BioS 321 Developmental Biology Laboratory
Spring 2014- CRNs 34248, 34249
Location: 3068 SEL

Instructor:
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Office hours for Instructor or TAs are by appointment.

Course Description:
This course is designed as an upper level laboratory course in developmental biology. The laboratory course will be an intensive exposure to the principles and techniques used in developmental biology with an emphasis on classical experiments. Different model organisms will be used in these experiments: Drosophila, C. elegans, sea urchin, Hydra, and Planarian.

Course Objectives:
This is an advance developmental biology laboratory course that builds on the basic techniques taught in the BioS 200-level lecture courses. This course will give the students hands on exposure to advanced developmental biology techniques and principles. Additionally, they will learn scientific communication both written and oral.

Materials:
Textbook- There are no formal textbooks for this course. The following textbooks are suggested as resources for background information to help understand the concepts behind the experiments: "Principles of Development” by Lewis Wolpert and Cheryll Tickle (ISBN 978-0-19-95542-87) or “Developmental Biology” by Walter Gilbert (ISBN 978-0-87893-384-6).

Laboratory Notebook- In this course, a LabArchives electronic laboratory notebook (ELN) will be maintained as part of the course. The fee for the ELN is $15.00. All laboratory experiments will be provided via LabArchives along with supporting materials and research articles related to the experiments. The ELN will be introduced the first week of the course.

iClicker- Available at the UIC bookstore. You must register your iClicker through Blackboard site for this course.

Grading:
Research Papers (2 X 120 pts) 240 pts
Lab Notebooks (10 X 40pts) 400 pts
Exam 1 100 pts
Exam 2 100 pts
iClicker points 110 pts
Class Participation 50 pts
Total 1000 pts
Extra credit points can be earned by volunteering to perform laboratory experiments outside the normal class time (maximum 10 points).

**Grading Scale:**
Total points earned in the course:
- 900-1000 A
- 800-899  B
- 700-799  C
- 600-699  D
- 0-599  F

**Research Papers:**
There will be two written assignments (Research Papers) during the semester related to two projects performed in laboratory. Instructions for these assignments will be posted to LabArchives and explained in class. Research papers are related to the experiments you performed in class. Research papers are 5-6 pages with an abstract, introduction, results and discussion section. Tables and Figures are not counted in your page count.

**Laboratory Notebook:**
All students will be required to keep an electronic laboratory notebook (ELN) via LabArchives. LabArchives ELN will be explained during the first week of the laboratory. These lab notebooks are very important and are a record of the experiments performed. The notebooks will be graded throughout the semester. There will be 11 graded laboratory notebook entries. The lowest grade earned for the laboratory entries will be dropped. The laboratory notebook entries are worth 40 points with the points divided into 5 pts for Purpose, 10 pts for Pre-Lab, 10 pts for Results and 15 pts for conclusions. The Purpose and Pre-lab entries will be due before the experiment begins, Results will be due in class at end of experiment and Conclusions will be due the Sunday (at noon) following the completion of the experiment. Due dates will be posted to LabArchives. There are no make-up labs.

**Late Assignments:**
Late assignments and ELN entries (i.e. work turned in after the due date/time) will be accepted but will be penalized. Five points will be deducted for each day that the assignment is late. This includes assignments that are forgotten on the day the assignment is due. All days of the week are included in the late policy (including Saturday & Sunday).

**Exams:**
Exam materials will cover in-lab lectures/discussions, reading assignments, and laboratory experiences. The primary focus of exams in a course of this nature is in problem solving and the demonstration of critical thinking skills.

**iClicker points:**
An iClicker remote will be used during the lecture part of each lab. A total of 110 points can be earned with the iClicker. The iClicker is a response system that allows you to respond to questions posed during class. You will be graded on that feedback (the proportion of
correct responses from the total questions posed adjusted to a 110 point scale). iClicker will be used in most lectures but the number of questions asked may vary from class to class. You are responsible for bringing your iClicker remote to class daily and making sure that it is working properly. If you forget to bring your iClicker to class you will not receive any iClicker points for that class. The score of one iClicker session will be dropped when calculating the final total of points.

