INSTRUCTORS

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TEACHING ASSISTANT

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Office hours: there is usually enough time to deal with most issues during lab, but meetings can be scheduled at other times if required, e-mail Instructor or TA to arrange (both Instructor and TA’s labs are in the LSA which is always locked so you need to make an appointment). Questions about anything can be e-mailed at any time to either Instructor or TA.

COURSE OBJECTIVES

This course is designed to familiarize students with experimental approaches used in developmental biology. This will be accomplished through a series of laboratory exercises introducing five of the model systems used by developmental biologists: the chick, Caenorhabditis elegans, the sea urchin, zebrafish and Drosophila. Labs will be devoted to each of these species giving you the opportunity to observe and perform experiments on real embryos, allowing you to compare embryonic development in these different model systems and to judge the advantages (and disadvantages) of each. The majority of the labs will concentrate on the fruit fly, Drosophila melanogaster. This will allow you to become very familiar with one model system and to perform some of the classic experiments used to uncover the genetic and molecular basis of development in this organism. Other objectives of this course are for you to learn proper laboratory technique, record keeping, and how to interpret experimental results.

LABORATORY SCHEDULE AND LOCATION

Monday OR Wednesday 1:00 – 4:50 PM A148 Langley Hall
TEXT BOOK

There is no assigned text book. The book used for the lecture course, Principles of Development, by Lewis Wolpert, will help in understanding the subjects covered in these laboratory classes. For those who do not still have their copy, several will be available on reserve in the Langley library.

E-MAIL COMMUNICATION AND COURSEWEB

The Instructor and TA will contact you via your official Pitt e-mail so that it is important that you read this regularly and make sure that you are not over quota. The official Pitt e-mail communication policy is as follows:

Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to http://accounts.pitt.edu, log into your account, click on Edit Forwarding Addresses, and follow the instructions on the page. Be sure to log out of your account when you have finished. (For the full E-mail Communication Policy, go to www.bc.pitt.edu/policies/policy/09/09-10-01.html.)

A Courseweb site is available for this course and will be used to post announcements, laboratory protocols, additional materials, and grades. The website is: http://courseweb.pitt.edu, and this course should be listed on your opening page. If you have any problems entering the site or if this course is not listed you should get in touch with the help desk (624-HELP). Some of the files on this site may be fairly large so be aware. **Before each class you must download and print out the handout for the next lab and read it.** Copies of the handout will not be available in lab (unless the handout has been posted late).

LABORATORY STRUCTURE

**Quiz**
A short quiz may be given at the beginning of class, primarily on the protocol for the lab.

**Lectures**
There will be a brief lecture given at the beginning of each laboratory section. The purpose of this lecture is to provide background information and outline the laboratory protocol for that day’s experiments.

**Experiments**
Methods and additional information for all experiments will be posted on Courseweb before the respective laboratory session. It is your responsibility to download these, print them out and read them before coming to class.
Discussion of results
Initially you will discuss your results and any questions you have been given with fellow students. Then the whole class will discuss that day’s experiments.

Cleanup
When you are finished with an experiment, it is your responsibility to clean your bench space. This means; put away any reagents that you have out, throw out any disposable materials you have used and dispose of any biological materials appropriately (see note on garbage below), and wipe off your bench with a damp paper towel. Some equipment such as forceps and pipettors must be handed back to the instructor or TA before you leave. Microscopes must be replaced in the storage room.

FINAL GRADE
Your final grade will be based on the following categories (details of these categories can be found below):

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Reports</td>
<td>50%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Laboratory Performance and participation</td>
<td>40%</td>
</tr>
</tbody>
</table>

LABORATORY REPORTS
You will write a report for each of lab or for a pair of labs. Your reports will contain a record of everything you do and should have the following format:

Although you are encouraged to talk to your partner and other students in the class about your results and how you might write up your report, your own report is your own work and you should not work together on the actual write up and you should not show your report to anyone else in the class. Plagiarism is not always copying the same words as someone else, saying exactly the same thing using slightly different words also constitutes plagiarism.

(1) A loose-leaf binder. Ideally this would be a hardbound notebook, but the loose-leaf format makes it possible to have labs graded without handing in everything. Each lab should be separated by a divider, with the divider labeled with the lab above it.
(2) Each page in your binder must be labeled in the top right hand corner with your name, the number of the lab and the date. When the lab is complete, number each page on the bottom.
(3) There must be four sections to each of your reports: Introduction, Methods, Results and Discussion.
(4) Reports must be printed.
(5) **Introduction.** The first page of each lab report is an introduction outlining what you are going to do and why. Most of the information required can be found in the introduction of the handout for each lab, but
the introduction to your own report must be written by yourself, and not simply copied from the handout. This should not include any details of the results or any discussion of the results. This can and probably should be completed before you come to lab.

(6) **Protocol.** This will be a direct photocopy or print out from your handout. You should write any modifications to the protocol, any problems encountered or other notes directly onto the copy; if there is insufficient space, put these on a separate sheet (handwritten). These notes must be legible to both yourself and anyone else. The intention is for you to be able to repeat the experiment at some time in the future, so you should make any notes you feel are required for you or anyone else to do this.

