

Genes and Development

Spring Semester 2017

Course Syllabus



<http://www.pdn.cam.ac.uk/staff/lewis>

<http://www.hawaii.edu/malamalama/2009/02/development-returns-to-evolution-theory/>

Course Information

Course Title: *Genes and Development* (3 credits)

Course Number: BSC 4029

Course Dates/Time: January 13 – May 6, 9:30 – 10:50 AM Wednesdays and Fridays

Course Location: Boca Campus, TBA

Instructor: **Dr. Catherine Trivigno**
Sansom Science Building Main Office (room 136)
Email: trivigno@fau.edu
Phone: (561) 799-8514
Office hours: Wednesdays 8:20-9:20 AM and Fridays 11:00 AM - 12:00 or by appointment

Course Description: This lecture course is open to advanced undergraduates and graduate students. In this course students will become familiarized with the cellular and molecular mechanisms that underlie organismal development. This will include discussion of specific developmental pathways and topics including differential gene

regulation, intercellular communication, fertilization, pattern formation, organogenesis, animal stem cells and cloning, evo/devo (evolution and development), sex determination, and developmental disorders. A variety of invertebrate and vertebrate experimental model systems will be discussed, including *C. elegans*, *Drosophila*, *Xenopus*, zebrafish, chick and mice. We will discuss both conceptual and experimental advances in developmental biology and the different methodologies that are currently available to developmental biologists.

Course objectives/student learning outcomes: Students will gain facility with the issues, concepts, and experimental approaches of historical and modern developmental biology. They will be able to integrate this knowledge into a wider framework of understanding the diversity and complexity of living organisms.

Course prerequisites: Students must have already completed Introductory Biology (BSC 1010, BSC 101OL and BSC 101I and BSC 101IL) with a grade of C- or better. It is preferable to have also completed Genetics (PCB 3063), Biochemistry (BCH 3033), or Molecular and Cell Biology (PCB 4023). *In the absence of any of these three courses, consultation with the instructor is required.*

Course evaluation methods: There will be a quiz or exam each week in this course (except for week 1). Please see the section on attendance below. More than one unexcused absence will result in an "F". Students may not make up any quiz or exam missed due to an unexcused absence or to arriving late for class.

Students taking the course for undergraduate credit will be graded based on their performance in the following areas.

4 quizzes (out of 5- lowest quiz grade dropped)-50% total (date TBA)
2 exams – 50% total

Required Textbook:

Essential Developmental Biology, Jonathan Slack
3rd edition 2012 Wiley-Blackwell Press
ISBN#: 978-1-1180-2286-3

Tentative List of Topics (topics, timing, and order subject to change):

- Week 1** Course Overview and Introduction – overview of developmental biology
- Assignment** – Read Ch. 1-2, study Powerpoint slides on Blackboard
- Week 2** Concepts in regulation of gene expression – transcription and translation, regulatory sequences, transcription factors, epigenetics
- Assignment** – Read Ch. 3, study Powerpoint slides on Blackboard
- Week 3** Developmental biology methodologies – microscopy, genetics, genomics/bioinformatics, comparative approaches
- Assignment** – Read Ch. 4, study Powerpoint slides on Blackboard
- Week 4** Classical and Experimental Embryology – worms vs. flies vs. frogs vs. chicks vs. mice
- Assignment** – Read Ch. 5 & 6, study Powerpoint slides on Blackboard
- Week 5** Transcription Regulation – The discovery of Hox genes
- Assignment** – Read Ch. 7 & 8, study Powerpoint slides on Blackboard
- Week 6** Signaling pathways – Notch, lateral inhibition, TGF-beta, etc
- Assignment** – Read Appendix 1, study Powerpoint slides on Blackboard
- Week 7** Fertilization – gametogenesis and activation of the egg
- Assignment** – Read Ch. 19, study Powerpoint slides on Blackboard
- Exam 1
- Week 8** Pattern Formation – segmentation in Drosophila; Dorsal/Ventral patterning of fly embryo; neural tube patterning
- Assignment** – Read Ch. 11 & 13, study Powerpoint slides on Blackboard

- Week 9** Nervous System Development – neural induction; neural stem cell formation; ASC genes, Notch pathway; neurons versus glia; axonogenesis; synaptogenesis
- Assignment** – Read Ch. 14, study Powerpoint slides on Blackboard
- Week 10** Muscle Development – mesoderm specification; myogenesis; muscle fiber formation and differentiation
- Assignment** – Read Ch. 15, study Powerpoint slides on Blackboard
- Week 11** Evolution and Development – the making of the fittest; Sex determination – comparison of methods in various organisms
- Assignment** – Read Ch. 22, study Powerpoint slides on Blackboard
- Week 12** Stem Cells – embryonic, adult, induced
- Assignment** – Read Ch. 21, study Powerpoint slides on Blackboard
- Week 13** Regeneration/Aging/Cloning – developmental plasticity
- Assignment** – Read Ch. 20, study Powerpoint slides on Blackboard
- Week 14** Development and Medicine – genetic disorders of development; diagnoses and therapies
- Assignment** – Turn in evaluations of student talks, review for exam, study Powerpoint slides on Blackboard

Exam 2

Policy on absences, religious accommodations, makeup tests, and incompletes

Students may not make up any quiz or exam missed due to an unexcused absence or to arriving late for class. Absences for which a medical or court excuse is provided within 48 hours of the absence (professional letterhead required) will be considered excused absences, and the student will be allowed to take a make-up exam or quiz if appropriate. Taking a vacation is not considered an excused absence-it is not acceptable for students to plan vacations that interfere with a six-week course such as this one. Reasonable accommodation will also be made for students participating in a religious observance. Students will be given the opportunity to make up work missed only during excused Absences. An Incomplete (I) may be given to students who, at the end of the course, have not completed all of the required course work due to exceptional circumstances, but otherwise have passing grades.

Students with Disabilities

In compliance with the Americans with Disabilities Act (ADA), students who require reasonable accommodations due to a disability to properly execute coursework must register with the Office of Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses- Boca Raton, Davie, and Jupiter, however, disability services are available for students on all campuses.

Code of Academic Integrity policy

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001. <http://www.fau.edu/ctl/4.001> Code of Academic Integrity.pdf



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Thursday, October 30th, 2014

To: Charles E. Schmidt College of Science
Biology Department

The Biomedical Science Department in the Charles E. Schmidt College of Medicine has reviewed the new Biology course proposals for **BSC 4029- Genes and Development (undergraduate course)** and **BSC 6079- Genes and Development (graduate course)**, and does not have any objections. The courses do not contain any material that could constitute a conflict with our Biomedical Science Graduate program curriculum.

Sincerely,

A handwritten signature in cursive script that reads 'Marc Kantorow'.

Marc Kantorow, Ph.D.
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