

Developmental Biology Laboratory

College of Charleston's (CofC) BIOL 322L-01 & -02, Spring 2016.

LABORATORY MEETING TIME:

Wednesday 1:30 – 4:30 pm and Fri 1 – 4pm in HWWE 208 in the second floor.
The first lab. will be on Wed. Jan. 13th and Jan. 15th 2016.

INSTRUCTOR: Richard Southgate, PhD. (University of Geneva, Switzerland, 1984).

OFFICE: HWWE 308.

PHONE: 953-0340 (not very efficient due to teaching, traveling and meetings etc.).

E-MAIL: southgater@cofc.edu (FAR BETTER !).

OFFICE TIMES: Monday 10:30 to 1 pm in HWWE 308 and if you cannot come at these times, set up **an appointment with me by e-mail**, and we can find a good time for both of us to talk. You can also come +/- any time at HWWE 305 **FOR SHORT MEETINGS ONLY** i.e, less than 5 minutes, but of course, there is a risk I may not be in my office....

MY TEACHING TIMES ARE:

**Developmental Biology lectures Mon, Wed and Fri at 9:30 – 10:20 am (HWWE 305),
Developmental Biology Labs. Wed 1:30 – 4:30 pm and Fri 1-4 pm labs. (HWWE 208) and
Molecular Biology Laboratory Thursday at 3:30 to 6:30 pm in SSMB 141,
and these times do not include travel, prep and clean-up times.**

TUESDAYs will be my off day, allowing me time for medical appointments (myself or other members in my home), prepping for that week's labs., grading, e-mail clean up, caring for an elderly parent and lecture prep. etc. So typically, I will not be available for student meetings on Tuesdays, but if you have an emergency, e-mail me for an appointment **but only for emergencies...**

DB LAB. There is **no book** or manual to buy for the lab. but there will be one copy of the excellent loose leaf "A Photographic Atlas of Developmental Biology by **Shirley Wright in the lab.** The protocols for each week will be posted on OAKS and **you will have to print them.**
The DB Lab. syllabus is posted in OAKS's DB Lab. section.

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 3 hours per week; laboratory 3 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.

<http://catalogs.cofc.edu/undergraduate/biol-322-developmental-biology-4.htm>

I will be using OAKS to post information and announcements.

Make sure to check the site frequently.

If you are not familiar with OAKS, please let me know. Instruction is also available from the Library.

COURSE RATIONALE AND LEARNING OBJECTIVES

This course is designed to provide a basic understanding of the principles of development. The wonder of a fertilized egg directing its own development into an adult organism 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 number of common themes including cell signaling, control of gene expression, cell migration and others in all these disciplines. We will 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 mechanisms that guide development. This lab part of the this course is designed to introduce students to these discoveries. In the lab, students will experience with modern techniques used to manipulate and examine developmental processes in several key model systems. But just as important as these practical reasons will be the development and appreciation of the elegant processes by which a single cell is transformed into a complex multicellular organism.

LEARNING OUTCOMES

- Familiarity with the main model systems used in Developmental Biology
- Familiarity with stages of development in different organisms
- Familiarity with techniques used to analyze gene and protein expression
- Training in scientific writing and scientific presentations
- Familiarity with reading the scientific primary literature
- Understand and be able to explain the use of modern developmental biology techniques
- Demonstrate an understanding of developing hypotheses and designing experiments.
- Communicate, analyze, and discuss experimental results.
- Understand, apply, and evaluate information presented in scientific journals.

TESTING and GRADING:

Your grade is based solely on your performance in the lab. lab. quizzes, reports, power point presentations and the lab. final exam.

The complete DB course is worth 875 points and the lecture part is worth 700 points, leaving 175 for the final (80:20%).

| | |
|----------------------------------|-------------------|
| Lab. Quizzes: | 20 points. |
| Final Lab. exam: | 50 points. |
| Reports: | 40 points. |
| PowerPoint Presentations: | 40 points. |
| Article | 25 points |

SYLLABUS

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 Southgate and I are trying to bring a glimpse of these eye popping changes to you in the “new” Developmental Biology Lab. I am not promising everything will work out perfectly or perhaps not working at all but all of us, you and I, will do our very best to minimize mistakes and to learn from any slip-ups. In this way,

you will begin to truly understand developmental biology processes far beyond than only slides and models in every lab. session, which can lead more likely to pure boredom. As some experiments may fail, there is always a sort of make- up plan, which means the syllabus is very tentative, not only for bad weather but live material availability etc. So, if needed, the order of some of the lab. activities can be switched.

REMEMBER: THIS IS A VERY TENTATIVE SYLLABUS

W 01/13/2016 and F 01/15/2016:

- Lab introduction/Safety
- Some slides and live organisms.