(7) **Results/Observations.** The Results section should present your data. Data may be presented visually in whatever form is appropriate: usually diagrams and photographs (which you may take yourself or which may be provided for you by the Instructor or TA). These should be labeled and you should write a legend. **THE RESULTS SECTION MUST INCLUDE A SECTION OF TEXT DESCRIBING YOUR RESULTS AND OBSERVATIONS (AND REFER TO ANY DIAGRAMS/PHOTOS YOU HAVE INCLUDED). A SERIES OF LABELLED DIAGRAMS/PHOTOGRAPHS IS NOT SUFFICIENT!** This should be written during class (and thus must be in your own handwriting), although additional comments can be included after lab.

(8) Any drawings must be made on unlined paper in pencil (this includes any labels).

(9) You need to include photos you have taken during lab in your final report. Consequently you should bring a USB drive to lab so that you can take your photos home with you.

(10) For those of you with little experience of including photos in reports, you can use the following instructions (I will assume you are using Microsoft Word): (i) In your report file navigate to the place where you want your photo to be inserted (on a new line). (ii) Go to the Insert menu, then Picture then From file.. then find your photo file on your USB drive and it will be inserted (you must have saved your file as a JPEG). You can resize the photo very simply by clicking on it once, whereupon you will get a box around the image, just click on the edge of the box and drag to resize.

(11) **Discussion and conclusions.** The discussion should include an interpretation of your results. Much of this will be covered during class, either with individual discussions with the instructor or TA or in any group discussions at the end of the class. It is to your advantage to make sure you understand what is being discussed during each class **AND MAKE NOTES DURING THE CLASS DISCUSSIONS!** If, at the end of class, you still do not understand what you have been doing you should talk to the instructor or TA.

It is important that you include only the appropriate information in each section. Students often have a problem deciding what should be in the Results and what should be in the Discussion (and often the distinction can be blurred), but you will be given guidance after each of your reports and discuss any comments with your Instructor or TA. Inappropriately organized or overly verbose reports will be marked down. In all sections, be concise and avoid inclusion of extraneous information. You will be graded on the quality of your material not the quantity.

The reports for each lab should be sufficient so that you could refer back to them in a few years and repeat the experiment (without making the same mistakes!). It is essential that you get into the habit of writing things down as you do them – if you wait you will forget. It may not be possible to complete each class on the same day as additional results or photographs may not be available until the following day or the following
class. These records for each lab are not meant to be a perfect, publication quality documents, but should be legible and as organized as possible.

It will not be necessary to have a single report for each lab: sometimes 2 labs can be written up as one and you will be informed when this is the case.

A schedule for handing in completed labs for marking is given in the general schedule for the class. Completed labs MUST be handed in within a manila folder (or equivalent - you will need at least three in case there is a delay in grading) labeled clearly with your name, on the date shown in the schedule. In general, a lab report is due to be handed in the next week during lab. However, if you have problems writing a report, you can discuss this during lab next week, but must have the lab written up in two days. Labs that are handed in late without prior notification and agreement of the Instructor will be graded down and possibly not graded at all.

When you get your reports back you should look over them when you have some free time during lab and then briefly discuss your report with the Instructor or TA (depending upon who graded the report).

LABORATORY PERFORMANCE

The Instructor and TA will assess the experimental technique and quality of results of each student.

PARTICIPATION

You will be expected to contribute to any discussions we have whether they are during the initial lecture, at the end of class or during class in smaller groups. If you do not say anything during all the labs you will get no marks for this section. For some labs, the results of that day’s experiments will be reported by different groups; your performance here will also go towards your Participation grade.

ATTENDANCE

Attendance is mandatory for each class, from the beginning until the end. A grade of zero will be given for reports, performance and participation for any lab that is missed, unless a valid excuse is provided. A request to be excused must be made in writing within one week of the missed session, detailing the reason for absence and must be accompanied by written external documentation such as a doctor’s note or an invitation letter for interview at medical school. The instructor will decide whether a request for excuse will be given. If an excuse is granted the final grade will be based proportionately on the laboratories completed. No more than three labs can be missed whatever the reason.

LABORATORY SAFETY

There are inherent dangers in all laboratories. The following rules are designed to minimize these dangers and will be strictly enforced.

Attire — Shorts and sandals/opened toed shoes are not permitted.
Protective gloves will be provided and must be worn when handling hazardous materials. It is very important that you realize the gloves are to protect you from hazardous chemicals – but, if your gloves become contaminated with these chemicals they can then spread them around the lab. Consequently, you must immediately dispose of gloves that have become contaminated. And you must never touch equipment that you will touch with your bare hands, such as your microscopes, with gloves, as they may be contaminated. Also, gloves must be discarded before you leave the lab, this includes leaving to go into the microscope room (i.e. no gloves in the microscope room).

Eating, drinking, and smoking are not permitted.

Glass and other "sharps" (e.g., needles and razor blades) must be disposed of in the waste containers provided, not in the regular trash.

