

# ZOO 4603C - Embryology & Development - Fall 2013

Section 0001: WF 9:30 - 10:50 am Lecture (BA 213)

5 Credits

Section 0011: WF 11:30 - 1:20 pm Laboratory (BIO 304)

**Instructor:** Dr. Cynthia Bayer

**Office (BIO 439) Hours:** Tue 2:30 - 4:30 pm

**Email:** Webcourses@UCF

Wed 1:30 - 3:00 pm

**Phone:** 407-823-1460

Fri 1:30 - 3:00 pm

---

**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.

---

## 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 Student price at website: \$118.96  
Looseleaf - ISBN: 978-1-60535-192-6 Student price at website: \$77.33

A Photographic Atlas of Developmental Biology. Shirley J. Wright, 2005. Morton Publishing  
Looseleaf - ISBN: 978-0-89582-629-9 <http://www.morton-pub.com> price: \$63.95

**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 be using 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. *Note: Students need purchase only one remote because the same unit can be used in every course that uses the i>clicker system.* After you purchase your remote, you must register it no later than **August 28, 2013. TO REGISTER:** Log into your **Webcourses** account. Choose our course and click on the i>clicker link. 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. Students may choose instead to use **i>clicker GO** on their WiFi-enabled mobile device.

**Course website & Communication:** Access our course website at Webcourses@UCF via the myUCF portal using your PID and PID 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 and graded questions)

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. Letter grades for the semester will be awarded according to the scale below. These grade ranges will be strictly adhered to with no exceptions. **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).

**Cheating will not be tolerated!** Turn baseball caps backward while taking exams. Go to the restroom before the exam. Any student caught using unauthorized materials, including electronic devices, in an exam, copying off another paper, signing in for someone else on an exam, or in any way misrepresenting their work will receive an automatic F and the matter will immediately be referred to the UCF Office of Student Conduct for disciplinary action. In addition, a "Z Designation" will be placed on the student's official transcript indicating academic dishonesty, where the letter Z will precede the final grade for this course. For more information about the Z Designation, see <http://z.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 on the Grades page at our Webcourses site. Exam papers and scantrons can be reviewed in my office, 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 administered).

**Disability Access:** The University of Central Florida is committed to providing reasonable accommodations for all persons with disabilities. Students with disabilities who need accommodations in this course must contact the instructor at the beginning of the semester to request and discuss needed accommodations. Students who need accommodations must be registered with Student Disability Services, Ferrell Commons 7F, Room 185, phone (407) 823-2371, TTY/TDD only phone (407) 823-2116, <http://sds.sdes.ucf.edu/> before requesting accommodations from the instructor.

**Important Academic Dates:**

Aug 19	Classes begin
Aug 22	Drop/Swap deadline
Aug 23	Add deadline
Oct 28	Withdrawal deadline
Dec 2	Classes end
Dec 4 - 10	Final Exam Period
Dec 6	ZOO 4603C Final Exam 7:00 - 9:50 am (Exam Day 4)
Dec 13 - 14	Commencement
Dec 17	Grades Available on my UCF

**Holidays:**

Sept 2	Labor Day
Nov 11	Veteran's Day
Nov 28	Thanksgiving Day

**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 20</b>	
Early Development in Amphibians	8
Early Development in Birds and Mammals	9
Ectodermal Derivatives	10, 11
<b>Exam 2 - Oct 23</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 - Nov 22</b>	
<b>Final Exam - Dec 6</b>	Comprehensive

