

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

Embryology (BIO-222)

General Course Syllabus
Spring 2016

Course Title: Embryology (BIO-222)

Course Description: This course is the study of vertebrate embryonic development from gametogenesis and fertilization to the development of the body organs. Laboratory exercises include experiments with living sea urchins, Japanese medaka fish, frogs, and chick embryos, as well as microscopic examination of the various sections of the embryos.

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

General Education Course: No

Course Credits: 4.0

Hours per week: 6.0: 3 hours lecture and 3 hours lab

Course Coordinator: John Smalley

Required Lecture

Textbook: Essential Developmental Biology, 3rd edition, Jonathan M. W. Slack, Wiley-Blackwell
ISBN: 978-0-470-92351-1

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.
7. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
8. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

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. This information, when given by the instructor should be recorded by the student in the **Student Assessment Section** of this document.

Course Content

Lecture Content (including but not limited to):

Topic

1. Overview of Development
2. Gametogenesis, Fertilization and Lineage Tracing
3. Oogenesis and early development of *Drosophila*
4. Amphibian Development
5. Amniote Development
6. Development of Ectodermal Derivatives in Vertebrates
7. Development of Mesodermal and Endodermal Derivates in Vertebrates
8. Metamorphosis
9. Plant Meristems
10. Reproduction in Plants
11. Cell Specification and Signaling in Plants
12. Cellular Associations, Environments, and Behaviors
13. Tissue Interactions and Morphogenesis
14. Gender Determination 279
15. Regeneration
16. Stem Cells and Regenerative Medicine 334
17. Evolution and Development

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).

Student Assessment:

Lecture Examinations	%
Laboratory Component	%
Student Project/Report	%
Class Participation	%
Other	%
Total	100%

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.

Faculty Addenda: As per individual faculty member

Lecture Attendance: As per instructor;

Lab Attendance: As per instructor;

Policy Concerning Late Assignments: As per instructor;

Policy Concerning Make-Up Testing: As per instructor;

Safety Information: As per instructor and assigned exercise;

College Policies:

Student Responsibility

Students will be held responsible for reading all pertinent information in college publications regarding withdrawals, course drops, college deadlines, and tuition refunds. Students are responsible for compliance with the rules and regulations as stated in college publications.

Absence of Instructor

Students are expected to wait twenty minutes for a faculty member to come to class. If at the end of twenty minutes, the faculty member does not come, the students should sign an attendance sheet, which indicates the course, date, and time. A student should deliver the attendance sheet to the divisional office (A304) if between 9:00 a.m. and 5:00 p.m. or to the Evening Office (C107) if before 9:00 a.m. or after 5:00 p.m. Students cannot be penalized by faculty for not waiting longer than twenty minutes.

Academic Dishonesty and Plagiarism

Bergen Community College is committed to academic integrity – the honest, fair and continuing pursuit of knowledge, free from fraud or deception. Students are responsible for their own work. Faculty and academic support services staff will take appropriate measures to discourage academic dishonesty. **Plagiarism** is a form of academic dishonesty and may be a violation of U.S. Copyright laws. Plagiarism is defined as the act of taking someone else's words, opinions, or ideas and claiming them as one's own.

Consequences of Violations Academic Integrity

A. Instructor's Sanctions for a Violation

The faculty member will determine the course of action to be followed. This may include:

- Assigning a failing grade on the assignment;
- Assigning a lower final course grade;
- Failing the student in the course
- Other penalties appropriate to the violation;

In all cases, the instructor shall notify the Vice President of Student Services of the violation and the penalty imposed. The student has the right to appeal the decision of the instructor to the appropriate department head.

B. Institutional Sanctions for Violations

When a violation of academic integrity has been reported regarding a student, the Vice President of Student Services may impose disciplinary penalties beyond those imposed by the course instructor, which may include suspension or dismissal from the College. The student shall have the right to a hearing before the Vice President of Student Services or a designated judicial affairs committee. Judicial procedures governing violations of academic integrity are contained in the student handbook.

Class Attendance

All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

Eating and Drinking

Eating or drinking in classrooms, lecture rooms, laboratories, gymnasium, swimming pool, or passageways is forbidden. Covered beverages only are permitted in the library. Eating and drinking are permitted in cafeteria and vending areas only.

Learning Assistance

Henry and Edith Cerullo Learning Assistance Center

The Tutoring Center, English Language Resource Center, Math Walk-In Center and Writing Center are collectively known as the Henry and Edith Cerullo Learning Assistance Center. The Cerullo Learning Assistance Center is located in the Pitkin Education Building, in Room L-125. The telephone number is (201) 447-7489. The Learning Assistance Center, staffed with peer and professional tutors, offers free individual and group tutoring, supplemental instruction, and online tutoring for subjects offered at the College. The Center provides alternative approaches to problem solving and organizational skills. Tutors help clarify classroom lectures and textbooks and help students prepare for exams. These services build student self-confidence and reduce

fear of failure. The Center is equipped with the latest technology and software, including tapes, books, review sheets, exercises and software.

Services for Students with Disabilities

Bergen Community College aims to create inclusive learning environments where all students have maximum opportunities for success. Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Specialized Services at 201-612-5269 or via email at ossinfo@bergen.edu for assistance.

Sidney Silverman Library

Main Building, Pitkin Education Center, L-wing, 2nd Floor.

Paramus Library Hours: (201) 447-7131 or visit <http://www.bergen.edu/library/calendar/gcal.htm>

Paramus Service Desk: (201) 447-7970

Meadowlands Location: 1280 Wall Street, Lyndhurst 2nd Floor

Meadowlands Library Hours: <http://www.bergen.edu/library/calendar/gcal.htm>

Meadowlands Service Desk: (201) 301-9692

www.bergen.edu/library

Testing Services

The Bergen Community College Office of Testing Services (OTS) is located in Room S-127. OTS serves the college community by identifying, developing, procuring, administering, processing, and/or evaluating examinations, which meet a variety of administrative and instructional needs. To contact the OTS, please call (201) 447-7202. The Office of Testing Services administers makeup tests as a service for students who, for compelling and exceptional reasons, have missed a scheduled classroom examination. Students must receive prior permission from and make arrangements with their course instructors to take these examinations, under specific conditions, in the Office of Testing Services, Room S-127.

WebAdvisor

WebAdvisor is a web interface that allows students to access information contained in Datatel's Colleague, the administrative database used by Bergen Community College. Students may use WebAdvisor to register for classes, to pay tuition and fees, to view their class schedules, to check grades, to check on progress toward degree requirements, etc. WebAdvisor accounts are available for all students enrolled in credit programs. New students are strongly encouraged to attend an in-person registration or advisement session before using a WebAdvisor account. Eligible students without WebAdvisor user names and passwords may access their WebAdvisor account by going to go.bergen.edu and selecting "I'm new to WebAdvisor." Then, follow the on-screen directions. Check the WebAdvisor FAQ for answers to common questions, such as how to reset your password. Students must have a valid e-mail address on file with the College to use WebAdvisor