disseminated in the course *i.e.* all material posted on (see above). If a student has more than the maximum allowed absences, as defined in the course syllabus, the professor may assign a grade of "WA" for the student. The grade of "WA" is a failing grade. The procedure for assignment of this grade requires that the professor submit the WA grade form after the withdrawal deadline.”

## Student responsibility for safety compliance

Students are required to follow the strict and standard safety procedures outlined in the School of Science and Math (SSM) safety policy and procedures document posted on OAKS



SCHOOL OF SCIENCES  
AND MATHEMATICS

### SAFETY POLICY AND PROCEDURES

The School of Sciences and Mathematics of the College of Charleston understands that the safety of our students, staff and faculty is of paramount importance. Engendering a safety culture is an important part of our mission in teaching and doing science. Each department, course of instruction, or research lab may require higher standards or procedures. The policies and procedures set forth below are understood to be minimum requirements across our departments.

In this document, the term "laboratory" is meant for a work space/facility where chemicals, biological agents, or equipment is used for research and/or instruction.

No one (student, staff, faculty, or visitor) will be allowed in a laboratory (teaching or research) to perform experiments or where experiments may be in progress unless these regulations are followed.

Students dismissed from a teaching lab due to violations of the safety procedures will not be allowed to re-enter the laboratory until authorized to do so by their supervisor (instructor) and, in the case of research laboratories, by the department chair or designee. Any course work missed because of a violation of these guidelines cannot be made up at another time (or by an extension of the lab period) and will be treated as an unexcused absence.

## CougarAlert

The College of Charleston has an agreement with the Blackboard Connect Inc. [formerly The NTI Group, Inc. (NTI)] to use its Connect-ED communication software to provide an emergency notification system that is capable of reaching students, faculty, staff and parents within minutes of a campus crisis. This system is called **CougarAlert**.

### Information for Students

The CougarAlert emergency notification system will contact up to six phone numbers for the student. Students may include family member numbers in their address and phone number information.

**All students should log onto [MyCharleston](#) to review their address and telephone information and update as needed.**

To access the address and telephone information, follow these steps:

1. Log on to [MyCharleston](#)
2. Click on the Academic Services tab
3. Click on the Banner Self-Service link in the third column
4. Click on the Personal Information link
5. Click on the Update Address and Phones and Cougar Alert link

The CougarAlert system will pull the phone number in the following order – cell phone with text messaging option, cell phone without text messaging option, residence hall room phone number, mailing phone number, home phone number, parent phone number and parent 2 phone number.

If you do not have one of these numbers in your student record, the system will select the next number on the list. To avoid issues related to timely communication of emergency messages to the proper places, every student must update his or her contact information in [MyCharleston](#) with current accurate information.

<http://ssm.cofc.edu/pdf-files/SSM%20Lab%20Safety%20Policy%20Adopted%20March%207%202012.pdf>

In the first laboratory, we will go over this important CofC safety policy. You will have to take the safety quiz on OAKS, as well as sign a copy of this policy that will be kept in my office for min. two years.

By signing, you agree that you

- understand the potential safety dangers in this lab.,
- know how to deal with any potential accident and also
- agree to the CofC's requirements stated in this policy.

If you do not sign this document, you will not be able to stay in this course. ....

**REMEMBER:**

*College of Charleston Campus Emergencies: 843.953.5611*

*Non-emergency: 843.953.5609*

*Department Directory*

*General Information: 843.953.4980,*

*Crime Action Line: 843.953.4998,*

*Records Coordinator: 843.953.7825,*

*Fire and EMS: 843.953.5499*

*Hearing Impaired Phone: 843.953.1419*

## **HONOR CODE AND ACADEMIC INTEGRITY**

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each instance is examined to determine the degree of deception involved.

Incidents where the professor believes the student's actions are clearly related more to ignorance, miscommunication, or uncertainty, can be addressed by consultation with the student. We will craft a written resolution designed to help prevent the student from repeating the error in the future. The resolution, submitted by form and signed by both the professor and the student, is forwarded to the Dean of Students and remains on file.

Cases of suspected academic dishonesty will be reported directly to the Dean of Students. A student found responsible for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student's transcript for two years after which the student may petition for the X to be expunged. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

It is important for students to remember that unauthorized collaboration--working together without permission-- is a form of cheating. Unless a professor specifies that students can work together on an assignment and/or test, no collaboration is permitted. Other forms of cheating include possessing or using an unauthorized study aid (such as a PDA), copying from another's exam, fabricating data, and giving unauthorized assistance.

Remember, research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the professor.

Students can find a complete version of the Honor Code and all related processes in the *Student Handbook* at [http://www.cofc.edu/studentaffairs/general\\_info/studenthandbook.html](http://www.cofc.edu/studentaffairs/general_info/studenthandbook.html).