## Laboratory Schedule

Dates	Topics	Lab Manual References (pages) Wright's Atlas of Developmental Biology
Aug 21 & 23	<u>Lab 0</u> . Introduction and distribution of slides	Handout
Aug 28 & 30	<u>Lab 1</u> . Frog cleavage, gastrulation, & neurulation	77-80, 95-96, 109-115
Sept 4 & 6	<u>Lab 2</u> . 4 mm frog	143-150
Sept 11 & 13	<u>Lab 3</u> . 7 mm frog	156-161
Sept 18 & 20	<u>Lab 4</u> . 10 mm frog	162-169
Sept 25 (Wed)	Review for Lab Exam 1	
Sept 27 (Fri)	<b>Lab Exam 1</b> (frog embryology)	
Oct 2 & 4	<u>Lab 5</u> . <i>Experimental</i> : Sea urchin fertilization	Handout
	<u>Lab 6</u> . <i>Experimental</i> : Live 11 mm frog embryos	Handout
Oct 9 & 11	<u>Lab 7</u> . Chick cleavage, gastrulation, & neurulation	80-83, 96-101, 116-123
Oct 16 & 18	<u>Lab 8</u> . 33-hr chick	171-191
Oct 23 & 25	<u>Lab 9</u> . 48-hr chick	194-199
Oct 30 & Nov 1	<u>Lab 10</u> . <i>Experimental</i> : Set up planarian regeneration	Handout
	<u>Lab 11</u> . <i>Experimental</i> : Live chick embryos	Handout
Nov 6 & 8	<u>Lab 12</u> . 72-hr chick	201-209
Nov 13 (Wed)	Review for Lab Exam 2	
Nov 15 (Fri)	<b>Lab Exam 2</b> (chick embryology)	
Nov 20	Finish planarian regeneration & checkout slides	

### Studying for the Lab Exams

*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 the available microscopes with display screens). 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 a good grade because they did not put enough effort into their lab work. Remember that the lab will amount to 40% of your final grade.

You will be examining 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 Questions and Points:** An i>clicker remote or i>clicker GO subscription is required for in-class participation and voting in this course. 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 through the UCF Bookstore or online at <http://iclicker.com/purchase/>. Instructions for use are on the back of the remote.

### **IMPORTANT INFORMATION BEFORE PURCHASING YOUR i>CLICKER:**

- **When purchasing your clicker, 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.
- **I have enabled i>clicker GO for this course.** You have the option of using **i>clicker GO**, which enables you to vote via a web-enabled device like a laptop or smart phone. PLEASE NOTE that i>clicker GO cannot be used in a course where your instructor has not enabled i>clicker GO. Check with your other instructors to ensure that i>clicker GO is permitted in each course you take—otherwise, you may want to consider purchasing a remote so that you can use it in all your courses. *Only purchase an i>clicker GO subscription if:*
  1. You will not be using i>clicker in another course that does not allow i>clicker GO.
  2. You do not plan to sell back a remote to the bookstore.
  3. You have access to a wireless device (i.e. a laptop, iPhone, iPod Touch, or Android) running a browser that supports AJAX, JavaScript, and HTTPS requests such as Internet Explorer, Firefox, Chrome or Safari.

**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 or set up your i>clicker GO account by **AUGUST 28, 2013**. You must have come to class at least once and voted on at least one question in order to complete this registration.

#### **i>clicker remote registration:**

Log into your **Webcourses** account. Choose our course and click on the i>clicker link. Follow the instructions to type in your clicker ID (directly under the barcode on the back of your remote). i>clicker will be used every day in class, and you are responsible for bringing your remote daily.

#### **i>clicker GO registration:**

To create an i>clicker GO account, visit <https://iclickergo.com> or download the app for [iOS](#) or [Android](#). Creating an account automatically starts a free 14-day trial subscription. **Please use this trial period to make sure i>clicker GO will work for all of your i>clicker classes before purchasing a subscription as there are no refunds afterwards.**

Once you create your i>clicker GO account, you do not need to do anything else to register. Just be sure that your account has the following profile information:

Student ID: Your UCF NID  
School ZIP/Postal Code: 32816  
School Name: University of Central Florida

At the end of your trial, should you decide to purchase i>clicker GO, you can purchase access to i>clicker GO in a variety of subscription lengths using your credit card online or through in-app purchase with your smartphone; this subscription includes an unlimited number of courses.

If you have an activation code from purchasing an access card in the bookstore or from a package with a textbook, you will need to redeem the code from the i>clicker GO website. Once redeemed, the activation will take affect for iOS and Android apps. You cannot redeem access cards from within the iOS or Android apps. To redeem on the website, visit <https://iclickergo.com> and log into your account. Enter your code from your account profile page if you do not see an entry field upon logging into i>clicker GO.

If you have more questions on i>clicker registration, please visit <http://support.iclicker.com> for FAQs and other resources.

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

#### **Cheating policy:**

I consider bringing a fellow student's i>clicker to class to be cheating and a violation of the University Honor Code. If you are caught 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 may 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 difficult 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. Creating an i>clicker GO account automatically starts a free 14-day trial subscription.

*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.*