Biol 4464/8803 Developmental Biology, Fall 2015

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Text: Developmental Biology by Scott Gilbert is recommended (eBook available through CourseSmart http://www.coursesmart.com/9780878939787). Related online resources: supplement website http://10e.devbio.com that provides additional information and the sixth edition (http://www.ncbi.nlm.nih.gov/books/NBK9983/?term=developmental biology). Readings from recent review articles, primary literature and online resources, including ***Developmental Biology Interactive***: www.devbio.biology.gatech.edu.

Topics (detailed schedule will be available at 1st class):

I: Introduction
Fertilization
Cleavage
Gastrulation and Mesoderm Induction

II: Neurulation
Neural Crest and EMT
Somitogenesis and Segmentation Clock
Limb Development
Heart Development

III: Plant Development
C. elegans Development, Lineage and Patterning
Drosophila Development, Axis Formation, and HOX Code
Evo-Devo

IV: Developmental Genetics, Gene Regulation, and Epigenetics
Stem Cell
Regeneration
Aging

V: Student Presentation and Paper Discussion
Class Summary and Survey

Class schedule:

Aug. 17th	Introduction
<u>I. Early Development: Fertilization, Cleavage, and Gastrulation</u>	
Aug. 19th	Fertilization (mainly Chapter 4, a little bit of Chapter 17)
Aug. 21st	Fertilization
Aug. 24th	Fertilization and Cleavage
Aug. 26th	Cleavage (first pages of Chapters 5-9)
Aug. 28th	Gastrulation and mesoderm induction (Ch7~p225, most of Ch8-9)
Aug. 31st	Gastrulation and mesoderm induction
Sept. 2nd	Gastrulation and mesoderm induction
Sept. 4th	Gastrulation and mesoderm induction, *first take home exam*

Sept. 7th	Labor Day, No Class	
II. Organogenesis		
Sept. 9th	Neurulation, *first take home exam due*	
Sept. 11th	Neurulation (last portion of Ch8-9, first pages of Ch10)	
Sept. 14th	Neurulation	
Sept. 16th	Neural Crest and EMT (Ch11 p375-392)	
Sept. 18th	Neural Crest and EMT	
Sept. 21st	Somitogenesis and Segmentation Clock (Ch12 p417-429)	
Sept. 23rd	Somitogenesis and Segmentation Clock	
Sept. 25th	Limb Development (Ch14)	
Sept. 28th	Limb Development	
Sept. 30th	Heart Development (Ch13, p449-460)	
Oct. 2nd	Heart Development, *second take home exam*	
III. Development in Plants and Invertebrates		
Oct. 5th	Plant Development	
Oct. 7th	C. elegans Development, *second take home exam due*	
Oct. 9th	C. elegans Development (Ch5, p170-178)	
Oct. 12th	Fall Break, No Class	
Oct. 14th	C. elegans Development	
Oct. 16th	Drosophila Development (Ch6)	
Oct. 19th	Drosophila Development	
Oct. 21st	Drosophila Development	
Oct. 23rd	Evo-Devo, *third take home exam* (part of Ch 20)	
IV. Developmental Regulation, Stem cell, and Postembryonic Development		
Oct. 26th	Developmental Genetics, Gene Regulation, and Epigenetics	(Ch2)
Oct. 28th	Developmental regulation, *third take home exam due*	
Oct. 30th	Stem Cell (p319, p347, p472, etc.)	
Nov. 2nd	Stem Cell	
Nov. 4th	Regeneration (p568)	
Nov. 6th	Regeneration and Aging	
Nov. 9th	Aging, *fourth take home exam* (p579)	
V Student Presentation		
Nov. 11th	paper discussion	

Nov. 13th	Student Presentation (#1-2), *fourth take home exam due*
Nov. 16th	Student Presentation (#3-4)
Nov. 18th	Student Presentation (#5-6)
Nov. 20th	Student Presentation (#7-8)
Nov. 23rd, 25th&27th	Thanksgiving Holidays, No Class
Nov. 30th	Student Presentation (#9-10)
Dec. 2nd	Student Presentation (#11-12)
Dec. 4th	Student Presentation and Class Summary (#13 & summary)

Expectations: Understand developmental processes in general, and more importantly, think like a developmental biologist, and be able to:

1. Pose questions and hypotheses concerning developmental processes, and perform literature search to validate the hypotheses.
2. Identify appropriate model organisms for testing hypotheses.
3. Outline experiments or experimental strategies to test specific hypotheses.
4. Read literature and think critically whether the experimental design, data analysis, and conclusions are warranted.
5. Communicate current findings, ideas and models of developmental processes to peers, both orally and in written (e.g. on webpage).

We are not going to emphasis memorization in this class (although you do need to know some basics to understand a particular process), and in fact, lots of information, e.g. the activities of a signaling pathway in a certain process, will change over time as our understanding advances. What is important is that you learn to integrate information collected from different sources (and judge them critically) to understand a problem, form hypothesis, design experiments to test the hypothesis rigorously, and interpret the results properly.

Assessment (Grading):

In class quiz - 25%

Four take home exams - 50% (with one lowest grade dropped, the remaining three grades will be averaged)

Final presentation - 25% (students will choose a topic, find a research article on the topic, and present it to the class. The presentation will include an introduction of the topic and necessary background knowledge for understanding the article, and a journal club style paper discussion.)

Bonus point - 5% extra (publish a web page summarizing information learned on the topic.)

Honor Code:

You are expected to abide by Georgia Tech's honor code (www.honor.gatech.edu). We will mainly have take home exams and you are not allowed to discuss or collaborate on those exams. Similar answers will all get scored 0. You can refer to textbooks, lecture notes, etc. **Plagiarism is never allowed** - all writing must be in *your own words*, AND you must cite or acknowledge all sources of ideas, text, and images or figures. The take home exam is expected to be finished in an hour.