## **SPECIAL REQUESTS**

If there is a student in this class who has a documented disability and has been approved to receive accommodations through SNAP Services, please feel free to come and discuss this with me during my office hours.

Any student eligible for and needing academic adjustments or accommodations because of a disability is requested to speak with the professor in a timely manner so that your needs can be addressed.

The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations should notify their professors as quickly as possible.

This College abides by section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act that stipulates no student shall be denied access to an education "solely by reason of a handicap." Disabilities covered by law include, but are not limited to, learning disabilities and hearing, sight or mobility impairments. If you have a documented disability that may have some impact on your work in this class and for which you may require accommodations, please see an administrator at the Center of Disability Services, (843) 953-1431 or me so that such accommodation may be arranged.

The Developmental Biology (DB) Lab. is combined with the DB classes that is 20 % of the total grade (1000 points in the lectures and 250 points in the lab. part. 50 points of the lab. grade will be associated with the lecture 200 point final (May 1<sup>st</sup> 2015), thus leaving 200 points in the lab. part of lab. grade.

## **CONFIDENTIALITY OF STUDENT RECORDS**

The Family Educational Rights and Privacy Act of 1974 (FERPA) is a federal law designed to provide students with greater access to and control over information contained in their educational records, while at the same time prohibiting, in most circumstances, the release of *any information* contained in those educational records without express written consent of the student. This law guarantees privacy of student records, open access by students to their records, restricted release of information to specified authorities or others only with written consent, and procedures allowing students to challenge the contents of their records. The law also requires that an inventory of records be maintained denoting the location, content, and any official review of students' records and identifying the staff member in charge of records and/or reviews. Notice of this law must be provided annually to all students. Forms necessary for obtaining access to student records are provided by the Office of the Registrar.

THIS IS WHY I CANNOT INFORM YOU FOR A REQUEST FOR YOUR GRADES ETC. BY E-MAIL OR THE TELEPHONE AT THE END OF THE SEMESTER. THE ONLY LEGAL

OPTION IS PERSON – PERSON COMMUNICATIONS I.E SEEING EACH OTHER IN PERSON.

**Grading**

Presentations (2 x Technique Talks) 50%

Lab Reports (4) 50%

A rubric will be provided for both components.

<b>GRADE SCALE:</b>			
93 and above: A	80-83.9: B -	67-69.9: D <sup>+</sup>	
90-91.9: A -	77-79.9: C <sup>+</sup>	64-66.9: D	
87-89.9: B <sup>+</sup>	74-76.9: C	60-63.9: D -	
84-86.9: B	70-73.9: C -	below 60: F	

### **Our Experiments:**

In this class we will explore 3 general areas that incorporate molecular biology:

- (1) DNA damage induced by chemical mutagens.
  - a. Techniques used : Ames Test, PCR, ligation, transformation, plasmid purification, DNA sequencing.
- (2) The connection between alleles and phenotype.
  - a. Techniques used: DNA extraction, PCR, Enzyme Digestion, Electrophoresis, DNA sequencing
- (3) Epigenetic Modifications: genetic model systems, gene regulation, Bioinformatics, ncRNA, DNA methylation.
- (4) The intersection between molecular biology and society.
  - a. Techniques used: Bioinformatics, Enzyme Digestion, Gel Electrophoresis, Primer Design.

**Technique Talks:** Each group will deliver (2) technique talks to teach the class about commonly used methods in the molecular biology lab.

Your “lesson” should include the following.

- A brief history
- A general overview of the methodology. Here you will review unfamiliar vocabulary and tell us how the procedure is conducted. It is also good to know the “why” behind each step. For example, when we extract DNA we have to lyse the cells using a detergent. Why exactly is this step necessary?
- Mention the limitations of the procedure
- Provide examples of some interesting applications of this technique.

<b>Technique</b>	<b>Presentation Date</b>
PCR (traditional and Real Time)	09/10/18
DNA/RNA Extraction and Purification	09/10/18
Molecular Cloning Techniques	09/17/18
Enzyme Digest and Gel Electrophoresis	09/17/18
DNA Sequencing	09/24/18
Detection of Epigenetic Modifications: Bisulfite Conversion and Sequencing	10/01/18
CRISPR Gene Editing	10/08/18
Protein Extraction and Purification	10/08/18

**Lab Meetings:** At the conclusion of each experiment we will hold a lab meeting to disseminate our findings and to discuss the results. You are expected to come to lab meetings with your organized and summarized. I will lead each of the meetings, but I will expect each group to participate by sharing their data, confusing results, interesting conclusions, etc.