

**BIOL 312L-04: Molecular Biology Lab**  
**Fall 2016 Syllabus**  
**Thursdays 4-7**  
**SSMB 141**

Instructor:	Dr. Melissa Scheiber
Office:	SSMB 212
Office Hours:	Thursdays 10:30am-12:30pm or by appointment
Phone:	843-953-9530
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**Course Description and Objectives:**

Each pair of students will be assigned a gene associated with breast cancer. This will be a semester long project that builds upon the experiments from the previous weeks. Through literature searching, data-mining, and various molecular techniques (primer design, RNA and DNA extraction, RNA and DNA quantification, reverse transcription, PCR, Real Time RT-PCR, restriction enzyme digests), students will be required to work together to formulate and test a hypothesis on how this gene may regulated the development and/or progression of breast cancer.

**Learning Outcomes:**

Students will

- demonstrate the ability to use and explain modern molecular biology techniques.
- demonstrate an understanding of developing hypotheses and designing experiments.
- communicate, analyze, and discuss experimental results.
- demonstrate the ability to evaluate and apply information presented in scientific journals.

**Co-requisite(s) or Prerequisite(s):** BIOL 312, MATH 250 or equivalent course in statistics or permission of instructor.

**\*\*Dates and Course content on this syllabus are subject to change\*\***

Due to the research based nature of this lab, we will need to be flexible with our dates and requirements.

**Course Policies:**

**Grading:** Based on a total of **120 points** by the following system:

**Attendance:** 5 points

**Participation:** 5 points

**Midterm Exam:** 20 points

**Scientific Thinking (in-class and homework):** 30 points

**Notebook Entries:** 30 points

**Final Report:** 30 points

**Final Grading Scale:**

A (93.5-100), A- (90-93.49), B+ (88.5-89.9), B (83.5-88.49), B- (80-83.49), C+ (78.5-79.9), C (73.5-78.49), C- (70-73.49), D+ (68.5-69.9), D (63.5-68.49), D- (60-63.49), F (<60)

**Attendance:** Since this is a lab class, attendance is critical and required. However, if you must miss a lab please email the instructor and your lab partner. **You will be required to sign-in at the beginning of every lab period.** Unexcused absences will result in lower attendance and participation grades. **Missing 2 to 3 labs due to unexcused absences will result in a WA (withdrawal due to excessive absences).** Excused absences (emergency or known in advance) must be officially documented. I will be teaching two of the five sections of Biol-312L. If arranged in advance for an excused absence, you may attend my other lab section. Please remember you are working as a team, so attending another lab section will still result in a deduction of participation points. There are no make-up exams. Assignments are due during the scheduled lab period. **Late assignments will receive a 25% deduction of points for each day they are late.**

**Participation:** Grading of participation will be assessed based on the following criteria. Your presence and positive attitude in class is a major factor in participation. Participation will also be assessed based on but not limited to:

- Coming to class prepared
- Working well with others (science is collaboration)
- Willingness to help (i.e. make reagents and clean up after lab)
- Asking good questions (everyone needs to participate in lab discussions)

**Textbook:** There is not a required paper textbook for the lab. Lecture and lab materials (including protocols), assignments, and links to research articles will be posted to the Biol 312 lab course page on Oaks.

**Supplies: REQUIRED**

- One very fine point permanent marker (e.g. ultra-fine point Sharpie)
- One bound notebook (e.g. composition book)
- Lab coat
- Safety Goggles (with side shields)

**Electronic devices:** There are several laboratory exercises that require the use of a laptop or tablet. The instructor will indicate ahead of time which exercises require a laptop/tablet. However, students are encouraged to bring your laptop or tablet for every class, but they can only be used for class activities.

**Lab Notebook:** In this lab you will be treated like a real scientist, therefore you are required to keep a lab notebook like a real scientist. This notebook will be electronic. On the weeks that data is collected, you will complete an electronic entry and submit it into the appropriate drop box folder on OAKS. The entries must be submitted prior to the start of the following week's lab. We will discuss in detail the required format of the notebook entries and which lab exercises require notebook entries.

**Homework and In-class Assignments:** The lab exercises will involve working within a group. However, despite being encouraged to solve problems as a team, your homework and in-class assignments **MUST** show individual thought.

**Midterm Exam:** The midterm will be a short in-class written exam. The purpose of this exam will be to assess laboratory skills (pipetting, lab math, safety, etc..).

**Final Lab Report:** At the end of the semester, you turn in a final lab report during finals week. We will go over in more detail the requirements for this report the first week of November. Each individual is required to write their own lab report. YOU MAY NOT WORK TOGETHER. THIS IS AN INDEPENDENT REPORT.