**SOME LABORATORY INFORMATION**

**Partners** – Each of you will choose a partner to work with in each lab.

**Coats, backpacks etc.** – Please hang your coats up on the hooks by the door; you can also leave your backpacks there also, so that all you need to bring into the lab will be your binder and writing materials.

**Lab number** – Each pair will be given a number, remember this because you should label all your experimental material with this number.

**Discussion groups** – Each group will comprise all the students on a single bench (i.e. two pairs). When you have finished your experiments, or even while you are doing them, you should discuss your results and any questions posed by the Instructor. Each group will be assigned at least one task/question that they must attempt to complete/answer in the class discussion.

**Garbage** – Please ensure you dispose of garbage in the appropriate cans. Glass and other "sharps" go in the broken glass box), biological waste goes in red bags (but please ask what is defined as ‘biological’ waste before using these red bags).

**Microscopes** – Each pair will have use of a dissecting and compound microscope. These are numbered: use the same microscope each week.

**Micropipettors** – Each pair will have use of a set of four micropipettors. These are numbered: use the same set each week and return them to the TAs or instructor before you leave each week.

**Forceps** – Each pair will have use of a set of four pairs of dissecting forceps, two good, fine pairs and two less fine ones. Each of these is numbered: use the same set each week and return them to the TAs or instructor before you leave each week.

**Attire** – Some labs may be messy so dress appropriately (wear old clothes or lab coats).

**Cell phones** – These must be switched off during the lecture at the beginning of class and the discussion at the end (off means off).

**ACADEMIC INTEGRITY AND STUDENT CODE OF CONDUCT**

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity: Student Obligations. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in
the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy.

Although you will be working closely with a partner, and your reports may contain the same data, this does not mean that the rest of your reports should be exactly the same. Think for yourself. You should, of course, discuss your results or interpretations with the instructor, TA, or fellow students. See additional comments above on what may constitute plagiarism in lab reports.

*Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of Turnitin.com page service is subject to the Usage Policy and Privacy Pledge posted on the Turnitin.com site.*

**STUDENTS WITH DISABILITIES**

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 216 William Pitt Union, (412) 648-79890/(412) 383-7355 (TTY), as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.
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<thead>
<tr>
<th>DATE</th>
<th>LAB</th>
<th>EXPERIMENT</th>
<th>DEADLINES</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td>No Lab</td>
<td></td>
</tr>
<tr>
<td>9/11</td>
<td>1</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>16/18</td>
<td>2</td>
<td>Martin Luther King Day (No Lab Monday or Wednesday)</td>
<td></td>
</tr>
<tr>
<td>23/25</td>
<td></td>
<td>C. elegans</td>
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<tr>
<td>30/1</td>
<td>3</td>
<td>Chick I</td>
<td>Laboratory report for labs 2 to be handed in for grading.</td>
</tr>
<tr>
<td>6/8</td>
<td>4</td>
<td>Chick II</td>
<td></td>
</tr>
<tr>
<td>13/15</td>
<td>5</td>
<td>Zebrafish I</td>
<td>Laboratory report for labs 3/4 (single report) to be handed in for grading</td>
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<tr>
<td>20/22</td>
<td>6</td>
<td>Zebrafish II</td>
<td></td>
</tr>
<tr>
<td>27/29</td>
<td>7</td>
<td>Sea Urchins</td>
<td>Laboratory report for labs 5/6 (single report) to be handed in for grading</td>
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<tr>
<td>4-11</td>
<td></td>
<td>Spring break (No laboratory)</td>
<td></td>
</tr>
<tr>
<td>12/14</td>
<td>8</td>
<td>Genetic regulation of embryonic development in <em>Drosophila</em> I. Zygotic segmentation genes.</td>
<td>Laboratory report for lab 7 to be handed in for grading</td>
</tr>
<tr>
<td>19/21</td>
<td>9</td>
<td>Genetic regulation of embryonic development in <em>Drosophila</em> II. Maternal effect genes.</td>
<td>Laboratory report for lab 8 to be handed in for grading</td>
</tr>
<tr>
<td>26/28</td>
<td>10</td>
<td>Genetic regulation of embryonic development in <em>Drosophila</em> III. Homeotic genes.</td>
<td>Laboratory report for labs 9 to be handed in for grading</td>
</tr>
<tr>
<td>2/4</td>
<td>11</td>
<td>Genetic regulation of wing development in <em>Drosophila</em> I.</td>
<td>Laboratory report for lab 10 to be handed in for grading</td>
</tr>
<tr>
<td>9/11</td>
<td>12</td>
<td>Genetic regulation of wing development in <em>Drosophila</em> II.</td>
<td>Laboratory report for lab 11 to be handed in for grading</td>
</tr>
<tr>
<td>16/18</td>
<td>13</td>
<td><em>Drosophila</em> oogenesis.</td>
<td>Laboratory report for lab 12 to be handed in for grading</td>
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*NOTE: THIS SCHEDULE MAY BE MODIFIED DURING THE SEMESTER, YOU WILL BE NOTIFIED OF ANY CHANGES*