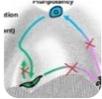


# Developmental Biology Lab



BIOL 322 Laboratory



Spring 2017, Richard Southgate, PhD

## INSTRUCTOR CONTACT: Dr. Richard Southgate

Office: HWWE room 308

Phone: 953-0340 (not very efficient so please e-mail first)

e-mail: [southgater@cofc.edu](mailto:southgater@cofc.edu)

## MEETING TIMES

**LABORATORY:** Monday: 1:30 – 4:30 pm in HWWE room 208. Lab is mandatory.  
There is a separate syllabus for the lab.

## OFFICE VISIT TIMES

**Monday 10:30 am to ~12 noon as I have to prep the DB lab.**

**Wednesday 10:30 am to ~12:30.**

On some occasions, I will also have to go to faculty meetings in SSMB at 12–1 pm, so on those days, I will not be available, and I will let you know in class or on OAKS or by Group e-mails.

We can also talk **after Monday lab**, or by **appointment (e-mail be for a good time)** and I may also be available on **Wed. afternoons** in my office, so ask. The best way to contact me is by e-mail ([southgater@cofc.edu](mailto:southgater@cofc.edu)) and providing me with times when you are available. I check my e-mail frequently and will give you a specific meeting time in return.

## COURSE 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.

**The Developmental Biology course participation is 80% in class & 20% in lab. for one grade.**

## 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.

### **COURSE OBJECTIVES**

- 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.

### **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).

### **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**

**Lecture and laboratory testing are integrated (you get only one grade, 80% in class and 20% in lab.) in this course.**

**CLASS: 80% = 750 pts., 100% = 937.5 pts, so the LAB. = 20% = 187.5 pts.**

**So the total lab. points are 187.5 points.**

4 Lab. Quizzes @ 5 pts each	Total <u>20 points</u>
1. 4 Lab Reports: 15 pts each	Total <u>60 points</u>
a. Fertilization	15 points
b. Planaria	15 points
c. Chicken IHC	15 points
d. <i>C. elegans RNAi</i>	15 points
2. Images portfolio	<u>40 points</u>

This assignment's instruction will be explained in lab. and on OAKS.

3. PPT Presentation:	<u>30 points</u>
4. 2 lab. article reports @ 20 pts. = 40 pts.	40 points.
5. Attendance:	10 points.

**TOTAL: 200 points (20 + 60 + 40 + 30 + 40 + 10) in the labs but your total lab. grade will be reduced by 0.9375% to 187.5 pts = the 20% part of the overall lab. grade in this course.**

**GRADING SCALE:**

92 and above: A	80 - 82.9: 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-
83 - 86.9: B	70 - 73.9: C-	Below 60: F

**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 ... OK it is getting rarer and rarer to be very cold in SC but it can happen. 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 but unfortunately it is probable it will occur at least once this semester.



Date	Topic & Exercise
Jan. 23 '17	Introduction, safety, microscope, and lab expectations. Slides: sea urchin cleavage, movies, models Live organisms. Portfolio discussion <b>#1) OAKS QUIZ on safety: due before Jan. 30 '17</b> , signing the policy rules.
Jan 30 '17	Gene expression discussion Introduction to RNA expression + methods to analyze RNA expression Slides: <i>Xenopus</i> cleavage, movies, models.
Feb 6 '17	Planaria part 1: observation, dissection, Planaria Smedbase, bioprojects Developing a hypothesis, RNAseq and microarray information
Feb 13 '17	Slides: gastrulation, movies, models, Planaria part 2: RT-PCR set up and discussion, <b>#2) OAKKS LAB. QUIZ: PLANARIA due before Feb 20 '17</b> Salamander embryo/Axolotl observation and set up treatment
Feb 20 '17	Planaria part 3: gel electrophoresis Chicken embryos, observation, dissection, start IHC

