

# ZOO 4603C - Embryology & Development - Fall 2019

Section 0001: WF 09:00 - 10:20 am Lecture (BIO 209)

5 Credits

Section 0011: WF 11:00 - 12:50 pm Laboratory (BIO 211)

Section 0012: WF 01:00 - 02:50 pm Laboratory (BIO 211)

**Instructor:** Dr. Cynthia Bayer

**Office (BIO 202D) Hours:** Tues & Thurs 12:00 - 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, 11th ed., Gilbert & Barresi (2016) Sinauer Assoc. Inc. Publ.

Available as Casebound (hardcover) ISBN: 978-1-60535-470-5 or as an eBook.

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 iClicker:** We will use the iClicker classroom response system on a regular basis for class points. You must purchase a physical **iClicker remote** or a **REEF subscription** to bring to every class lecture. It would be wise to bring extra batteries for your remote. The purchase of a remote or REEF is NOT optional; it is an integral part of this course. You must register for this course by **SEPT 4**.

**TO REGISTER YOUR REMOTE:** in **Webcourses** click on the iClicker tab. Follow the instructions to type in your remote ID (which is directly under the barcode on the back). You may use either a multiple-choice-only **iClicker+**, or the alphanumeric-capable **iClicker2** remote, as I will only utilize multiple-choice responses to questions in this course. **TO REGISTER IN REEF:** Purchase a *REEF Education* subscription, enter your UCF NID in your REEF profile, find, and join our course.

- You must use ONLY iClicker *OR* REEF in this course. Attempting to switch between the 2 response modes may prevent proper recording of your votes and consequently your points in class.

## **Academic Activity:**

Students must document their 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 30**. 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 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** and **Announcements** features 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%** = iClicker points: Participation (answering at least 75% of the questions) = 3 pts.  
& Graded Questions: correct = 1pt, 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 iClicker 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 an unexcused event, you will receive a score of 0 and that will be the exam dropped from the final grade calculation. If you miss an exam because *circumstances beyond your control* prevented you from taking the exam, or because you were required to participate in *official UCF business*, you must provide acceptable documented evidence from an appropriate authority (doctor, police, judge, UCF). 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 any 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 by me. 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).

**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).

**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. Students enrolled at UCF are expected to familiarize themselves and uphold the standards of academic behavior defined in the University's *Rules of Conduct* (Section UCF-5.008) in the Golden Rule handbook <http://goldenrule.sdes.ucf.edu>.

“Academic misconduct includes but is not limited to cheating, plagiarism, assisting another in cheating or plagiarism, and commercial use of academic materials.” (Section UCF-5.015 The Golden Rule handbook) This includes using unauthorized materials or electronic devices during an exam, copying from another student's exam, signing another student's name on an exam or other assignment, using another student's iClicker remote or REEF app for them in their absence, or in any way falsifying or misrepresenting your academic work. Violations of the UCF *Rules of Conduct* may result in a 0 on an assignment, an F in the course, or formal documentation through an Academic Misconduct Report submitted to the Office of Student Conduct <http://osc.sdes.ucf.edu> for disciplinary action. Possible sanctions include Disciplinary Suspension, a "Z Designation" placed on the student's official transcript indicating academic dishonesty, <http://goldenrule.sdes.ucf.edu/zgrade>, or Disciplinary Expulsion from UCF.

**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.

**Help & SARC:** Please ask for help if you need it! I am here to answer your questions. Additionally, help is available through SARC (Student Academic Resource Center, Howard Phillips Hall, Room 113: 407-823-5130; <http://sarc.sdes.ucf.edu>). Students can request a Learning Consultation with a Learning Skills Specialist, or attend Academic Success Workshops to improve study skills & strategies.

**UCF Cares:** UCF and I care not only about your academic success, but also your overall well-being. Please visit UCFcares.com <http://cares.sdes.ucf.edu/> if you are seeking resources or support, or if you are worried about a friend or classmate. Free services and information are included for a variety of student concerns, including but not limited to alcohol use, bias incidents, mental health concerns, sexual harassment or assault, and financial challenges. You can also e-mail [ucfcares@ucf.edu](mailto:ucfcares@ucf.edu) with questions or for additional assistance. You can reach a UCF Cares staff member Student Care Services, <http://scs.sdes.ucf.edu>, Ferrell Commons 142, between 8 a.m. and 5 p.m. by calling 407-823-5607.

If you are in immediate distress, please call Counseling and Psychological Services (CAPS), Counseling Center 101 <http://caps.sdes.ucf.edu> to speak directly with a counselor 24/7 at 407-823-2811, or call 911.

