

University of Arkansas – Fort Smith
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General Syllabus

BIOL 4914 Developmental Biology

Credit Hours: 4

Lecture Hours: 3

Laboratory Hours: 3

Prerequisite: BIOL 3803/3801 Genetics/Lab

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

The study of the progression through time and space from a single cell, the fertilized egg, to a complex multicellular organism. Explores the processes of morphogenesis, differentiation, pattern formation, growth, and reproduction at the molecular, cellular, and organismal levels to provide a current overview of development in a wide variety of organisms.

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Assess basic principles of embryonic development common to multicellular organisms.
2. Classify differences in developmental strategies that have evolved together with different groups of organisms.
3. Evaluate the importance of postembryonic development.
4. Assess modern approaches used in developmental genetics to dissect the molecular control of development.
5. Give examples of molecular regulatory hierarchies that control development and explain how they work.

A. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students analyze mechanisms of organismal development and predict developmental responses to environmental factors.

Communication Skills (written and oral)

Students will communicate and display understanding of the protocols/procedures in the form of oral presentation. They would explore peer-reviewed papers on the current status of research in the field and its applications and write a short essay to communicate their understanding.

Ethical Decision Making

Students will investigate the ethical dilemmas associated with genetic manipulation of organismal development.

Global and Cultural Perspectives

Students will explore how scientific research in developmental biology has an impact on medicine, agriculture and economy in different parts of the world.

III. Major Course Topics

- A. Common Features of Development
- B. Developmental Genetics
- C. Experimental Embryology
- D. Techniques for the Study of Development
- E. Model Organisms.
- F. Gametogenesis
- G. Fertilization
- H. Cleavage
- I. Genomic Equivalence
- J. Gastrulation
- K. Cell Adhesion and Morphogenesis
- L. Neurogenesis and Axis Induction
- M. Ectodermal Organs
- N. Endodermal Organs
- O. Mesodermal Organs
- P. Mutants and transgenic Mice
- Q. Hox Genes and Vertebrate Development
- R. Sex Determinants
- S. Senescence
- T. Growth, Regeneration, and Evolution