Developmental Biology

BIO 332 (3 or 4 credits)
Cedar Crest College, Spring 2010
Prerequisites: BIO 222/231 or BIO 235/236

Lecture 8:00 – 9:15 AM Tuesday and Thursday, Science Center 139
Laboratory Wednesday, 1-4 PM, Miller 31

Instructor:

Dr. Audrey Ettinger, Associate Professor of Biology
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Telephone and Voice mail: 610-606-4666 x3512
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Office hours: Monday 11:30-1:30, Tuesday 9:30-11, and by appointment.

Textbooks:

- Developmental Biology by S. Gilbert. Eighth edition, ISBN 0-87893-250-X *(Previous edition* available online at www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=books)
- Bioethics and the New Embryology: Springboards for Debate by S. Gilbert, A. Tyler & E. Zackin. ISBN 0-7167-7345-7
- Vade Mecum 2 CD, particularly the lab manual Developmental Biology: A Guide for Experimental Study by M. Tyler (included with textbook)
- Optional, for lab: A Photographic Atlas of Developmental Biology by S. Wright. ISBN 0-89582-629-1.
- Two journals that you may find helpful are Development (http://dev.biologists.org/) - articles older than 1 year are free, as are some "Open Access" articles and Developmental Biology (http://www.sciencedirect.com/science/journal/00121606). Links are given on the eCompanion site.

Course Objective:

Developmental Biology can be defined as the study of the formation of an adult organism from a single cell. Students will be introduced to the field of Developmental Biology using both traditional embryology and modern molecular approaches. Laboratory activities will allow students to perform techniques presented in the lecture, including designing their own experiments using model organisms.

Learning Outcomes and Assessment:

1. Students will expand their knowledge of developmental biology.

Assessment: Midterm and final exams, written assignments, discussion board, literature discussions, classroom participation, laboratory reports, laboratory notebook.

2. Students will improve their ability to engage in scientific and quantitative reasoning by engaging in critical discussion and interpretation of experimental data and research papers, and by analyzing laboratory data.

Assessment: Literature discussion, written assignments, laboratory reports, laboratory notebook, midterm and final exams, classroom participation.

3. Students will acquire new laboratory skills and improve existing ones.

Assessment: Laboratory reports, laboratory notebook.

4. Students will improve their scientific writing skills

Assessment: Written assignments, discussion board, laboratory reports, laboratory notebook

Lecture:

Class sessions will consist of traditional lectures, discussion of primary literature, and some films. You will understand the material presented in the lecture better if you read the assigned chapter before coming to class. For the literature discussions, you will prepare questions before class to help you participate in the discussion.

Laboratory:

The laboratory schedule will be distributed at the first lab meeting on Wednesday, January 20. There will be some flexibility for you to design your own experiments if you so desire.
The lab manual (Developmental Biology: A Guide for Experimental Study by Mary Tyler) can be found on the Vade Mecum2 CD included with the textbook. You may need to spend some time in the lab outside the scheduled Wednesday afternoon sessions.

Attendance:

Lecture attendance is not mandatory, but you are responsible for understanding the material from any lecture that you may miss. Repeated absences may lower your participation grade, and you must submit discussion questions for the literature sessions even if you miss them. Attendance at all exams is required; if you miss an exam, you must have a note from the Dean of Students to allow a make-up session.

Assignments and Grading:

Midterm exams (2)	**15% each (30%)**
Final exam	**25%**

The exam will be given during Exam Week and will be scheduled by the Registrar.
Emphasis will be placed on material covered since Exam 2, but the exam will be comprehensive. The contents of the primary papers will be included both on the midterm exams and on the final. Study guides will be distributed in class before each exam.

Discussion board **15%**

- An "eCompanion" online classroom for this course can be found at http://cedarcrestonline.net. You should have received login information by email.
- When you log on to the page, you will see a tab marked "Courses" near the top. Click on that tab, which will have a link to this course. PLEASE take the time to do the Student Orientation Tutorial (under "Special Courses") if you have never used the eCollege program!
- The primary material for discussion will be the Bioethics textbook. Reading assignments and dates are given later in the syllabus. You will write two entries for each topic, ideally using one entry to respond to a classmate's comments. Entries should be a generous paragraph in length (5-6 sentences minimum). You should include comments that indicate that you have read and thought about the assigned readings.
- Additional related readings will be posted to the eCompanion site; incorporating their content into your discussion board postings will improve both your grade for the board and your overall participation grade.
- The following general questions are given in the heading of the discussion board page and could be addressed for most discussion topics, together with the focused questions on each topic:
  - Did you have an opinion on this issue before taking the course?
  - How did you develop that opinion - were you influenced by your family, your religion, the press, previous coursework?
  - Did the scientific background material about the topic surprise you compared to public knowledge?
  - Has your opinion changed at all based on understanding more about the underlying science?
- Your contributions to the discussion board will be graded on the basis of three criteria: consistent contributions, as assigned, appropriate length for contributions, and quality of contributions, including specific reference to the assigned reading.

Writing assignments **20%**

You will write four short essays about the primary papers. The first two assignments will be 1-2 pages long, and the second two will be 3-4 pages long. Each will be due the same day as the paper is discussed. Specific details of each assignment will be distributed in class.

