



Developmental Biology

BIOL 3090-001/091 - Fall 2015

TR from 8:00-9:15 a.m. in BO1045

3 Credit Hours

Instructor

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Office Hours: MT 10-11:00 a.m., WR 9-10:00 a.m. and R 3-4:00 p.m. (or by appointment)

Course Description

This course will introduce students to the molecular and cellular mechanisms that underlie the early development of organisms. The focus will be on the genes and proteins involved in controlling the behavior of cells in the processes of differentiation, morphogenesis and growth. Developmental mechanisms and processes will be examined in genetic model organisms such as the fruit fly (*D. melanogaster*) and the worm (*C. elegans*) as well as in vertebrates such as the frog (*X. laevis*), chicken, mouse and humans.

Required Materials

Textbook: Principles of Development (Forth or Fifth Edition, ISBN 978-0-19-955428-7 or 978-0-19-967814-3, respectively), Lewis Wolpert editor. Oxford University Press.

Clicker: A Turning Technologies response card can be obtained at the UT bookstore and elsewhere. The most basic model is sufficient. Register your clicker ID on Blackboard if you have not already done so for another course (see below).

Clicker Registration

Once you have registered your clicker ID on Blackboard for any course, you do not have to repeat the procedure for any additional courses, unless you change your clicker. If you have not already registered your clicker ID for another course on Blackboard you must do so by noon, Monday, **August 31**. Use the Blackboard "Clicker Registration" link and be careful not to enter the letter "o" in place of zero (0) when entering your device ID. The letter "o" is not used in any device ID. *If you miss the deadline or change clickers during the semester you must send me your new clicker ID by email.* The Blackboard registration mechanism will not be used after the August 31 deadline. You will not receive clicker question points unless your current clicker ID is registered in advance of the lecture.

General Information

- BIOL 3030 (Cell Biology) is a prerequisite for this course.
- Lecture slides will be available for download from Blackboard before class (usually the evening before the lecture). Note that you can arrange your Blackboard settings so that you are informed by email when the lecture slides or any other course content is posted to Blackboard. For instructions see the file "Setting Up Email Notifications For Blackboard Content Changes" under the "More Course Info" link on Blackboard.
- Please ask questions during the lecture, particularly if you feel something was not explained clearly. You can also ask questions after class by email, phone, or in person.
- Put away your cell phone while in class. Make sure it is off or in silent mode.
- If you are going to bring a laptop or tablet to class please use it for note taking only.
- If you wish to make audio recordings of the lectures please ask me first.
- Do not bring food into the room, although a drink is acceptable.

Student Evaluation

Your final grade will be calculated as follows:

54% Three in-class exams (18% of your final grade for each)
30% Comprehensive final exam
10% Clicker points
6% Discussion questions
100%

Available **bonuses**: 2% for the top discussion board participants (see below for details).

Grading Scale:	90-100%	A	67-70%	C
	87-89%	A-	63-66%	C-
	83-86%	B+	59-62%	D+
	79-82%	B	55-58%	D
	75-78%	B-	50-54%	D-
	71-74%	C+	<50%	F

Exam Information

- There will be three exams during the semester and each will be worth **18%** of your final grade. The exams will cover mainly new material (since the last exam), although some concepts from earlier in the course will be revisited on the later exams. Exam questions will be based on the lecture material.
- The final exam will be comprehensive and it will count for **30%** of your final grade. Approximately half of the final exam will count for the last section of the course with the remaining half devoted to the first three sections.
- All exams will be a mix of multiple choice, definitions and short answer questions.

- On exam days:
 - Bring two pencils and an eraser.
 - Students will be asked to present a **picture ID** when turning in exams.
 - Additional time will not be given to students who come late for exams and latecomers will not be permitted to start if someone has already left the exam.
 - If for any reason the university is closed on the day of a scheduled exam, the exam will be given during the next scheduled class.
- Once the exam answers are available you will have until the next exam to with any exam grading concerns.
- You may view your most recent exam in my office, only up until the day of the next scheduled exam. You have this same time period to respond with any exam grading concerns.
- The exam schedule will not be changed for individuals who have more than one exam on an exam day. This also applies for the final exam. The best way to prepare for this situation is to be aware of your exam schedules and review course materials regularly in advance of the exams.

Clicker Questions

- In each lecture approximately three questions about the lecture material will require your response using the Turning Technologies response card (clicker).
- **One point is given for a correct answer and half a point for an incorrect answer.**
- Set your clicker to channel 41 for this class.
- Clicker questions will begin in the third lecture (Sept. 1).
- The clicker questions will count for **10%** of your final grade.
- The grading system for clicker questions is set so that you can still receive the full 10% even if you miss two classes with unexcused absences. For example, if 100 clicker questions are asked during the lectures you would only require 94 points for a perfect clicker score for the semester ($100 - (2 \text{ lectures} \times 3 \text{ points}) = 94$).
- A small prize will be given to the student who maintains a perfect cumulative clicker score for the longest period into the semester.

