

# ZOO 4603C - Embryology & Development - Fall 2015

Section 0001: WF 09:00 - 10:20 am Lecture (BA1-209)  
Section 0011: WF 11:00 - 12:50 pm Laboratory (BIO 304)

5 Credits

**Instructor:** Dr. Cynthia Bayer  
**Email:** [Webcourses@UCF](mailto:Webcourses@UCF)  
**Phone:** 407-823-1460

**Office (BIO 202D) Hours:** Tues 12:00 - 2:00 pm  
Thurs 12:00 - 2:00 pm  
Fri 1:00 - 2:00 pm

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**Course objectives:** We will study the mechanisms of morphological change during animal development considering examples of developmental processes in several animal model systems. The cellular, molecular, and genetic basis of animal development through different stages, from gametogenesis to organogenesis, will be examined. The laboratory will consist of microscopic examination of different stages in early embryonic development in frog and chick. We will also observe and conduct experiments with several living organisms representing model systems used in the study of developmental processes.

**Prerequisites:** A grade of C or better in PCB 3063 (General Genetics) and PCB 3023 (Molecular Cell Bio) or PCB 3522 (Molecular Biology I). Some topics covered in PCB 3063 and PCB 3023 may be reviewed briefly in this course, but not discussed in depth.

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## Required Textbooks:

Developmental Biology, 10<sup>th</sup> ed., Scott F. Gilbert (2014) Sinauer Assoc. Inc. Publ. [www.sinauer.com](http://www.sinauer.com)  
Available as Casebound (hardcover), binder ready Looseleaf Textbook, or as an eBook.  
Casebound - ISBN: 978-0-87893-978-7  
Looseleaf - ISBN: 978-1-60535-192-6

A Photographic Atlas of Developmental Biology. Shirley J. Wright, 2005. Morton Publishing  
Looseleaf - ISBN: 978-0-89582-629-9 <http://www.morton-pub.com>

**Required i>clicker:** We will be using the i>clicker classroom response system on a regular basis. You will need to purchase an i>clicker remote and bring it with you to every class lecture. It would be wise to bring extra batteries as well, as we will use the remotes in activities that count for class points. The purchase of a remote is NOT optional; it will be used as an integral part of this course. You must register your remote for this course no later than **SEPT 2, 2015**. TO REGISTER: in **Webcourses** click on the i>clicker tab. Follow the instructions to type in your clicker ID (which is directly under the barcode on the back of your remote). You may use either the original multiple choice-only **i>clicker**, **i>clicker+**, or the alphanumeric-capable **i>clicker2** remote, as I will only utilize multiple-choice responses to questions in this course.

## Academic Activity:

All faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete the **Syllabus Quiz** on our Webcourses site by **5:00 pm AUG 28, 2015**. Failure to do so may result in a delay in the disbursement of your financial aid.

**Course website & Communication:** Access our course website at [Webcourses@UCF](mailto:Webcourses@UCF) via the myUCF portal using your NID and password. There you will find a folder of **Lecture PPTX** and **Lab Handouts** for you to print and bring to lecture and laboratory sessions. I will use the **Inbox** link to the **Conversations** page at our Webcourses site for communication with students.

**Classroom Conduct:** By enrolling at UCF, all students have agreed to abide by the *Golden Rule*. Please become familiar with this document at: <http://www.goldenrule.sdes.ucf.edu/> It is assumed that all students will act in a mature manner in the classroom showing consideration for their peers and the instructor. Please also use common courtesy in class by arriving and departing on time, refraining from talking during class, and silencing cell phones and other electronic devices.

**Grading:**     **90%** = best 5 out of 6 lecture/lab exams  
                  **10%** = i>clicker points - class participation = 3 pts.  
                                - graded questions, correct = 1 pt. incorrect = 0.25 pt.

There will be 3 lecture exams, 2 laboratory exams, and a comprehensive lecture/lab final exam, each worth 100 points. Lecture exams will be based only on material covered in lecture, which includes topics not covered in the textbook. Some notes and diagrams presented in lecture are not included in the PowerPoint slides available at the Webcourse website. Therefore, students who routinely skip lectures will be at a significant disadvantage. Lab exams will test your knowledge of the prepared specimens observed during laboratory sessions, and your exam grade will reflect the amount of time you spend in lab studying these specimens.

