Administrative Unit: Science Department
Course Prefix and Number: BIOL 380
Course Title: Developmental Biology

Number of Credit Hours: 3
Lecture Hours: 3
Laboratory Hours: 0

Catalog Description: Study of animal development, including gamete development and fertilization, embryonic development, mechanisms of cellular differentiation, cell-cell interactions during development, and mechanisms of differential gene expression. Emphasis on understanding development at the cellular and molecular level. Designed to prepare preprofessional students for later studies. Prerequisites: BIOL 110, CHEM 110, BIOL 342. Offered even Fall semester.

Prerequisite(s)/Corequisite(s): BIOL 110, CHEM 110, BIOL 342.

Text(s): General texts addressing molecular and genetic aspects of developmental biology are suitable, such as:


Course Objectives:
- To understand the basic principles of developmental biology in animals.
- To acquire knowledge of human development by understanding the origins of birth defects.
- To discover similarities and differences in pattern formation during development using several models.
- To integrate concepts of genetics and cell biology to understand mechanism in developmental biology.
- To understand current reproductive issues.

Measurable Learning Outcomes:
- Relate the history of developmental biology to current understanding and issues in the field
- Explain the role of different model organisms in increasing our understanding of specific problems in developmental biology
- Detail the mechanisms by which gametes are formed; compare and contrast these processes for oogenesis versus spermatogenesis
- Summarize important steps in fertilization and egg activation
• Enumerate the different stages in embryonic development and explain the basis of formation of tissue layers and embryo patterning
• Describe the mechanisms involved in generation of vertebrate nervous system, integument, and organs
• Compare and contrast the purpose, hormonal controls, and genetic mechanism that control metamorphosis in insects and amphibians
• Relate the effects of cellular environment and extracellular matrix to cell fate and tissue formation
• Describe the role of regulation of gene expression in embryonic development and cell differentiation; distinguish between transcriptional, translational, and post-translational control mechanisms
• Illustrate the role of homeotic genes in pattern formation and segmentation
• Distinguish between evolutionary lineages of different developmental pathways
• Describe the molecular and genetic basis of specific birth defects in humans
• Summarize technologies in assisted reproduction and discuss associated controversies

Topical Outline (major areas of coverage):
- Study of developmental biology; model organisms
- Gametogenesis and fertilization
- Cell lineages
- Embryogenesis and pattern formation
- Homeotic genes
- Vertebrate organogenesis; tissue interactions
- Insect and amphibian metamorphosis
- Regulation of gene expression during development
- Evolution and development
- Birth defects and reproductive issues

Recommended maximum class size for this course: 25

Library Resources: Online databases are available at http://www.ccis.edu/offices/library/resources.asp. You may access them from off-campus using your eServices login and password when prompted.

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Signature
Date: September 21, 2005

NOTE: The intention of the master syllabus is to provide an outline of the contents of this course, as specified by the faculty of Columbia College, regardless of who teaches the course, when it is taught or where it is taught. Faculty members teaching this course for Columbia College are expected to facilitate learning pursuant to the course objectives and cover the subjects listed in the topical outline. However, instructors are also encouraged to cover additional topics of interest so long as those topics are relevant to the course’s subject. The master syllabus is, therefore, prescriptive in nature but also allows for a diversity of individual approaches to course material.