9-2014

BIOB 301.01: Developmental Biology

Ekaterina Voronina
University of Montana - Missoula, ekaterina.voronina@umontana.edu

Biology of Development
Course Syllabus
BI0B 301 CRN 74955
T/Th 11:10 AM-12:30 PM ISB110

Instructor: Ekaterina Voronina
Office: ISB Rm 217
Office Hours: M,W 9-11am or by appointment
email: ekaterina.voronina@umontana.edu
Updates, supplements, and assignments are available through the BIOB 301 Moodle page

Prerequisites: BIO 221 (required) BIO 223 (recommended)
The material in this course assumes a basic understanding of cellular processes, including: mitosis and meiosis, DNA translation and transcription, and principles of eukaryotic gene expression, at the level covered in a general introductory biology text. Please ask if you have questions about your previous coursework or preparation for this course.

Course book: Scott F. Gilbert ***Developmental Biology***, 10th edition (available in hardback and electronic versions) Sinauer Associates: Sunderland MA

Supplemental material will be available through the course website in advance of class. The students are responsible for obtaining the copies of these articles in a timely fashion.

The course examines major cellular and molecular mechanisms of animal embryogenesis. Topics include gamete interactions, establishment of body plan, cell signaling, developmental regulation of gene expression, molecular genetic approaches to analysis of embryonic development, evolutional conservation of developmental strategies. The course emphasizes experimental approach to analyze mechanisms of development. Relevance to biotechnological applications, disease, and social context will be discussed. Additional emphasis is on the connection between mechanisms of normal development and disease etiology. The course will cover general principles of development and current important issues. Relevant ethical issues will be discussed. Both invertebrate and vertebrate model systems will be covered, including *Drosophila, C. elegans*, chick, frog, zebrafish, mice and human.

Any handouts will be available at the door before lecture begins. Please be sure to pick them up each day before lecture. Extra copies will be available outside my office after lecture.

Equal opportunity for students with disabilities: Students with disabilities may request reasonable modifications by contacting me. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). "Reasonable" means the University permits no fundamental alterations of academic standards or retroactive modifications. For more information, please consult http://www.umt.edu/disability.

Course Schedule
Note: lecture dates and topics subject to change at instructor's discretion; however, assignment due dates and exam dates will remain as scheduled.

	Date	Topic	Reading
1	Aug 26	Introduction to animal development. Body plan. ***Pre-Test***	
2	Aug 28	Approaches to study developmental biology. Regulative vs mosaic development.	Ch. 1; handout, p.32
3	Sept 2	Differential gene expression - anatomy of a gene, transcription, transcription factors, RNA splicing	Ch. 2 (p.35-48; 53-65)
4	Sept 4	Differential gene expression - epigenetics, chromatin	Ch. 2 (p.35, 51)
5	Sept 9	Case study: genomic imprinting and growth ***Problem Set due***	p.51, Reik and Walter, 2001
6	Sept 11	Cell signaling, communication and patterning	Ch. 3
7	Sept 16	Germ cell specification and migration	Ch. 17 (591-606)
8	Sept 18	Meiosis. Spermatogenesis	Ch. 17 (606-610; 616-619), Ch. 4 (118-124)
9	Sept 23	Oogenesis	
10	Sept 25	***Exam I (covers material up to Sept 23)***	
11	Sept 29	Fertilization. Sperm-egg recognition. Cell signaling. Blocks to polyspermy.	Ch. 4 (126-151)
12	Oct 2	Cleavage. Fate mapping. Maternal determinants.	Ch. 5,6,7,8
13	Oct 7	Maternal contribution: localized mRNAs in *Drosophila* oocyte	Ch. 6
14	Oct 9	*Drosophila* early development: gradients determining positional information	Ch. 6
15	Oct 14	Genetics of axis specification. Interpretation of positional information. Segmentation and homeobox genes.	Ch. 6
16	Oct 16	Gastrulation: separating germ layers. Cell fates, cell motility and shape change.	Ch. 5,6,7,8
17	Oct 21	Amphibian patterning: signaling, cell-cell interactions. ***Essay due***	Ch. 8
18	Oct 23	Imaginal disc patterning in *Drosophila*.	p.559-563
19	Oct 28	Neurulation	Ch. 10 (333-355)
20	Oct 30	***Exam II (covers material up to Oct 23)***	
	Nov 4	***Election Day - No Class***	
21	Nov 6	Neural Crest Cells	Ch. 11
	Nov 11	***Veterans Day - No Class***	
22	Nov 13	Sex determination. Environmental regulation of development.	Ch. 15
23	Nov 18	Limb formation	Ch. 14
24	Nov 20	Postembryonic development	Ch. 16
25	Nov 25	Stem cells, units of development and regeneration ***Essay revision due***	p. 319-331
	Nov 27	***Thanksgiving Break - No Class***	
26	Dec 2	Cloning and reprogramming	p. 32, 46
27	Dec 4	*REVIEW; Post-Test*	

	Dec 12	**10:10-12:10** *Final Exam*	

Ihr habt den Weg vom Wurm zum Menschen gemacht, und Vieles ist in euch noch Wurm.
(You have made your way from worm to man, and much within you is still worm.)
Friedrich Nietzsche, 1883, from *Also Sprach Zarathustra*

Examinations and Assignments

There will be one **problem set**, one **essay**, two **in-class exams**, and one **final exam**. Each will include a combination of question formats. The problem set will be take-home. The essay will be a 2-3 page summary of a research article in developmental biology. Exams will be in class; final exam will be cumulative for entire semester.

Grading:

Grades for the course will be assigned based on the cumulative performance and not based on a curve.
A indicates that the work is markedly superior and is without major problems.
B indicated that the work has met all of the requirements of the assignment or course at a level that is above average, and that the student has met most of the goals.
C indicates satisfactory work that is consistently average and that meets the course goals in a sufficient level to pass, even though there may be some problems with the work.
NC indicates that the failure to complete the course or assignments, or work that is below the standard required for awarding the credit.

Grade breakdown:

Pre-test	10 pts
Post-test	10 pts
Problem Set	25 pts
Essay	25 pts
In class Exam 1	100 pts
In class Exam 2	100 pts
Final Exam	150 pts
Total	420 pts