- Exam scores will be posted on the Grades page at the Webcourses site. **90%** of your course grade will be based on the **best 5 out of 6** exam scores. The score of the final exam will be dropped if it turns out to be the lowest of your scores, or you may choose not to take the final exam. The points earned from i>clicker class participation and graded questions will comprise **10%** of your course grade. Flat letter grades for the semester will be awarded according to the scale below. These grade ranges will be strictly adhered to with no exceptions. There will be **no curving** of final course grades. **NOTE: this is a 5-credit course.**

90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, below 59%= F

**Missed Lecture Exam Policy:** If you miss an exam for any reason, that exam will receive a score of 0 and will be the exam that is dropped from the final grade calculation. If you miss a second or subsequent exam, you must provide acceptable documented evidence from an appropriate authority (doctor, police, judge, etc.) that circumstances beyond your control prevented you from taking the exam, or that you were required to participate in official UCF business. A doctor's note must be on letterhead with a contact phone number, and must indicate that a medical condition was treated. Documented evidence must be presented to me within 24 hours of the start of the exam. Under these circumstances, a make-up exam will be given following the final exam or at a mutually convenient time to be arranged. In the absence of acceptable documentation, a grade of 0 will be assigned for a 2<sup>nd</sup> or subsequent missed exam.

**Missed Laboratory Exam Policy:** Because of their format, there is NO opportunity for a make-up laboratory exam, so be sure not to miss Lab Exam 1 or Lab Exam 2. Your absence will result in your earning a grade of 0 for the missed exam.

**Taking Exams:** All electronic devices must be inaccessible during exams. Use or display of any unauthorized electronic device will result in a zero for the exam, referral to the Office of Student Conduct, and a "Z Designation" on the student's official transcript (see below). All exams will use scantrons that will be provided to each student. It is your responsibility to bubble in the scantron answers completely with a #2 pencil and erase clearly. If you arrive late to an exam, you will be allowed to take the exam. However, you must turn in the exam paper at the regular scheduled end of the exam. You will not be allowed extra time unless a documentable emergency has occurred (see above).

**Academic Integrity:** As reflected in the UCF creed, integrity and scholarship are core values that should guide our conduct and decisions as members of the UCF community. Plagiarism and cheating contradict these values, and are serious academic offenses. Penalties can include a failing grade in an assignment or in the course, suspension or expulsion from the university, or a "Z Designation" on a student's official transcript indicating academic dishonesty (see <http://z.ucf.edu/>). A student caught cheating will immediately be referred to the UCF Disciplinary Action Committee at the Office of Students Conduct <http://www.osc.sdes.ucf.edu/>.

**Reviewing Exams:** Scantrons will not be returned to students. Individual test report sheets with all correct and incorrect responses marked on it will, however, be available. Scores will be posted at our Webcourses site. Exam papers and scantrons can be reviewed during regularly scheduled office hours, for the period of time up until the next exam (e.g., exam 1 can be reviewed up until exam 2 is given).

**Course Accessibility:** It is my goal that this class be an accessible and welcoming experience for all. If anyone believes the design of this course poses barriers to effectively participating and/or demonstrating learning in this course, please meet with me (with or without a Student Accessibility Services (SAS) accommodation letter) to discuss reasonable options or adjustments. You may also want to contact SAS <http://sas.sdes.ucf.edu> (Ferrell Commons 185; 407-823-2371) to talk about academic accommodations.

**Important Academic Dates:**

Aug 24	Classes begin
Aug 27	Drop/Swap deadline
Aug 28	Add deadline
Nov 2	Withdrawal deadline
Dec 7	Classes end
Dec 9-15	Final Exam Period
Dec 11	ZOO 4603C Final Exam 7:00 - 9:50 am (Exam Day 3)
Dec 18-19	Commencement
Dec 21	Grades Available on my UCF

**Holidays:**

Sept 7	Labor Day (Mon)
Nov 11	Veteran's Day (Wed)
Nov 26-28	Thanksgiving Break

**Schedule of Lecture Topics**

**Textbook Chapter  
Developmental Biology Gilbert 10<sup>th</sup> ed.**

Developmental Anatomy and Specification	1
Gametes & Fertilization	4
Early Development in Invertebrates	5, 7
<b>Exam 1 - Sept 25</b>	
Early Development in Amphibians	8
Early Development in Birds and Mammals	9
Ectodermal Derivatives	10, 11
<b>Exam 2 - Oct 28</b>	
Mesodermal & Endodermal Derivatives	12, 13
Sex Determination & Germ line Differentiation	15, 17
Postembryonic Development	16
Early Development & Axis Specification in <i>Drosophila</i>	6
<b>Exam 3 - Dec 4</b>	
<b>Final Exam - Dec 11</b>	Comprehensive