	<b>#3 and #4) OAKS QUIZZES RT-PCR AND GEL ELECTROPHORESIS due before Feb 27'17</b> Slides: chicken cleavage and gastrulation, models Salamander embryo/Axolotl observation and imaging
Feb 27 '17	Planaria part 4: data discussion and paper presentation <b>PLANARIA REPORT #1) due Mar 12 '17,</b> Chicken embryos end of IHC imaging, <b>CHICKEN IHC REPORT #2) due Mar 20 '17</b> Axolotl observation include all images with legend in portfolio Discussion genome browser and Top Hat
Mar 6 – Mar 12 '17	SPRING BREAK
Mar 12 '17	Slides: neurulation, movies, models, qRT-PCR introduction
Mar 16 '17	Midterm grades
Mar 20 '11	Fertilization, <b>FERTILIZATION LAB. REPORT #3) due Mar 27 '17</b>
Mar 23 '17	Last day for W
Mar 27 '17	RNAi data collection and paper discussion <b>C. elegans RNAi REPORT #4) due Apr 03'17</b>
Apr 03 '17	Slides: organogenesis: <i>Xenopus</i> , pigs
Apr 10 '17	<b>FINAL PRESENTATIONS FIRST SET</b>
Apr 17 '17	<b>FINAL IMAGE PORTFOLIO due Apr 17</b> <b>FINAL PRESENTATIONS SECOND SET</b>

## COURSE POLICIES

### ELECTRONIC DEVICES

You are encouraged to bring your laptop or tablet for every class, but they can only be used for class activities. Breach of that trust will lead to you losing that right.

### ATTENDANCE POLICY

You have to come to the lab. because there is **no possibility to make up**. If you become ill or any other reason, you will be excused as long as you have **documentation that proves you were ill (doctor note, Dean note, institute interview, student games etc.)**. If you were ill on that particular lab. with documentation, we will meet when you are better, I will ask you some questions to make sure that you understood the lab. contents from the lab. protocols and notes from your partner etc. and perhaps a small “pseudo” report.

**If you did not take a lab. without an excused reason, you will lose the 12.5 attendance points and any quiz / report points on that particulate lab. day, and if you do not come for two unexcused labs., you will be labeled with a “WA” grade unless you withdraw but between because, without by two, I will initiate a WA withdrawal.**

**Communication is everything, so please talk to me if there is an issue but you have to have documented proof (doctor’s note, etc.).**

Students are responsible for all content for any class missed. Under extenuating circumstances, I will make one-on-one decision based on individual conditions and again if you have provided documentation.

I will work individually with student-athletes who will need to be absent for meets/competitions/games.

## **COLLEGE POLICIES**

### **• DISABILITY SERVICES**

The College will make reasonable accommodations for persons with documented disabilities. Students should apply at the Center for Disability Services / SNAP, located on the first floor of the Lightsey Center, Suite 104. 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 or if necessary by an appointment.

- 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 i.e. earlier than later.

- 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. <http://www.disabilityservices.cofc.edu>

### **• 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 be 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.

- Students should be aware 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/>  
<http://studentaffairs.cofc.edu/honor-system/studenthandbook/>  
<http://parkj.people.cofc.edu/HonorCode.pdf>

- **CENTER FOR STUDENT LEARNING**

I encourage you to utilize the Center for Student Learning's (CSL) academic support services for assistance in study strategies and course content. They offer tutoring, Supplemental Instruction, study skills 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.

- **STUDY SKILLS WORKSHOPS**

Each semester a series of study skills workshops are offered free of charge to all College of Charleston students. The Workshop Series 101 is geared towards the general student population wanting more information on study skills. The Workshop Series 101 occurs three times a week lasting about 50 minutes for each session. Students will receive weekly reminders via email and Facebook for the upcoming session with time and place. You can also visit <http://csl.cofc.edu/study-skills/workshops/index.php>

**IMPORTANT DATES** <http://registrar.cofc.edu/pdf/ac-2017Spring.pdf>

**EXTRA-INFORMATION: Safety Policy and Procedures**

<http://biology.cofc.edu/current-students/School%20of%20Sciences%20and%20Mathematics%20Safety%20Policy%20and%20Procedures.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*

*If use see a mistake in this Syllabus, please inform me.*