Discussion Board

- Every week you will be required to ask a question about the past lecture material using the discussion board. This is to encourage students to study the course material on a weekly basis and to identify topics that may require additional discussion in class. Example questions: I saw Jack Hana with a two-headed turtle on TV last week. Did that turtle have a mutation in the *cerberus* gene? I don't understand topic X; can you explain topic X again in class? If you don't have a question, a comment related to the lecture material is also acceptable.
 - Deadline to submit your question on the discussion board: **Every Monday @ noon**

- Grading: One point for any “reasonable” question or comment related to the material. Discussion grade (%) = Total points collected/(Total points available - 1) x 100
- Interesting questions, or topics that multiple students are having trouble with, will be addressed at the beginning of the first lecture of that week.
- A 2% **bonus** will be added to the final grades of ten students with the best, most insightful questions through the semester.
- Students are also encouraged to reply to the questions on the discussion board if they know the answer or have a comment to make. Another 2% **bonus** will be given to the ten students with the highest number of relevant replies to the questions on the discussion board over the semester.

Absences

- Make-up exams and adjustments to clicker or discussion question grades will only be provided for *serious* medical or personal reasons that are backed up with the proper documentation such as a doctor’s note. *Accommodations will be made only if the instructor is notified as soon as possible after the absence.*
- Make up exams will be scheduled within a week of the original exam date. If multiple students need a make-up exam they will write it at the same time in the Testing Center (FH1080). If it is not possible for a student to take the make-up exam within one week then the two remaining in-class exams will be used to determine the final grade for that student. Make-up exams will be long answer or essay format with few, if any, multiple-choice questions.

Academic Dishonesty

- The university policy on academic dishonesty can be accessed at:
“<http://www.utoledo.edu/dl/students/dishonesty.html>”
- Bringing a clicker to class for someone else is considered academic dishonesty for both students involved. Both students will be sanctioned according to university policy.
- Do not talk to other students or use electronic devices during examinations. Keep your eyes on your own work. Those who violate these rules will receive an F for the exam.

Keys to Success

1. **Attend every class.** Material presented during class will be emphasized for the exams and clicker points contribute to your final grade. In-class interactions with the instructor help strengthen your understanding of the material.
2. **Do not wait until a day or two before the exam to study.** This is one of the worst and most common mistakes students make. Go over your notes as often as you can between exams and make sure you understand the material *before* your last study session. Ask questions about topics you don't understand as soon as possible, either during lecture or during office hours.
3. **Be active with your studying.** Reading the textbook before class, taking notes during class, and making a separate set of study notes after class will aid in your ability to understand and retain the presented concepts. Review your old exams during office hours.
4. **Test yourself.** Have a roommate or classmate ask you questions about the material in your notes. Doing this will let you know where you might have to spend more time on the details. Take advantage of the textbook website, which has a glossary and multiple-choice questions.
5. **Form a study group.** It helps with number four above and you will find out how well you know the material when you try to explain it to someone else.
6. Additional information can be found in the files "Keys to Success" and "Survival Skills" under the "More Course Info" link on Blackboard.
7. A list of valuable resources, to help you with your academic and social life at the University of Toledo, can be found at "www.utoledo.edu/menu/current.html". This includes tutoring services, the writing center, library information, and IT services among others.

Course Schedule

Date	Lecture	Topic	Chapter	
			4 th ed	5 th ed
Aug 25	1	Introduction and History	1	1
Aug 27	2	Concepts In Development	1	1
Sept 1*	3	Development of the <i>Drosophila</i> Body Plan I	2	2
Sept 3	4	Development of the <i>Drosophila</i> Body Plan II	2	2
Sept 8	5	Development of the <i>Drosophila</i> Body Plan III	2	2
Sept 10	6	Patterning the Vertebrate Body: Animal Models	3	3
Sept 15	7	Patterning the Vertebrate Body: Axis Formation	4	4
Sept 17		Exam I		
Sept 23	8	Patterning the Vertebrate Body: Germ Layer Formation	4	4
Sept 24	9	Patterning the Vertebrate Body: Somite Formation	5	5
Sept 29	10	Patterning the Vertebrate Body: Neural Induction	5	5
Oct 1	11	<i>C. elegans</i> Development	6	6
Oct 6		<i>Fall Break</i>		
Oct 8	12	Plant Development I	7	7
Oct 13	13	Plant Development II	7	7
Oct 15		Exam II		
Oct 20	14	Morphogenesis: Adhesion and Cleavage	9	8
Oct 22	15	Morphogenesis: Gastrulation and Neurulation	9	8
Oct 27	16	Morphogenesis: Migrations	9	8
Oct 29	17	Cell Differentiation: Control of Gene Expression	8	10
Nov 3	18	Cell Differentiation: Models of Differentiation I	8	10
Nov 5	19	Cell Differentiation: Models of Differentiation II	8	10
Nov 10	20	The Plasticity of Gene Expression (Stem Cells)	8	10
Nov 12		Exam III		
Nov 17	21	The Vertebrate Limb	11	11
Nov 19	22	Organogenesis	11	11
Nov 24	23	Nervous System Development I	12	12
Nov 26		<i>Thanksgiving Day</i>		
Dec 1	24	Nervous System Development II	12	12
Dec 3	25	Fertilization	10	9
Dec 8	26	Sex Determination and Growth	13	9/13
Dec 10	27	Review		
Dec 15		Final Exam (8-10am)		

The pace of the lectures varies from year to year so the exact day a particular topic is discussed may differ from this schedule. However, the topic order and the exam dates will not change.

Other Important Dates: First discussion question due: Aug. 31
Deadline for clicker registration Aug. 31
*Clicker questions begin: Sept. 1