# Developmental Biology

BIOL 3090-001/091 - FALL 2012

Classes: TR from 8:00-9:15 a.m. in WO1205

## Instructor

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Hrs: M 10-11 am & Th 1-2:30 pm

## 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 (Third or Forth Edition, ISBN 978-0-19-955428-7 or 978-0-19-927537-3, respectively), Lewis Wolpert editor. Oxford University Press. Some material from the 4th edition will be discussed in class, but that material will be available on the lecture slides.
**Clicker**: Turning Technologies response cards are available in the bookstore.

## Clicker Registration

**Your clicker must be registered at student.turningtechnologies.com by 5 pm on August 27.**
Follow the web site instructions carefully, paying particular attention to the following points:

- 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 devise ID.
- For "Step One" on the web site, under "Other Info" please enter your Rocket ID.
- For "Step Two" my email address is "robert.steven2@utoledo.edu". "Add" BIOL3090 and click "Next".
- For "Step Three" click on "Complete Registration".
- If you have any problems registering your clicker please call 1-866-746-3015.

**If you change clickers during the semester** please email me with your new clicker ID as soon as possible. The registration web site will not be used after August 27 and you will not receive points for clicker questions unless I have your clicker ID registered.

# General Information

- BIOL 3030 (Cell Biology) is a prerequisite for this course.
- Attend every class. Material presented during class will be emphasized for the exams. Discussing the material in class and reading it from the textbook (preferably before the class) will aid in your ability to understand and retain the presented concepts.
- This course is web assisted: lecture slides will be available for download the day before class.
- Please ask questions during the lecture if you feel something was not explained clearly. You can also ask questions by email, in person, or through Skype (dr.robertsteven). I am available during my office hours or by appointment.
- Turn off cell phones while in the class.
- Do not bring food into the room, although a drink is acceptable.
- If you wish to make audio recordings of the lectures please ask me first.

# Student Evaluation

**Tests**

- There will be three tests during the semester and each will be worth **20%** of your final grade. The tests will cover only new material (since the last test). Test questions will be based on the lecture material and assigned readings from the textbook.
- 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 tests will be a mix of multiple choice, definitions and short answer questions.
- On test days:
    - Bring a pencil and an eraser.
    - Students will be asked to present a picture ID when turning in exams.
- Make-up tests will only be provided for serious medical or personal reasons. A doctor's note is required for a medical absence. The make-up tests will be essay format. Please let me know as soon as possible if you cannot take a test.

**Clicker Questions**

- In each lecture approximately three questions about the lecture material will require your response using the Turning Technologies response card (clicker).
- To encourage a prompt start to the lectures and discourage disruptions due to lateness a "free" point will be given to those present with their clicker at the beginning of each class.
- Clicker questions will begin in the third lecture (August 28).
- 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 three classes with unexcused absences. For example, if 100 clicker questions are asked during the lectures you would only require 88 points for a perfect clicker score for the semester (100 - (3 lectures x 4 points) = 88).
- A 1% **bonus** to the final grade will be given to those who answer every clicker question and are present for every "free" point at the beginning of class. You must notify me *immediately* about an excused absence from class (serious medical or personal reasons only) if you want your clicker grade adjusted for that class.

- A small prize will be given to the student who maintains a perfect cumulative clicker score for the longest period into the semester.
- Bringing a clicker to class for someone else is considered academic dishonesty for both students involved and the penalty for doing so is severe.

**Class Discussion**

- Participation in class discussion, such as answering questions during class throughout the year, may result in up to a 2% **bonus** added to your final grade.

**Grading Summary**

- (20% x 3 = 60%) Tests + 30% Final Exam + 10% Clicker Questions = 100%
- Available bonuses: 1% for answering all clicker questions and 2% for discussion (see above for details)

**Grading Scale:**

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

# Course Schedule

| Date | Lecture | Topic | Chapter | |
|---|---|---|---|---|
| | | | 3rd ed | 4th ed |
| Aug 21 | 1 | Introduction and History | 1 | 1 |
| Aug 23 | 2 | Concepts In Development | 1 | 1 |
| **Aug 27** | | **5 pm Deadline for Clicker Registration** | | |
| Aug 28* | 3 | Development of the *Drosophila* Body Plan I | 2 | 2 |
| Aug 30 | 4 | Development of the *Drosophila* Body Plan II | 2 | 2 |
| Sept 4 | 5 | Development of the *Drosophila* Body Plan III | 2 | 2 |
| Sept 6 | 6 | Patterning the Vertebrate Body: Model Organisms | 3 | 3 |
| Sept 11 | 7 | Patterning the Vertebrate Body: Axis Specification | 3 | 4 |
| **Sept 13** | | **Exam I** | | |
| Sept 18 | 8 | Patterning the Vertebrate Body: Germ Layers | 3 | 4 |
| Sept 20 | 9 | Patterning the Vertebrate Body: Somite Formation | 4 | 5 |
| Sept 25 | 10 | Patterning the Vertebrate Body: Neural Induction | 4 | 5 |
| Sept 27 | 11 | *C. elegans* Development I | 5 | 6 |
| Oct 2 | | *Fall Break* | | |
| Oct 4 | 12 | *C. elegans* Development II | 5 | 6 |
| Oct 9 | 13 | Plant Development | 6 | 7 |
| **Oct 11** | | **Exam II** | | |
| Oct 16 | 14 | Morphogenesis: Adhesion and Cleavage | 7 | 8 |
| Oct 18 | 15 | Morphogenesis: Gastrulation | 7 | 8 |
| Oct 23 | 16 | Morphogenesis: Migrations | 7 | 8 |
| Oct 25 | 17 | Cell Differentiation: Control of Gene Expression | 8 | 10 |
| Oct 30 | 18 | Cell Differentiation: Models of Differentiation | 8 | 10 |
| Nov 1 | 19 | Cell Differentiation: Plasticity of Gene Expression | 8 | 10 |
| Nov 6 | 20 | The Vertebrate Limb | 9 | 11 |
| **Nov 8** | | **Exam III** | | |
| Nov 13 | 21 | Organogenesis | 9 | 11 |
| Nov 15 | 22 | NS Development: Specification and Organization | 10 | 12 |
| Nov 20 | 23 | NS Development: Axon Guidance and Synapse Formation | 10 | 12 |
| Nov 22 | | *Thanksgiving Day* | | |
| Nov 27 | 24 | Germ Cell Development | 11 | 9 |
| Nov 29 | 25 | Fertilization and Sex Determination | 11 | 9 |
| Dec 4 | 26 | Growth and Aging | 12 | 13 |
| Dec 6 | 27 | Review | | |
| **Dec 11** | | **Final Exam (8-10am)** | | |

**Other Important Dates:**

*Clicker questions begin: Aug. 28
Last day to drop: Sept. 3
Last day to withdraw: Oct. 26