Participation **10%**

- For each primary literature discussion, you will bring three questions (typed) about the paper; asking and answering these questions should help you to participate.
- The class may participate in the Annual Health and Wellness Conference. If so, we will decide as a group what content to present and what format to use.
- Your grade will also be affected by attendance, contribution to classroom discussions, and preparation for class.

Laboratory

Notebook and participation	**10%**
Reports (2)	**25% each (50%)**
Experimental Conclusions	**10%**
Poster and presentation	**20%**
Assignment on gene chips	**10%**

Details of the laboratory assignments are on the laboratory schedule.

Grades

Grades will be assigned as follows:

93.0-100% A	90.0-92.9% A-	87.0-89.9% B+	83.0-86.9% B
80.0-82.9% B-	77.0-79.9% C+	73.0-76.9% C	70.0-72.9% C-
67.0-69.9% D+	60.0-66.9% D	less than 60.0% F	

The instructor reserves the right to "curve" exam grades to your benefit.

Honor Code

I fully support the Cedar Crest College Honor Code and the associated Community Standards for Academic Conduct. I adhere to its positions on Academic Misconduct, Academic Dishonesty or Plagiarism, Classroom Protocol, and Attendance. Students are responsible for reading the current versions of these documents in "A Student's Guide to Cedar Crest College."

Students with documented disabilities who may need academic accommodations should discuss these needs with their instructor during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.

Discussion board schedule: All listed readings are from Gilbert, Tyler, and Zackin. Additional readings may be assigned in class or directly on the discussion board. You will need to make 2 entries for each time period given. Each cycle runs Monday-Sunday, some topics for one week, some for two.

Lecture schedule: This is an **approximate** schedule of lecture topics and the accompanying reading assignments. All readings are from Gilbert's Developmental Biology. Primary papers will be distributed in class.

Tuesday January 19	Course introduction	
Thursday January 21	Principles of developmental biology	Ch. 1
Tuesday January 26	Life cycles and evolution of developmental patterns	Ch. 2
Thursday January 28	Principles of experimental embryology	Ch. 3
Tuesday February 2	The genetic core of development	Ch. 4
Thursday February 4	**Paper discussion #1**	
Tuesday February 9	Differential gene expression	Ch. 5
Thursday February 11	Differential gene expression	Ch. 5
Tuesday February 16	Cell-cell communication	Ch. 6
Thursday February 18	Fertilization	Ch. 7
Tuesday February 23	**Exam #1**; Covers material through Tuesday, Feb. 16	
Thursday February 25	Invertebrate development	Ch. 8
Tuesday March 2	**Paper discussion #2**	
Thursday March 4	Early development and axis formation in amphibians	Ch. 10
Tuesday March 9	**Spring Break**	
Thursday March 11	**Spring Break**	
Tuesday March 16	Early development and axis formation in amphibians	Ch. 10
Thursday March 18	Early development of vertebrates	Ch. 11
Tuesday March 23	Ectoderm – Central nervous system	Ch. 12
Thursday March 25	Ectoderm – Central nervous system	Ch. 12
Tuesday March 30	**Paper discussion #3**	
Thursday April 1	Neural crest cells and axonal specificity	Ch. 13
Tuesday April 6	**Monday schedule – no class**	
Thursday April 8	**Exam #2**; Covers material through Tuesday, March 30 (emphasis on material since Exam 1)	
	April 9-April 11 PAS Meeting	
Tuesday April 13	Mesoderm	Ch. 14
Thursday April 15	Mesoderm	Ch. 14
Tuesday April 20	Limb development	Ch. 16
Thursday April 22	Medical implications of developmental biology	Ch. 21
Tuesday April 27	**Paper discussion # 4**	
Thursday April 29	Medical implications of developmental biology	Ch. 21
Tuesday May 4	Developmental mechanisms of evolutionary change	Ch. 23

Discussion board schedule: All listed readings are from Gilbert, Tyler, and Zackin. Additional readings may be assigned in class or directly on the discussion board. You will need to make 2 entries for each time period given. Each cycle runs Monday-Sunday, some topics for one week, some for two.

Week	Dates	Chapters	Topics
1-2	Jan 18 -- Jan 31	Ch. 1-2	When Does Human Life Begin?
3	Feb 1 -- Feb 7	Ch. 15	The Ethics of Animal Use in Research
4	Feb 8 – Feb 14	Ch. 14	Genetic Essentialism
5-6	Feb 15 – Feb 28	Ch. 3-4	Should Assisted Reproductive Technologies be Regulated?
7-8	Mar 1 – Mar 21 (includes Spring Break)	Ch. 5-6	Should We Select the Sex of Our Children?
9-10	Mar 22 – Apr 4 (includes Easter Break)	Ch. 7-8	Should We Allow Humans to be Cloned?
11-12	Apr 5 – Apr 18	Ch. 9-10	Should We Use Stem Cells to Repair the Human Body?
13	Apr 19 – Apr 25	Ch. 11-12	Should We Modify the Human Genome?
14	Apr 26 – May 5	Ch. 13	What is “Normal”?