**Lab Safety: *IMPORTANT! The two main projects of this course will involve handling of human normal breast cells and human breast cancer cell lines.*** In addition to the College of Charleston safety policies and procedures (found after course schedule), we will take extra precautions and assume the cells have infectious potential. We will follow strict safety practices that if followed appropriately will put students at little to no risk of infection. One the first day of class, the risk assessment, which addresses all the safety precautions associated with this course, will be distributed and discussed. Acknowledgment of this receipt must be obtained prior to participation in any laboratory exercises. You will be required to take additional online safety training through CITI. If students have a medical issues or general concerns about the safety of the lab exercises, they are encouraged to talk with the instructor in advance about accommodations that may be made during the class

### **College Policies:**

**Center for Student Learning:** I encourage you to utilize the Center for Student Learning's (CSL) academic support services for assistance in study strategies, speaking & writing strategies, and course content. They offer tutoring, Supplemental Instruction, study strategy appointments, and workshops. Students of all abilities have become more successful using these programs throughout their academic career and the services are available to you at no additional cost. For more information regarding these services please visit the CSL website at <http://csl.cofc.edu> or call (843)953-5635.

**Center for Disability Services:** (<http://disabilityservices.cofc.edu/for-faculty/fags.php>)

- Any student eligible for and needing accommodations because of a disability is requested to speak with the professor during the first two weeks of class or as soon as the student has been approved for services so that reasonable accommodations can be arranged.
- The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying me as soon as possible and for contacting me one week before accommodation is needed.
- This College abides by section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. 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/SNAP, 843.953.1431 or me so that such accommodation may be arranged.

### **College of Charleston Honor Code and Academic Integrity:**

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

Incidents where the instructor determines the student's actions are related more to a misunderstanding will handled by the instructor. A written intervention designed to help prevent

the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student's file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF 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 XX to be expunged. The F is permanent. 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 the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others' exams, fabricating data, and giving unauthorized assistance. 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 instructor. Students can find the complete Honor Code and all related processes in the Student Handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>

**Schedule:**

<b>Date</b>	<b>Laboratory Exercise</b>	<b>Assignments/Deadlines</b>
<b>Aug 29</b>	Last day to Drop/Add	
<b>Sept 1</b>	Introduction, Lab Safety, Lab Notebooks	
<b>Sept 8</b>	Pipetting, Lab Math	
<b>Part I: Determining Gene Expression in Breast Cancer</b>		
<b>Sept 15</b>	In-depth Introduction, Microarray tutorial, Database Search, Using PubMed	
<b>Sept 22</b>	Presentation of Journal Article #1	All Citi modules must be completed
<b>Sept 29</b>	Discuss PCR, Design Primers	Hypothesis statement due <i>Hypothesis notebook entry due</i>
<b>Oct 6</b>	RNA Extraction	Journal Assignment #1 due Primers due <i>Primer notebook entry due</i>
<b>Oct 13</b>	RNA Quality	<i>RNA extraction notebook entry due</i>
<b>Oct 20</b>	<b>Midterm Exam</b> Reverse Transcription	<i>RNA quality notebook entry due</i>
<b>Oct 27</b>	Real Time qPCR	<i>Reverse transcription notebook entry due</i>
<b>Nov 3</b>	Analyze Real Time qPCR results Discuss Final lab report	
<b>Part II: Understanding Genetic and Epigenetic Alterations in Gene Expression</b>		
<b>Nov 10</b>	Mutation Introduction Mutation part A: Extract DNA and Check Quality of DNA	<i>Real time qPCR notebook entry due</i> Journal Assignment #2 available on OAKS
<b>Nov 16</b>	Last day to withdraw with a "W"	
<b>Nov 17</b>	Mutation part B: PCR Mutation part C: Restriction enzymes	<i>DNA extraction and quality notebook entry due</i>
<b>Nov 24</b>	No class: Thanksgiving Holiday	
<b>Dec 1</b>	Mutation part D: Run agarose gel Mutation part E: Analyze gel results	Journal Assignment #2 Due <i>PCR notebook entry due</i>
<b>Dec 8</b>	No class Will accept final report early for extra credit	<i>Restriction enzyme notebook entry due</i>
<b>Dec 12</b>	<b>Final Report Due</b>	<b>Dropbox will be setup on OAKS Due by noon.</b>

