

BIOL-UA 26 Developmental Biology

Instructors:

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Course Description:

The course covers the fundamentals of developmental biology in plants and animals with an emphasis on developmental genetics approaches that have connected specific genetic pathways to developmental traits. The first part of the course develops basic principles of developmental biology, including cell-cell signaling, cell identity, pluripotency, and differentiation. These are taught through examples of early development in plants and animals. The emphasis is on the concepts that connect animal and plant development, such as signaling mechanisms that maintain stem cell niches and the factors that determine the developmental potential of a cell. The second part of the course focuses primarily on animal development, such as gastrulation, limb and heart development.

Pre-requisite:

Molecular and Cell Biology I (BIOL-UA 21)

Textbook and Required Materials:

N/A

Grading:

Midterm 1	30%
Midterm 2	30%
Final Exam	30%
Class Participation	10%

Topics:

Introduction, Concepts in Developmental Biology
Mechanisms of differentiation
Induction, asymmetric division
Morphogens
Cell-cell signaling
Polarity and the organizer
Fertilization in Animals and Plants
Introduction to Plant Development
Hormone regulation in plants
Root development
Developmental Plasticity and Symbiosis
Discussion of Carlsbecker et al.
Shoot Development
Cellular Plasticity in Plants
Induced Pluripotent Cells (iPS)
Following cells in development
Early development in invertebrates
Macho-1 in ascidian



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Early *Drosophila* development
Patterning the *Drosophila* embryo
Segmentation in *Drosophila*
Early amphibian development
Comparison with amniotes
Neurulation, Neural tube patterning
Neural crest
Axonal guidance, target specificity
Segmentation in vertebrates
Myogenesis
Vertebrate limb development
Heart development
Gut development
Sex determination in mammals
Sex determination in *Drosophila*
Germ cells specification and migration
Evolutionary Developmental Biology
Evolutionary Developmental Biology II
Paper discussion (TBD)