W 01/20/2016 and F 01/22/2016:

- 1) Description and background information on the Planarian experiment over the next 3-4 weeks, that includes Video, Dissection, RT-PCT, + an article **search** on Planaria (Planaria biology, regeneration, stem (neoblast cells) & published max. 4 years ago),
- 2) **Planaria dissection,**
You will need to come by the lab over the next few days to check your animals and take pictures
- 3) Discussion: How to study RNA expression part 1: techniques used to evaluate gene transcription in qualitative and quantitative ways (Northern, microarray, *in situ*, RNAi, etc.).
- 4) Introduction to NCBI databases: **GEO [Gene Expression Omnibus]**, <http://www.ncbi.nlm.nih.gov/geo/> **Exercise in computer room**
[GEO is a public functional genomics data repository supporting MIAME- compliant data submissions. Array- and sequence-based data are accepted. Tools are provided to help users query and download experiments and curated gene expression profiles.

MIAME describes the **Minimum Information About a Microarray Experiment** that is needed to enable the interpretation of the results of the experiment unambiguously and potentially to reproduce the experiment. [[Brazma et al., Nature Genetics](#)]
- 5) Select a Planaria research article, peer-reviewed and full-length, not more than 3 years old.

W 01/27/2016 and F 01/29/2016

- Photograph and collect planaria document regeneration
Practice pipetting and setting up reactions

Discussion: How to study RNA expression part 2:

- RNA sequencing technology experimental design and data output .
- Introduction to Planaria genome webpage: **Smedgb and genome browsers**
Exercise in computer room

- Planarian transcriptome: short oral and paper presentations (random student for each bench (pulling a name out of a hat) to give a brief summary of the article to the lab. members. All students will each make a small /**short** word document of 10 your bench group), **WRITE IN YOUR WORDS I.E. NO COPING OR PLAGERISM.** 10 points.

W 02/03/2016 and F 02/05/2016

- Planarian RT-PCR reaction set up.
- Discussion genomic versus cDNA
- Discussion: How to study RNA expression part 3:
- Analysis of RNA sequencing data through the “green line” (with the help of Dr. Agnes Southgate , who was trained (over 2 weeks) in this new technology last Summer at the Cold Spring Harbor Laboratory on Long Island, NY, a prestigious research and learning center which was founded in 1890. **Exercise in computer room**

SLIDES, MODELS AND MOVIES: GAMETES, FERTILIZATION

W 02/10/2016 and 02/12/2016

- **Bioinformatic exercise due**
- Planarian gel analysis of RT-reactions and wrap up
- SLIDES, MODELS AND MOVIES: CLEAVAGE
- QUIZ FROM LAST WEEK’S LAB. (GAMETES, FERTILIZATION)

W 02/17/2016 and 02/19/2016

- **Planaria report due in this lab. (20 points).**
- SLIDES, MODELS AND MOVIES: GASTRULATION
- QUIZ FROM LAST WEEK’S LAB. (CLEAVAGE)

W 02/24/2016 and F 02/26/2016

- Axolotl retinoic acid experiment

W 03/02/2016 and F 03/04/2016

- Axolotl analysis and observations, image capture

SLIDES, MODELS AND MOVIES: Neurulation.

SPRING BREAK SUN 3/1 TO SUN 3/8

W 03/16/2016 and F 03/18/2016

- **Axolotl report due**
- Chicken lab. Chicken egg dissection, models, movies, and live video capture.
- Chicken IHC staining part 1
- QUIZ FROM TWO WEEK’S LAB. (NEURULATION)

W 03/23/2016 and F 03/25/2016

- Chicken IHC immunostaining part 2

- Organogenesis slides

W 03/30/2016 and F 04/01/2016

- **Chicken IHC report due**
- Organogenesis slides
- QUIZ FROM LAST WEEK'S LAB. (ORGANOGENESIS – last week)).

W 04/06/2016 and F 04/08/2016

- First batch of Powerpoint presentations

W 04/13/2016 and F 04/15/2016

- Second batch of Powerpoint presentations
- Final DBL exam.

REMEMBER: THIS IS A VERY TENTATIVE SYLLABUS !!!!!!!!!!!

There may be different or additional or replacing DBL activities during the semester that will be described on OAKS.

Important dates for the Spring 2016 semester.
Red = need to be remembered

January 2016

Thursday, Jan 7 Spring full semester and Express I classes begin.
Wednesday Jan 13 Last day of Drop/Add for full semester classes.
Monday Jan 18 **Martin Luther King, Jr. Holiday, observed.**
No classes. College closed.
Saturday Jan 30 Designated Storm Make-Up Day (SD).

