

Developmental Biology laboratory syllabus

BIOL 322L, Fall 2016

GENERAL INFORMATION

LABORATORY MEETING TIMES:

Monday 2 – 5 pm in HWWE 208 (Dr. A. Southgate).

The first lab. will be on Monday Aug. 29th 2016.

Please bring your laptop/tablet/Cell phone etc. to every lab. for notes, images etc.

A notebook is required. The other section of the lab is on Wednesday afternoon.

INSTRUCTORS:

MONDAY LAB.: Agnes Southgate, PhD.

Office: HWWE 306, Phone 843-953-6544.

E-mail: southgatea@cofc.edu

Office Times: after lab period

WEDNESDAY LAB.: Richard Southgate, PhD.

Office: HWWE 308, Phone: 953-0340

E-mail: southgater@cofc.edu,

TEXTBOOK

- * There is no book or manual to buy for the lab.
- * The protocols for each week's activities, as well as assignments and other information will be posted on OAKS and you are responsible for downloading/printing them. Make sure to check the site frequently and if you are not familiar with OAKS, let us know as instructions are available from the Library.
- * There will be one copy of the excellent "A Photographic Atlas of Developmental Biology [Loose Leaf], Shirley J. Wright (Author) in the lab for use DURING lab (cannot be removed from the lab).

UNDERGRADUATE CATALOG DESCRIPTION: BIOL 322 Developmental Biology (4)

Lecture surveys the different stages of development from fertilization to organogenesis in both invertebrate and vertebrate model systems. Lecture covers both the descriptive nature of embryonic development, as well as the conserved molecular and cellular patterns. The laboratory covers some techniques of developmental biology, as well as

histology slides of embryonic development, and research paper discussion.

Lectures three hours per week; laboratory three hours per week.

Prerequisites: BIOL 111/111L, BIOL 112/112L, BIOL 211/211D, and BIOL 305.

Co-requisite or prerequisite: MATH 250 or equivalent course in statistics or permission of instructor.

COURSE LEARNING OUTCOMES

This course is designed to teach students a basic understanding of the principles of development. The wonder of a fertilized egg directing its own development into an adult organism, starting from two gamete cells and then a complete single cell (the zygote) is nearly unfathomable in its complexity.

You will find that the borders separating the disciplines of developmental biology, genetics, cell biology, biochemistry and molecular biology etc. become indistinct as there are a large number of common themes including cell signaling, control of gene expression, cell migration, cell division and others in all of these disciplines. We find that the pathways of development are very similar in diverse animal groups, and we will be using a number of model organisms to deconstruct the patterns of early development in animals. Recent technological advances have begun to shed light on these fundamental molecular and cellular mechanisms that guide development.

The lab part of the Developmental Biology course is designed to introduce students to these discoveries by exposure to modern techniques that are used to manipulate and examine developmental processes in several key model systems. But just as important, over the course of these lab. activities, students will witness their growing appreciation of the elegant processes by which a single cell is rapidly and nearly automatically transformed into a complex multicellular organism.

Specific outcomes

- * The students will be able to describe and recognize images of the different developmental stages in multiple developmental model systems
- * The students will acquire skills in dissection, tissue staining, and microscopy including fluorescent microscopy
- * The students will understand the different approaches used in modern developmental biology to investigate gene expression. They will be able to use this knowledge to develop their own hypothesis and read primary literature in a critical way
- * The students will be familiar with handling large molecular datasets such as gene expression studies. .

STUDENT MANDATORY PARTICIPATION IN THE LAB.:

Students are expected to come to lab. on time, to be serious in their studies, to ask questions, and generally to be engaged in the lab.

Students also should have looked the protocol in question BEFORE the lab. starts

Students are expected to help with cleanup and microscope relocation after the lab. sections

Students need to remember AT ALL TIMES that we follow the strict safety procedures and rules established at CofC

TESTING AND GRADING

1. 4 Quizzes @ 5 pts. each 20 points

2. Short papers in class summary: 20 points

3. Lab Reports:
 - a. Fertilization 10 points
 - b. Planaria 15 points
 - c. Immunofluorescence 10 points
 - d. IHC 10 points
 - e. *C elegans* RNAi 10 points
 - f. Honeybee qRT-PCR analysis 10 points

4. Images portfolio collected before midterm 15 points
and at the end of semester 15 points
This assignment will be fully explained in class and precise instructions provided on OAKS

5. PPT Presentation: 50 points

6. Notebook organization 10 points
Keep all your observations, lab. expectations and results etc. in a 3-ringed notebook that will be checked out periodically. Most experiments span over several weeks and you should not count on your memory of 4 weeks ago when writing your lab report. The notebook will also be critical as a source of information and details for your slide / drawing portfolio.

7. Attendance + participation 5 points

TOTAL

200 points

Your final lab. grade will be added as 20% of the course grade based with this grade scale.