**Research Participation:**
Students must demonstrate an effort in actively participating and conducting your laboratory experiments in an accurate and timely manner. Students will be graded on their attendance, performance and outcome of experiments. Students are expected to come to class prepared for discussion of experimental design and will loose points if not prepared. Students that do not participate or neglect their research projects will loose points. Approximately two points are earned for each lab session.

**Laboratory Safety:**
- **NO eating or drinking is allowed in the laboratory**
- **Attire**- shorts and sandals/open toes are not permitted
- **Protective clothes**- lab coats or old an old shirt are highly recommended
- **Protective gloves**- will be provided and MUST be worn when handling hazardous materials
- **Glass** must be disposed of in the glass disposable box (Do NOT put glass in the regular garbage).
- **“sharps” (razors blades, needles)** must be disposed of in the red sharp containers. (Do NOT put “sharps” in the regular garbage).
- **Organic waste** must be collected in a separate container and NOT disposed down the sink
- **Biological waste** must be disposed into the red biohazard bags.

**Disability Resource Center:**
Concerning disabled students, the University of Illinois at Chicago is committed to maintaining a barrier-free environment so that individuals with disabilities can fully access programs, courses, services, and activities at UIC. Students with disabilities who require accommodations for full access and participation in UIC Programs must be registered with the Disability Resource Center (DRC). Please contact DRC at 312-413-2183 (voice) or 773-649-4535 (Video Phone) 312-413-7781 (Fax).

**Course Policies in Accordance with University and College Policies:**
**Enrollment:**
Students may earn academic credit only for courses in which they are properly registered. *Officially enrolled students will be listed on the class roster. Students will not be permitted to attend any course unless they are officially enrolled.*

**Course Drops:**
Students may drop courses and/or terminate their enrollment status consistent with University and college deadlines. To officially drop a course, a student must use the web-
Based Web for Student System to enter the drop request no later than the first two weeks of the Spring Semester. Students may drop courses through the tenth week with College permission. For courses dropped after the second week of the semester, a grade of W will appear on the student's record. A student who fails to officially drop a course may be assigned a grade of F.

Attendance:
The University expects students to attend all class sessions and to arrive promptly. The University expects instructors to be reasonable in accommodating students whose absence from class resulted from: (1) participation in University-sanctioned activities and programs (Written letter of absence is needed from program coordinator); (2) Observance of University recognized religious holidays (notification by the 10th day of the term), (3) personal or family illness and/or other compelling circumstances (detailed documentation is required). In all scheduled absence from class, the instructor should be notified at least a week in advance if feasible. Sudden absences require notification by email to the instructor.

Academic Integrity:
University of Illinois at Chicago is a community of scholars committed to developing educated persons who accept the responsibility to practice personal and academic integrity. You are responsible for knowing and following the university's student honor code, Student Academic Integrity Policies and Procedures, including plagiarism.

Academic dishonesty includes, but is not limited to:
1. Cheating. Either intentionally using or attempting to use unauthorized materials, information, people, or study aids in any academic exercise or extending to or receiving any kind of unauthorized assistance on any examination or assignment to or from another person.
2. Fabrication. Knowing or unauthorized falsification, reproduction, lack of attribution, or invention of any information or citation in any academic exercise.
3. Academic dishonesty/plagiarism. Intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise.
4. Bribes, favors, thefts. Bribing or attempting to bribe, promising favors to or making threats against, any person, with the intention of affecting a record of a grade or evaluation of academic performance. Any conspiracy with another person who then takes or attempts to take action on behalf of or at the direction of the student.
5. Examination by proxy. Taking or attempting to take an exam for someone else other than the student is a violation by both the student enrolled in the course and the proxy or substitute.
6. Grade tampering. Any unauthorized attempt to change, actual change of, or alteration of grades or any tampering with grades.
7. Non-original works. Submission or attempt to submit any written work authored, in whole or part, by someone other than the student. This is plagiarism.

Cell Phone:
As a member of the learning community, each student has a responsibility to other students who are members of the community. When cell phones or pagers ring and
students respond in class it disrupts the class. All such devices must be put in a silent (vibrate) mode and stowed away in your bag/coat and left at the coat rack. A laboratory class is long and it may have times when you are in an incubation period. If you want to briefly check your phone, you must leave the laboratory and check your phone in the hallway. We will ask you to put your cell phones away if we see them at your laboratory bench.

