Developmental Biology Laboratory Syllabus
College of Charleston’s (CofC) BIOL-322L-02, Fall 2016

GENERAL INFORMATION

LABORATORY MEETING TIMES:
Monday 2 – 5 pm in HWWE 208 (Dr. A. Southgate).
Wednesday 2 – 5 pm in HWWE 208 (Dr. R. 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 note book is also highly suggested, as well as a flow chart, as a memory aid.

INSTRUCTORS:
MONDAY LAB.: Agnes Southgate, PhD. (University of Geneva, Switzerland, 1985),
Office: HWWE 306, Phone 843-953-6544 (not efficient due to class / labs. / meetings etc.).
E-mail: southgatea@cofc.edu, FAR BETTER for multiple reasons!

WEDNESDAY LAB.: Richard Southgate, PhD. (University of Geneva, Switzerland, 1984),
Office: HWWE 308, Phone: 843-953-0340 (not efficient due to class / labs. / meetings etc.).
E-mail: southgater@cofc.edu, (FAR BETTER for multiple reasons!).
Please be aware of the slightly different email addresses [---a--- or ---r---] to minimalize mistakes!!!!

OFFICE TIMES: EVERY FRIDAYS
Richard Southgate, PhD: 9:30 – 12:30 pm in harbor Walk HWWE 308.
If you cannot come at these times, set up an appointment with the appropriate instructor by e-mail [---a--- or ---r---] and we can also talk briefly after your lab. section as well.

Here are my Fall 2016 teaching schedules to better plan around my availability, as I will not be in my office at these times:

RICHARD SOUTHGATE, PhD:
M, W and F, 8:30 – 9:20 am (BIOL-313-01 class in HWWE 211),
M 1:30 – 4:30 pm (BIOL-313L-01 in QF403 at MUSC),
T 1:35 – 4:35 pm (BIOL-313L-03 in QF403 at MUSC) and
W 2 – 5 pm (BIOL-322-2 in HWWE 208).

In addition, these labs require considerable more time than just the lab. times, as these labs have to be both prepared and cleaned up at the end of the particular section. In addition, the “Southgate’s” are usually not available on campus on Thursdays. This is our “off day” for medical appointments (us and a senior parent), grading, lecture preparation, research, letters of recommendation etc., care care etc., so e-mail us only if you definitely have to see one of us on Thursdays.
DB LABs. 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 before the laboratory session. 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.

UNDERGRADUATE CATALOG: 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.

- 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.
# Fall 2016 Academic Calendar

Dates in this calendar are subject to change without notice.

## August 2016
- **August 22**: Residence halls open. Move-in date and time is based on the residence hall.
- **August 22**: New Student Convocation.
- **Monday, August 29**: Final day for students to submit a request to Audit or apply for a Pass/Fail grade option for Express I classes.
- **August 29**: Final day for students to submit a request to Audit or apply for a Pass/Fail grade option for Express II classes.

## September 2016
- **September 7**: Last day for faculty to submit Undergraduate Individual Enrollment and Bachelor’s Essay applications to the Registrar’s Office for all full semester, Express I and Express II classes.
- **September 15**: Terasaki Verification for faculty members at CAVE.
- **September 15**: Last day for students to withdraw with a grade of "W" from Express I classes.

## October 2016
- **October 1**: Last day to submit an Undergraduate Application to Graduate in Fall 2016.
- **October 7**: Last day of Express I classes.
- **October 10**: Express final exams for M/W classes.
- **October 11**: Express final exams for T/R classes.
- **October 11**: Last day for students to submit incomplete undergraduate coursework to faculty for any Summer 2016 session (Summer 60-Day Deadline). Change of grade form to be submitted by faculty.

## November 2016
- **November 7**: Fall Break. No classes.
- **November 8**: Fall Break. Election Day. No classes. College Closed.
- **November 9**: Classes resume.

## December 2016
- **December 5**: Last day of full semester and Express II classes.
- **December 8**: Reading Day (SPT).
- **December 7**: Final semester and Express II final exams begin.
- **December 14**: Final semester and Express II final exams end.
- **December 16**: Final grades for full semester and Express II classes available to students on MyCharleston by 5pm.
STUDENT MANDATORY PARTICIPATION IN THE LAB.:
- Students are expected to come to lab. on time,
- To be serious in their studies,
- Asking many questions,
- Being engaged in the lab. sections,
- Having looked the protocol in question BEFORE the lab. starts (important for lab. quizzes),
- Helping with cleanup and microscope relocation after the lab. sections and
- always remembering that we follow the strict safety procedures rules at CofC as wells as MUSC and all other research Institutes / Universities / Colleges in the USA and elsewhere (see below).

************TESTING AND GRADING
4 Quizzes @ 5 pts. each                             20 points
Short papers in class summary:                     20 points
Lab Reports:
  Fertilization                                    10 points
  Planarian                                        15 points
  Immunofluorescence                               10 points
  IHC                                               10 points
  C. elegans RNAi                                  10 points
  Bee qRT-PCR analysis                             10 points
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.

PPT Presentation:                                  50 points
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.

Attendance + participation                         5 points
TOTAL                                             200 points
Your final lab. grade will be added as 20% of the entire course grade (i.e. class and lab.) and based on the below grade scale.