## 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.

1. You are responsible for knowing the biological, chemical, electrical, ergonomic, mechanical, and physical hazards associated with the equipment and materials that are being utilized in the laboratory. Listen to all instructions and ask questions about that which you do not understand.
2. Know the location of safety equipment: telephones, emergency shower, eyewash, fire extinguisher, fire alarm pull.
3. Know the appropriate emergency response procedures. If there is an injury or emergency, call 953-5611.
4. Do not work alone in the laboratory if you are working with hazardous materials or equipment.
5. Use hazardous chemicals, equipment, and biological agents only as directed and for their intended purpose.
6. Do not engage in horseplay, pranks or other acts of mischief while in lab.
7. Drinking, eating, and application of cosmetics is forbidden in laboratories where chemicals or biohazards are present. Smoking is forbidden in all College buildings.
8. Appropriate personal protective equipment shall be worn. The dress code for laboratory work when using chemicals, biological or physical hazards, or when instructed to do so by the laboratory supervisor is as follows:
  - a) Wear safety glasses or goggles at all times.
  - b) No exposed skin on arms, legs or torso.
  - c) Wear lab coats or other approved protective garments.
  - d) Wear gloves or other personal protective equipment (PPE) as directed by the instructor or mandated by prudent practices based on the chemicals being handled. If in doubt, wear appropriate gloves. Latex is not permitted. Avoid cross-contamination.
  - e) Remove PPE (gloves and lab coat) when exiting the laboratory.
  - f) Wash your hands, even if gloves were used, before leaving a lab where you did any lab work.

- g) Closed toe shoes are required. The heel and top of foot must be covered. High heeled shoes, sandals, and perforated shoes are not permitted.
- h) Confine long hair and loose clothing.
9. Inspect equipment or apparatus for damage before adding chemical reagents or biological samples or energizing electrical equipment. Do not use damaged equipment.
10. Never remove chemicals, biological samples, or laboratory equipment from a lab without proper authorization.
11. Presume that all chemicals and biological samples used in the laboratory are hazardous for you and the environment, unless instructed otherwise.
12. Never leave an experiment unattended unless proper safety precautions are in place.
13. Read all labels on chemicals twice before using them in the lab. Read all instructions twice for the operation of any equipment or machinery.
14. Properly and safely dispose of all waste materials.
15. Treat sharps and broken glassware containers carefully.
- a) Broken glass should be disposed of in properly marked safety containers. All sharps (needles, razor blades, etc.) used for any purpose must be disposed of in specially labeled SHARPS containers.
- b) Do not place contaminated glass in the broken glassware container. Consult your supervisor. c) Waste chemicals and contaminated PPE should be discarded as directed.
16. When using a reagent, replace the lid immediately. Never return unused reagents to stock bottles. Take only the amount needed for your experiment.
17. All chemicals and biological samples/media are to be disposed of in appropriately labeled containers. Specific instructions for each material will be provided. Pay attention to waste container labels before adding the material to be discarded.
18. Use good personal hygiene. Keep your hands and face clean. Wash hands thoroughly with soap and water after handling any chemical or biological agent.
19. Keep the work area clean and uncluttered with chemicals and equipment. Clean up the work area on completion of an operation or an experiment. Before leaving the laboratory, you are responsible for making sure your lab area is clean and organized.
20. Never store a chemical or biological specimen in an unlabeled container.
20. Always have your College of Charleston identification and insurance information with you when working in a laboratory. MedicAlert identification must be worn if you have any potential life-threatening chemical sensitivities or medical conditions.
21. Report any accident or injury, however minor, to your teaching assistant, instructor, or lab supervisor immediately. An accident report form must be completed and forwarded to the department chair, dean, and to the Director of Environmental Health and Safety.

**If you have questions/concerns about safety in the lab please first consult your instructor. If these are not answered, please see the department chair. Finally, you may consult the director of Environmental Health and Safety, Randy Beaver at 3-6802 or [beaverr@cofc.edu](mailto:beaverr@cofc.edu)**

**Adopted: March 7, 2012**

## 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.

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## CougarAlert Display Information

When you receive an emergency message from the College of Charleston's CougarAlert System, the return e-mail address will be displayed as cougaralert@cofc.edu, and Caller ID will be displayed as 843.725.7246 (this is the College's Emergency Information Hotline).

### Testing and Implementation

*Testing will be conducted each semester* to verify all systems are operating properly. The campus community will be notified via e-mail and web page postings when testing of the system will be conducted.

### Blackboard Connect Software

[Blackboard Connect](#) is an emergency communication software that sends notification before, during and after an emergency. With this new system, the College will be able to communicate in many modes, including voice messages to home, work and cell phones; text messages to cell phones, PDAs and other devices; written messages to e-mail accounts; and messages to teletypewriters and telecommunication devices (TTY/TDD) for the hearing impaired. In combination with our existing communications methods and emergency response plans, this new notification system will significantly enhance the College of Charleston's ability to maintain a learning environment in which students are safe, secure and comfortable.

In an emergency, communications to the campus will be issued in the following priority order:

1. Message to the [Blackboard Connect](#) Emergency Notification System (phone and e-mail).
  2. Recorded message to the College's Emergency Information Hotline, 843.725.7246.
  3. Update to the Website.
  4. Printed update sheets to be distributed and posted on campus (if necessary).
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The CougarAlert system will only be used to notify you in the event of a campus crisis or emergency.