Fall 2021 COURSE SYLLABUS, DEVELOPMENTAL GENETICS 447:370

Instructor:
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Graders:
Dr. Katherine Maniates

Office hours:
Friday 1-2 PM or by appointment.

Class Meeting Time:
Mondays 11 AM - 12:20 PM
Thursdays 11 AM – 12:20 PM

Class Location:
Livingston Campus TIL-226

Course Description:
How genes influence the developmental processes of an organism. How genetic analysis is used to understand central questions in developmental biology. How genetic analysis of developmental questions is integrated with experimental approaches in embryology, cell biology, molecular biology, biochemistry and genomics. The course will also survey the broad range of animal model systems used for understanding central questions in development.

Course Goals:
1) Understanding the major concepts and principles in developmental genetics. 2) Understand experimental methods and interpretation of experimental results. 3) Understanding of how developmental genetics is integrated with other major disciplines in the life sciences. 4) The ability to apply experimental approaches to address new questions in developmental biology. 5) An understanding of key terminology. 5) The ability to understand primary literature and evaluate conclusions based on data presented. 6) Memorization of some facts will be required. 7) To be mindful of ethical, medical, and societal outcomes in research and technological advances.

Course Materials:
Textbook: Not required this year but a good investment.
Developmental Biology Ninth Edition, Scott Gilbert, ISBN: 9780878935581

3 X 5 index cards for lecture surveys

Note book or paper for taking written notes. If you can take notes on a computer that is fine but it will be more difficult to reproduce things I draw on the board.

Course Web Site:
Canvas

Assigned Reading:
Any assigned reading will be posted on SAKAI site. I will also make announcements about reading assignments in class. Quizzes may include questions from reading assignments.

Lecture material and course format:
For major topics the priority will be a conceptual understanding. After introducing concepts, "real life" examples and all of the noise that comes with them will be discussed. This is the difference between paper and practice.

Some lecture material will be provided on powerpoint slides. I will typically try to make these slides available before each lecture. The slides will include diagrams that are too detailed or too difficult to represent on the chalkboard in class. Please note that you are still responsible for material presented in lecture (usually discussed or on the chalk board) that is not included on powerpoint slides. In other words, you will need to be able to take notes during lecture. **Be prepared to take notes in class.**

Tentative schedule:
Please note that this schedule is tentative. I may not get to every topic listed and I may add topics as the class progresses. The order of topics may change. This class evolves as I try to make it better!

Lecture #	**Date**	**Topic**
1	September 2	Introduction and course policies Thinking about science – The use of logic, evidence, inference and methods. What is developmental biology and developmental genetics
2	September 8	(Monday Class on Wednesday) A history of developmental biology and developmental genetics
3	September 9	Forward and reverse genetics
4	September 13	Model Systems
5	September 16	Basics of embryology Cell types and polarity
6	September 20	Cell specification – two types of development – instructive and determinative
7	September 23	Cell specification – continued Growth and cell proliferation
8	September 27	Guest Lecture: Dr. Ruth Steward – The *Drosophila* model system
9	October 30	Guest Lecture: Dr. Xue Mei – The zebrafish model system
	October 4	**Exam I - Lectures 1-9**
10	October 7	Review of Exam I Mitosis and meiosis review Gametogenesis
11	October 11	Germline specification Cancers of the germline
12	October 14	Defining wild-type and mutant phenotypes Genetic backgrounds, isogeny and inbreeding Types of mutants – phenotypic and molecular levels

13	October 18	Mutagenesis Maintaining mutants – storage and propagation
14	October 21	Genetic Screening – tricks of the trade Classic genetic screens and fly, worm, and weed development Modern twists on genetic screens – molecular tools, reverse genetics, gene knockouts, mosaic analysis
15	October 25	Genetic Screening continued – saturation mutagenesis
16	October 28	Genetic interactions: Epistasis, pleiotrophy, and the genetic, molecular and cell biological definition of pathways
17	November 1	Genetic interactions continued A survey of pathways in biology
	November 4	**Exam II – Lectures 10-18**
18	November 8	Review of Exam II Scientific Literature The biology of fertilization
19	November 11	The biology of fertilization continued
20	November 15	Literature analysis – *spe-9* paper
21	November 18	Literature analysis – Izumo paper
22	November 22	Literature analysis – Juno paper
	November 25	**No Class Thanksgiving Recess**
	November 29	**No class Wednesday schedule**
23	December 2	Literature anlaysis – *spe-45* papers
24	December 6	New forward and reverse genetic approaches Genome editing. Development and Disease
25	December 9	The future of developmental biology Bioethics -Reproductive biology -Embryology
	December 13	**Exam III – Lectures 19-25. Exam week schedule TBD** Reading days December 14-15