## Laboratory Schedule

Dates	Topics	Lab Manual References (pages) Wright's Atlas of Developmental Biology
Aug 26	Lab 0. Introduction and distribution of slides	Handout
Sept 2 & 4	Lab 1. Frog cleavage, gastrulation, & neurulation	77-80, 95-96, 109-115
Sept 9 & 11	Lab 2. 4 mm frog	143-150
Sept 16 & 18	Lab 3. 7 mm frog	156-161
Sept 23 & 25	Lab 4. 10 mm frog	162-169
Sept 30 (Wed)	Review for Lab Exam 1	
Oct 2 (Fri)	<b>Lab Exam 1</b> (frog embryology)	
Oct 7 & 9	Lab 5. <i>Experimental</i> : Sea urchin fertilization	Handout
	Lab 6. <i>Experimental</i> : Live 11 mm frog embryos	Handout
Oct 14 & 16	Lab 7. Chick cleavage, gastrulation, & neurulation	80-83, 96-101, 116-123
Oct 21 & 23	Lab 8. 33-hr chick	171-191
Oct 28 & 30	Lab 9. 48-hr chick	194-199
Nov 4 & 6	Lab 10. <i>Experimental</i> : Set up planarian regeneration	Handout
	Lab 11. <i>Experimental</i> : Live chick embryos	Handout
Nov 11 (Wed)	VETERAN'S DAY = no class	
Nov 13 (Fri)	Lab 12. 72-hr chick	201-209
Nov 18 (Wed)	Review for Lab Exam 2	
Nov 20 (Fri)	<b>Lab Exam 2</b> (chick embryology)	
Nov 25	Finish planarian regeneration & checkout slides	

*Attendance is mandatory for the 4 Experimental Laboratories.* Each unjustified absence from these labs will result in a 2% reduction of your final cumulative score. With the exception of the 4 *Experimental Laboratories*, lab attendance is optional. On regular weeks, the Wednesday lab session will begin with a lecture describing the objectives for the week. After that, students will proceed to examine prepared specimens for the remaining of the lab time for that week. Students may study individually (using individual microscopes) or in small groups (using microscopes equipped with flatscreen monitors). The time spent in lab is entirely up to the student's discretion. However, be mindful of the fact that your lab exam grades will correlate with time spent in lab. Many students in the past have performed well on the lecture exams but have missed out on earning an A as their course grade because they did not put enough effort into their lab work. Remember that the lab will amount to 40% of your final course grade.

You will examine prepared specimens of sequential stages of frog and chick embryonic development. Most of these specimens are two-dimensional sections. Do not attempt to merely memorize the structures within individual sections. Instead, learn to identify the position of each structure within the three-dimensional embryo, recognize its origin, and track how each structure (and the entire embryo) changes over time.

### Supplementary Materials for the Laboratory

You will be provided with a complete set of microscope slides with multiple sections of prepared embryos and a compound microscope for your use in lab during the entire semester. Please handle with care all slides, microscopes, and every piece of lab equipment that you use. Open the slide box only after placing it on your bench with the lid on top; otherwise the slides may fall out and break. If you damage a slide you may be required to replace an entire set (\$50 and up). Always carry the microscope using both hands. Ask the instructor for help if you need assistance with the proper use of the microscope. You may be held financially responsible for any equipment that you break or damage because of negligence. Notify the instructor immediately if you find any damaged slides or supplies.

## **i>clicker Instructions**

You have the option of using the original **i>clicker** remote, the newer **i>clicker+** (ISBN: 1464120153), or the alphanumeric-capable **i>clicker2** remote (ISBN: 1429280476). You may purchase a remote at the UCF Bookstore or online <http://iclicker.com/purchase/>. Instructions are on the back of the remote.

- **Be sure to consider which of your other courses may require an i>clicker or i>clicker2 remote.** I will only ask Multiple Choice questions in class. However, you may need an i>clicker2 remote for answering numeric/alphanumeric questions in another course.

**INSTRUCTIONS FOR i>CLICKER COURSE REGISTRATION:** i>clicker is a response system that allows you to respond to questions I pose during class, and you will be graded on that feedback and/or your in-class participation. In order to receive this credit, you will need to register your i>clicker remote by **SEPT 2, 2015**. You must have come to class at least once and voted on at least one question in order to complete this registration.

- Log into your **Webcourses** account. Choose our course and choose the i>clicker link in the left hand toolbar. Follow the instructions to type in your clicker ID (under the barcode on the back).
- It is **NOT** necessary to register your remote at iclicker.com as well. If you register a used remote on their national database, you will be charged a fee.
- Please use the default radio frequency AA to communicate with my receiver.

### **i>CLICKER POLICIES:**

#### **Cheating policy:**

I consider bringing a fellow student's i>clicker remote to class to be cheating and a violation of UCF's *The Golden Rule* of Conduct. If you are found with a remote other than your own or have votes in a class that you did not attend, you will forfeit all clicker points and face additional disciplinary action.

#### **Forgotten clicker policy:**

Note that we will be using i>clicker in almost every class and clicker points will make up 10% of your final grade. Please remember that it is your responsibility to come prepared to participate with a functioning remote every day. However, I do realize that unforeseen circumstances do arise, and for this reason I will drop the **single** lowest i>clicker day from your total participation grade.

#### **Broken/lost clicker policy:**

If you have lost or broken your i>clicker remote, you will have to purchase another one. Please email me with your new remote ID so that I can manually register your new remote.

**i>clicker Refunds and Exchanges:** Unopened i>clicker remotes can be returned to the UCF Bookstore for a full refund during the first week of classes with a receipt.

*Note that the instructor reserves the right to make changes to the syllabus or other aspects of the course at anytime. These changes will be announced in class.*