Bergen Community College
Division of Mathematics, Science, and Technology
Department of Biology and Horticulture

BIO-202 Embryology

General Course Syllabus

Revised: Spring 2014

COURSE TITLE: BIO-202 Embryology

PREREQUISITES: BIO-101 General Biology I and BIO-203 General Biology II

COURSE CREDITS/
CONTACT HOURS: 4 Credits/3 Lecture, 3 Lab

GENERAL EDUCATION
COURSE: No

COURSE DESCRIPTION: Embryology is the study of embryonic development from gametogenesis and fertilization to the development of organs, organ systems, and whole organisms. Additional topics include regeneration and differentiation at both the cellular and tissue level. Laboratory exercises include experiments with living sea urchins, Japanese Medaka fish, Zebra fish, Drosophila, Planaria, Hydra, Dictyostelium, and cauliflower, as well as microscopic examination of serial sections which illustrate the embryonic development of selected model organisms.

REQUIRED TEXTBOOK: **Principles of Developmental Biology,** Fred H. Wilt & Sarah C. Hake, Norton Publishing ISBN 0-393-97430-8

REQUIRED LABORATORY MANUAL: **A Photographic Atlas of Developmental Biology**, Shirley J. Wright, Morton Publishing Company ISBN 0-89582-629-1

STUDENT LEARNING OBJECTIVES

The student will be able to:

1. Identify the process and investigate the critical events of embryonic development.
2. Identify the origin and analyze the function of sex cells.
3. Distinguish the basic principles of embryonic development.
4. Survey the embryonic origin and development of various body organs.
5. Summarize the genetic, biochemical and physiological events of the embryonic development.
6. Demonstrate the methods and techniques employed in embryological research using living material.

The above student learning objectives will be generally assessed or evaluated by instructors using a variety of **assessment instruments** including **lecture exams, laboratory exams, quizzes, laboratory reports, written reports, presentations, projects, etc.** The decisions concerning the type or types and number of instruments that are used in a specific section of the course will be left to the instructor of that section.

Lecture CONTENT:

Chapter		Page
1	Overview of Development	3
2	Gametogenesis, Fertilization and Lineage Tracing	17
3	Oogenesis and early development of *Drosophila*	39
4	Amphibian Development	59
5	Amniote Development	79
6	Development of Ectodermal Derivatives in Vertebrates	101
7	Development of Mesodermal and Endodermal Derivates in Verts	129
8	Metamorphosis	159
9	Plant Meristems	177
10	Reproduction in Plants	192
11	Cell Specification and Signaling in Plants	209
12	Cellular Associations, Environments, and Behaviors	231
13	Tissue Interactions and Morphogenesis	253
14	The levels of Regulation of Gene Expression in Development	279
15	Development Regulatory Networks I	302
16	Development Regulatory Networks II	334
17	Evolution and Development	363

LABORATORY SCHEDULE*:
***Laboratory schedule subject to change due to availability of living organisms.**

1. Introduction, Basic principles governing embryonic development (computer simulations).
   Observations of *Dictyostelium* (living material).

2. Grasshopper spermatogenesis and *Ascaris* oogenesis, maturation, fertilization and development (slides).
   Arbacia Starfish Development (slides).
   Set up *Spongilla* aggregation experiment (living material).

3. Sea urchin Fertilization (living material).
   Set up cauliflower callus experiment for continued observation throughout the semester (living material).

4. *Drosophila* Life Cycle and examination of developmental stages (living material). Gel electrophoresis of proteins from various developmental stages of *Drosophila* (living material). Examination of *Drosophila* antennapedia mutants (living material).

5. Japanese *Medaka* Fish Development (living material) and observation of development throughout the semester.

6. Frog Development - Testes, ovary, cleavage and blastula slides). Frog Development - Gastrula and neurulation (slides).
   Frog Development hatching stage (slides).

7. Frog Development - 5-7 mm Tadpole(slides)
   Frog Development - 10 mm Tadpole (slides).

8. Set up cauliflower callus differentiation experiment (living material).
   Examination of *Spongilla* aggregation experiment (living material).

9. Introduction to *Hydra*. Set up *Hydra* regeneration experiment (living material).

10. Introduction to Planaria. Set up Planaria regeneration experiment(living material).

11. Chick Embryo- ovary, spermatogenesis, 13-16 hour chick embryo (slides).
    Chick Embryo - 18 hour, 20-22 hour and 33 hour embryo (slides)

12. Chick Embryo - 24-48 hour embryo (slides)
    Chick Embryo - 56-72 hours embryo (slides)

13. Chick Embryo - 96 hour embryo (slides).

14. Examination of results of *Hydra* and Planaria regeneration experiments (living material).

15. Examination of cauliflower clones (living material).

If you have a medical condition or develop a medical condition during this semester, which prevents you from fulfilling the requirements of this course, you must notify your physician. You and your physician must decide whether or not it is appropriate for you to remain in this course. If the decision is to remain in this course, please obtain a letter from your physician indicating that your continued participation in this course is appropriate and present it to the Department Chair.