March 2016

Sunday Mar 6 **Spring Break.**
- Sunday Mar 13
Monday Mar 14 Classes Resume
Full semester Mid Term and Express I final grades due at noon. Mid Term grades available when posted.
Friday Mar 18 **Last day for students to withdraw with a grade of "W" from full semester classes. NOTE: Holds placed by the Treasurer's Office will prohibit students from being able to withdraw in Banner Self-Service. Students should settle the hold with the Treasurer to be able to withdraw online or contact the Registrar's Office by this deadline to withdraw.**
Monday Mar 21 **WA (Withdrawal for Excessive Absences) form may now be submitted by faculty for full semester classes.**
Thursday Mar 31 Spring 2016 course-instructor Evaluations open.

April 2016

Thursday April 21 Last day of full semester and Express II classes.
NOTE: Only classes that normally meet on Mondays should meet on this last Thursday. Reading Day
Saturday April 23 First day of full semester and Express II final exams.
Friday April 29 Last day of full semester and Express II final exams.
Spring 2016 full semester and Express II course-instructor Evaluations close at midnight.

May 2016

Tuesday May 3 **Full semester and Express II final grades due at noon.**
Final grades for full semester and Express II classes available to students on MyCharleston after 5 p.m.
Saturday May 7 Spring 2016 Commencement

July 2016

Friday July 1 Last day for students to submit incomplete undergraduate coursework to faculty for any Spring 2016 class (Spring 60 Day Deadline). Change of grade form to be submitted by faculty.
Friday July 8 Undergraduate missing and incomplete grades for Spring 2016 sessions convert to a grade of "F".

Full information can found on <http://registrar.cofc.edu/pdf/ac-2016spring.pdf>

OAKS: is the learning Management System used by the College of Charleston and is accessed via **mycofc.edu**. It is where you may find the syllabus and supplementary lab.

course material that supplements the text and lecture (PowerPoint slides, answer keys, study guides, etc.).

I will use OAKS to post information and announcements before and after lab. activities. You are, therefore, responsible for **all of** the course's information on OAKS including any reading assignments, articles, movies, class/lab. handouts etc. all of which will be regularly updated on OAKS. This collected information is the basis and source of all questions of DBL quizzes, exams, home assignments, articles, reviews and the final. **Make it a habit to check the site frequently.... for study guides and any new DBL information (check out the "News" section at least once BEFORE the lab. next section. You are also responsible for printing out all lab. protocols.**

If you are not familiar with OAKS or having problems, please let me know, as I can try to help and there is also instructions on OAKS provided at the Library and OAKS TLT.

STUDENT PARTICIPATION IN THE LAB. : Students are expected to help with cleanup after their lab.

and following the strict and standard safety procedures rules in all Research Institutes / Universities / Colleges in the USA and elsewhere.

<http://gricemarinelab.cofc.edu/documents/policies/ssm-lab-safety-policy.pdf>

In the first lab., we will talk of this important CofC safety policy and after having looked at, digested and understood its contents, you and all the other students in this lab. will sign a copy of this policy that I will keep during this semester (and then 2 more years) in my office, in the case that student(s) wish to legally attack the college or myself. Signing this copy of this policy means that the students in this particular lab. activity knew the potential danger of this activity before actually doing experiment (which are luckily pretty minimally in most of the DB labs. but certainly not zero.....), This safety training trains you how to deal with any potential accident (in the DBL and any other future similar situation.

We will talk with more details in the first lab.

College of Charleston Campus Emergencies: 843.953.5611

Non-emergency: 843.953.5609

Department Directory

General Information: 843.953.4980

Crime Action Line: 843.953.49988

Records Coordinator: 843.953.7825

Fire and EMS: 843.953.5499

Hearing Impaired Phone: 843.953.1419

HONOR CODE AND ACADEMIC INTEGRITY

As members of the College community, students are expected to practice a high degree of personal conduct and to respect the rights of all other students, faculty, staff members, community neighbors and visitors on campus. Students are also expected to adhere to all federal, state and local laws.

Faculty members are expected to report violations of the Honor Code or Code of Conduct to the Office of the Dean of Students 843.953.5522.

This means faculty members who did not report such incidents of cheating to the Office of the Dean of Students, are considered to be equally guilty under college laws.

<http://studentaffairs.cofc.edu/honor-system/faculty-guide.php>. Before cheating, be fully aware of the long-term damage on your career if you are found to be guilty.

Students can find a complete version of the Honor Code and all its related processes in the *Student Handbook* at: <http://parkj.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 CofC's SNAP Services, please discuss this with me ASAP at the beginning of the semester to make sure all your rights are delivered.

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

The Developmental Biology (DB) Lab. is combined with the DB classes and is 20% of the total DB course grade (875 points in total, 700 in lectures and 175 points in the labs.

As stated above,

- you are responsible for all material covered or assigned in class or assigned electronically.
- You are responsible to print the lab. procedures except for the lab. 1, I print them for you.
- You should check OAKS regularly for any updates.
- The instructor is to communicate expectations, explain the material, and help you to be the best of his ability. However, the responsibility for learning is upon you, the student.