## Laboratory Schedule

<b>Dates</b>	<b>Topics</b>	<b>Lab Manual References (pages) Wright's Atlas of Developmental Biology</b>
Aug 28	<u>Lab 0</u> . Introduction and distribution of slides	Handout
Sep 4 & 6	<u>Lab 1</u> . Frog cleavage, gastrulation, & neurulation	77-80, 95-96, 109-115
Sep 11 & 13	<u>Lab 2</u> . 4 mm frog	143-150
Sep 18 & 20	<u>Lab 3</u> . 7 mm frog	156-161
Sep 25 & 27	<u>Lab 4</u> . 10 mm frog & live <i>C. elegans</i>	162-169
Oct 2 (Wed)	<u>Lab 5</u> . <i>Experimental</i> : Sea urchin fertilization	Handout
Oct 4 (Fri)	<u>Lab 6</u> . <i>Experimental</i> : Live 11 mm frog embryos	Handout
Oct 9 (Wed)	Review for Lab Exam 1	
Oct 11 (Fri)	<b>Lab Exam 1</b> (frog embryology)	
Oct 16 & 18	<u>Lab 7</u> . Chick cleavage, gastrulation, & neurulation	80-83, 96-101, 116-123
Oct 23 & 25	<u>Lab 8</u> . 33-hr chick	171-191
Oct 30 & Nov 1	<u>Lab 9</u> . 48-hr chick	194-199
Nov 6 (Wed)	<u>Lab 10</u> . <i>Experimental</i> : Set up planarian regeneration	Handout
Nov 8 (Fri)	<u>Lab 11</u> . <i>Experimental</i> : Live 48-hr chick embryos	Handout
Nov 13 & 15	<u>Lab 12</u> . 72-hr chick	201-209
Nov 20 (Wed)	Review for Lab Exam 2	
Nov 22 (Fri)	<b>Lab Exam 2</b> (chick embryology)	

Most weeks, the Wednesday lab session will begin with a presentation of the objectives for the week. After that, students have the rest of the Wed lab plus the Fri lab to examine their slides of prepared specimens. Students may study individually (using individual microscopes) or in small groups (using microscopes equipped with large monitors). *Laboratory attendance is mandatory*. Students will sign in each lab session. Be mindful of the fact that your lab exam grades will correlate with the amount of time you spend in lab. Many students who have performed well on the lecture exams have missed out on earning an A for this course because they did not put enough effort into their lab work. Remember that the lab exams 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. You will be sharing your assigned slides with a student from the other lab section. Please handle with care all slides, microscopes, and 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.

## iClicker Instructions

You have the option of using any physical **iClicker remote** or the **REEF** polling app downloaded onto your mobile device from iTunes or Google Play. You may purchase a remote at the UCF Bookstore or online at <https://www.iclicker.com/>. Instructions are on the back of the remote.

- **Be sure to consider which of your other courses may require an iClicker2 remote or REEF app.** I will only ask Multiple Choice questions in class. However, you may need an iClicker2 remote or Reef subscription for answering numeric/alphanumeric questions in another course.
- You must use **ONLY iClicker OR REEF** in this course. Attempting to switch between the 2 response modes may prevent proper recording of your votes and consequently your points in class.

**INSTRUCTIONS FOR iCLICKER COURSE REGISTRATION:** iClicker 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 iClicker **remote** in Webcourses or register your NID in your **REEF** profile by **SEPT 4**. 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 iClicker link in the left hand toolbar. Follow the instructions to type in your remote ID (under the barcode on the back).
- Please choose **CB** (my initials) as the radio frequency to communicate with my receiver.

### **iCLICKER POLICIES:**

**Cheating policy:** I consider bringing a fellow student's iClicker remote to class to be cheating and a violation of UCF's *The Golden Rule* of Conduct. If you are found with a remote or REEF app 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 remote policy:** Note that we will be using iClicker in almost every class and iClicker 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 **two** lowest iClicker days from your total participation grade.

**Broken/lost remote policy:** If you have lost or broken your iClicker 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.

**Awarding points policy:** The iClicker software has the final say in awarding points. If you were in class and using your registered remote or REEF app properly, you will see a check mark, and my receiver will record your response. If there is an issue with your remote or app, you must address it immediately (e.g. re-register, change the batteries, ensure you have the right frequency, etc.) in order to earn clicker points.

## Embryo Lecture Schedule

Aug 28: *Introduction*, Chapter 1 - *Questions*

Aug 30: Chapter 1

*DROP deadline* Thurs, Aug 29 11:59pm

*ADD deadline* Fri, Aug 30 11:59pm

Sep 04: Chapter 2 - *Patterns & Commitment*

Sep 06: Chapter 7 - *Fertilization*

Sep 11: Chapter 7

Sep 13: Chapter 10, 8 - *Invertebrates - Sea Urchins & Snails*

Sep 18: Chapter 10, 8

Sep 20: Chapter 8 - *Nematodes*

Sep 25: Chapter 8

Sep 27: **Exam 1 (Chapters 1, 2, 7, 8, 10)**

Oct 02: Chapter 11 - *Vertebrates - Amphibians*

Oct 04: Chapter 11

Oct 09: Chapter 12 - *Birds*

Oct 11: Chapter 12 - *Birds / Mammals*

Oct 16: Chapter 12 - *Mammals*

Oct 18: Chapter 13, 14 - *CNS*

Oct 23: Chapter 13, 14 - *CNS / PNS*

Oct 25: Chapter 13, 14, 16

Oct 30: **Exam 2 (Chapters 11, 12, 13, 14, 16)**

Nov 01: Chapter 15 - *Neural Crest*

*WITHDRAWAL deadline* Fri, Nov 1 11:59pm

Nov 06: Chapter 17, 18 - *Mesoderm*

Nov 08: Chapter 17, 18, 20 - *Mesoderm / Endoderm*

Nov 13: Chapter 20, 6 - *Endoderm / Sex Determination*

Nov 15: Chapter 6, 9 - *Sex Determination / Drosophila*

Nov 20: Chapter 9 - *Drosophila*

Nov 22: Chapter 9 - *Drosophila*

Nov 27: **THANKSGIVING BREAK**

Nov 29: **THANKSGIVING BREAK**

Dec 04: **Exam 3 (Chapters 15, 17, 18, 20, 6, 9)**

Dec 06: **Comprehensive Final Exam (Friday 7:00-10:00 am)**

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