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

A TENTATIVE SYLLABUS

Doing experiments that use living organisms has a price, mostly from failure to obtain live organisms in good shape. For example, we have had live chicken eggs left outside at Charlotte's Airport in the winter and they were frozen solid by the time they arrived in HWWE 208



Because of these possible lab. mishaps, we always have back-up plans and if needed, the order of some of the lab. activities may be switched at the last minute. I will make every effort to let you know ASAP in class and on OAKS.

Date	Topic & Exercise
Aug. 29	Introduction, safety, microscope, and lab expectations. Slides: sea urchin cleavage, movies, models OAKS quiz on safety: due before 9/5
Sept 5	Fertilization Lab report due Sept 12 Introduction to methods for analyzing RNA expression OAKS quiz on gene expression methods due before 9/12
Sept 12	Slides: <i>Xenopus</i> cleavage, movies, models Portfolio discussion Bioinformatics: GEO databases <i>Drosophila</i> /honeybee/other insects: myofibrils preparation and IF
Sept 19	Planaria part 1: observation, dissection Planaria Smedbase, bioprojects Developing a hypothesis RNAseq and microarray information Myofibrils IF: microscope work Myofibrils IF report due 10/10

Sept 26	Slides: gastrulation, movies, models Planaria part 2: RT-PCR set up and discussion Axolotl observation and set up treatment Myofibrils IF: microscope work if necessary
Oct 3	Planaria part 3: gel electrophoresis Chicken embryos, observation, dissection , start IHC OASKS quiz on RT-PCR and gel electrophoresis due before 10/10 Slides: chicken cleavage and gastrulation, models Axolotl observation and imaging
Oct 10	Planaria part 4: data discussion and paper presentation Planaria report due 10/17 Chicken embryos end of IHC imaging Chicken IHC report due 10/24 Axolotl observation include all images with legend in portfolio Portfolio due 10/17 Discussion genome browser and TopHat
Oct 17	Slides: neurulation, movies, models qRT-PCR introduction Honeybee project discussion, setting up qRT-PCR OAKS quiz on qRT-PCR and bee project due 10/24
Oct 21	Midterm grades
Oct 24	<i>C. elegans</i> setting RNAi feeding Honeybee project qRT-PCR data analysis Bee qRT-PCR report due 11/07 FINAL POWERPOINT project due 11/14 irrespective of day for class presentation
Oct 27	Last day for W
Oct 31	RNAi data collection and paper discussion <i>C. elegans</i> RNAi report due 11/07 Green line discussion
Nov 7-8	Fall break
Nov 14	Final presentations first set
Nov 21	Slides: organogenesis: <i>Xenopus</i> , pigs Slides: organogenesis: <i>Xenopus</i> , pigs

	FINAL IMAGE PORTFOLIO due 11/28
Nov23	THANKSGIVING
Nov28	Final presentations second set

EXTRA-INFORMATION:



SCHOOL OF SCIENCES
AND MATHEMATICS

SAFETY POLICY AND PROCEDURES

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.

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

Adopted: March 7, 2012

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

In the first lab., we will talk about this important CofC safety policy and after having looked and understanding its contents, you and all the other students in this lab. WILL HAVE TO SIGN A COPY OF THIS POLICY that we will keep in the Biology departmental office for this semester and longer.

This means that if any safety issue occurs, all students in this lab. who have signed this document:

- knew the potential dangers in the lab. (those are pretty minimally in the DB lab. luckily but not zero),
- knew how to deal with any potential accident and also
- agreed to the CofC's requirements and understood the reasons of the CofC safety policy.

You will also have to take and pass an OAKS quiz before being allow into the lab

We will talk with more details about this policy in the first lab.

College of Charleston Campus Emergencies: 843.953.5611

Non-emergency: 843.953.5609,

(<http://publicsafety.cofc.edu/staying-safe/emergencies-on-campus/index.php>)

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://studentaffairs.cofc.edu/honor-system/studenthandbook/2015-2016-student-handbook.pdf>

<http://studentaffairs.cofc.edu/honor-system/>

<http://jinr.people.cofc.edu/honorcode.pdf>

SPECIAL REQUESTS

If there is a student in this lab. who has a documented disability and has been approved to receive accommodations through SNAP Services, please feel free to come and discuss with us during our office hours (by e-mail for a meeting). 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.

<http://disabilityservices.cofc.edu/?referrer=webcluster&>

STUDENT RESPONSIBILITIES

You are responsible for all materials covered or assigned in DB lab or assigned electronically.

You should check OAKS regularly for any updates. The instructor is to communicate expectations, explain the materials, and help you to the best of his/her time and ability. However, the responsibility for learning is upon you, the student. Your grade is based on your performance on lab. quizzes, reports, the power point presentations, your slide/drawing/photo portfolio, your notebook, as well as attendance and participation.

Tips for Success:

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

Lab. room Norms:

- Safe behavior,

- Respect for others,
- Integrity,
- On time,
- Participation,
- Hard work – work hard,
- Don't cheat,
- Love Biology,
- Have fun!