**Laptops:**
We ask that students ONLY use laptops for taking notes, making entries into the ELN or research related to this course.
**Course Outline**

(This is a tentative schedule and may change due to progress in the experiments. Exam dates and are NOT subject to change and will be given on the designated date.)

<table>
<thead>
<tr>
<th>DATE</th>
<th>Research Plan</th>
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| **W1** 1/11 | INTRODUCTION TO COURSE  
- Laboratory notebook, lab reports, exams  
- Introduction to the microscope |
| 1/13 | • Working with LabArchives  
• Pipetting and Micro-pipetting Practice |
| **W2** 1/18 |  
- NO Class- MLK |
| 1/20 | • Writing a figure legend  
• Writing a Research Paper |
| **W3** 1/25 | *Drosophila* EMBRYOGENESIS  
- DAPI staining of nuclei to examine different embryonic stages |
| 1/27 | • Image DAPI stained embryos |
| **W4** 2/1 | EXPRESSION OF *Drosophila* SEGMENTATION GENES  
- Enhancer trap-LacZ expression of segmentation genes |
| 2/3 | • Image-enhancer trap-LacZ expression of segmentation genes |
| **W5** 2/8 | ANALYSIS OF *Drosophila* SEGMENTATION MUTANTS  
- Analysis of mutant phenotypes by changes to cuticle |
| 2/10 | • Image- *Drosophila* segmentation mutants cuticle |
| **W6** 2/15 | SEA URCHIN DEVELOPMENT  
- Fertilization, radial holoblastic cleavage |
| 2/17 | • Image- sea urchin development |
| **W7** 2/22 |  
- Image- sea urchin development  
*C. elegans*- INTRODUCTION AND EXAMINATION OF P GRANULES  
- Examination of germ-line specific P granules |
| 2/24 | • Image- P granules in *C. elegans* |
| **W8** 2/29 | *C. elegans*- EXAMINATION OF ACTIN ORGANIZATION  
- Phalloidin staining of cytoskeleton |
| 3/2 | • Phalloidin staining of cytoskeleton  
• EXAM 1 |
| **W9** 3/7 | *C. elegans* MUSCLE DIFFERENTIATION  
- GFP-reporters examine gene expression in living embryos |
| 3/9 | • Imaging of GFP-reporters |
| **W10** 3/14 | CHARACTERIZATION OF *C. elegans* GENES IN DEVELOPMENT  
- Effects of RNAi on pharyngeal muscle development |
| 3/16 | • Effects of RNAi on pharyngeal muscle development |
| 3/21-3/25 | **SPRING BREAK** |
| **W11** 3/28 | *Drosophila* APPENDAGE FORMATION- IMAGINAL DISCS  
- Enhancer trap-LacZ expression in imaginal discs |
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<tr>
<th>3/30</th>
<th>• Enhancer trap-LacZ expression in imaginal discs</th>
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<tbody>
<tr>
<td><strong>W12</strong> 4/4</td>
<td>FUNCTIONAL ASSAY USING UAS/GAL4 IN <em>Drosophila</em></td>
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<tr>
<td></td>
<td>• UAS/Gal4 in <em>Drosophila</em></td>
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<td>4/6</td>
<td>• UAS/Gal4 in <em>Drosophila</em></td>
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<tr>
<td><strong>W13</strong> 4/11</td>
<td>Examine adult flies from UAS/Gal4 in <em>Drosophila</em></td>
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<td>REGENERATION IN PLANARIA</td>
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<td></td>
<td>• Regeneration and neoblasts</td>
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<tr>
<td>4/13</td>
<td>• Regeneration and neoblasts in Planaria</td>
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<tr>
<td><strong>W14</strong> 4/18</td>
<td>• Regeneration by neoblasts</td>
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<tr>
<td>4/20</td>
<td>• Review</td>
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<tr>
<td><strong>W15</strong> 4/25</td>
<td>• Laboratory Practical Exam</td>
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<tr>
<td>4/27</td>
<td>• Written Exam</td>
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