<table>
<thead>
<tr>
<th>GRADE SCALE:</th>
<th>93 and above: A</th>
<th>80-83.9: B -</th>
<th>67-69.9: D +</th>
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</thead>
<tbody>
<tr>
<td>90-91.9: A -</td>
<td>77-79.9: C +</td>
<td>64-66.9: D</td>
<td></td>
</tr>
<tr>
<td>87-89.9: B +</td>
<td>74-76.9: C</td>
<td>60-63.9: D -</td>
<td></td>
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<tr>
<td>84-86.9: B</td>
<td>70-73.9: C -</td>
<td>below 60: F</td>
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A TENTATIVE SYLLABUS (for multiple reasons)
The old embryology Development Biology labs were largely limited to embryology only, mainly being a pure description of development. In the last two + decades there have been a huge explosion of new discoveries and research and Dr. Agnes and Richard Southgate are trying to bring a glimpse of these eye popping changes to you in the “improved” Developmental Biology Lab. We are not promising everything will work out perfectly and perhaps not working at all, but all of you and us, will do our very best to minimal any mistakes and to learn from any slip-ups as the real understanding of developmental biology processes often begins in these unplanned situations. Yes, we all learn far more doing experiments than just looking at too many (often boring slides and models, if in large numbers, in every lab, throughout the semester). Doing life experiments, materials and life organisms, however, has a price if the protocol fails, often due to situations frequently beyond the instructor’s care. 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 or weather issues causes severe delays resulting in live critters exhausting their oxygen supply in sealed bags i.e. DOA or they arrive alive and in good shape at the Charleston airport in the morning but were left in a hot hanger all day and were clearly dead when they arrived in the lab. …… Yes, it happens.

No doubt some of these problems can be traced to a mistake in the preparations that lead to a failed experiment activity (luckily rare) but all human made mistakes (especially if also very tired) happens …. Because of these possible lab. mistakes, there have to be back-up plans if things go wrong and this is why the syllabus is described as being “tentative” not only for bad weather but due to live material availability etc. So, if needed, the order of some of the lab. activities may be switched and of course, you will be notified in class and on OAKS. This may sound bad but still please join this exploration lab., learn a ton of new facts and have plenty of good fun as well, as well as, hopefully many “wow” moments….

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic &amp; Exercise</th>
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<tbody>
<tr>
<td>Aug 31</td>
<td>Introduction, safety, microscope, and lab expectations. Slides: sea urchin cleavage, movies, models OAKS quiz on safety: due before 9/7</td>
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<tr>
<td>Sept 7</td>
<td>Fertilization, Lab report due Sept 14 Introduction to methods for analyzing RNA expression OAKS quiz on gene expression methods due before 9/14</td>
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<td>Sept 14</td>
<td>Slides: Xenopus cleavage, movies, models Portfolio discussion, Bioinformatics: GEO databases Drosophila/honeybee/other insects: myofibrils preparation and Immunofluorescence / IF</td>
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<td>Date</td>
<td>Activity</td>
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<tr>
<td>Oct 19</td>
<td>Slides: neurulation, movies, models. qRT-PCR introduction. Honeybee project discussion, setting up qRT-PCR. OAKS quiz on qRT-PCR and bee project due 10/26.</td>
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<tr>
<td>Oct 21</td>
<td>Midterm grades.</td>
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<tr>
<td>Oct 26</td>
<td>C. elegans setting RNAi feeding. Honeybee project qRT-PCR data analysis. Bee qRT-PCR report due 11/09. FINAL POWERPOINT project due 11/16 irrespective of day for class presentation.</td>
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<tr>
<td>Oct 27</td>
<td>Last day for W.</td>
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<td>Nov 7-8</td>
<td>Fall break.</td>
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<td>Nov 16</td>
<td>Final presentations first set.</td>
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<td>Nov 23</td>
<td>THANKSGIVING.</td>
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<td>Nov 30</td>
<td>Final presentations second set.</td>
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REMEMBER: THIS IS A VERY TENTATIVE SYLLABUS !!!!!!!!!!
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) Confining 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.
In the first lab., we will talk about this important CofC safety policy and after having looked and understood 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 my office for this semester and longer.

This means that later with a safety issue, all students in this lab. who had signed this document, knew the potential dangers in the lab. (that 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 understanding the reasons of the CoC safety policy.

If you do not sign this document, you will not be able to stay in this course. .... (CofC policy, not us…)

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

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**College of Charleston Campus Emergencies:** 843.953.5611  
Non-emergency: 843.953.5609,  
**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

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**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.**


**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&](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 solely on your performance in the lab. on lab. quizzes, reports, the power point presentations, your slide/drawing/photo portfolio, your notebook, attendance and participation.

**TIPS FOR SUCCESS:**

- Attend all labs,
- Be active,
- When confused, ask for help – from the instructor and friends,
- Use resources to study – chapter study goals, class notes, sample problems, homework, end-of-chapter reviews, and key terms in textbook,
- Stay Healthy,
- **DO NOT FALL BEHIND** before this becomes a reality, get help ASAP!

**LAB. ROOM NORMS:**

- Safe behavior,
- Integrity,
- Participation,
- Don’t cheat,
- **HAVE FUN!**
- Respect for others,
- On time,
- Hard work – work hard,
- Love Biology,

Let me know if you see a mistake in this Syllabus, remember it can be updated, if necessary. Latest version 08/25/2016.