

Kingsborough Community College
The City University of New York
Department of Biological Sciences

Biology 22 - **Developmental Biology** Spring 2020

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Course Description - Bio 22 is a 4 credit course in Developmental Biology and consists of lecture (3 hours per week) and laboratory (3 hours per week). Prerequisites for the course include one year of General Biology (BIO 13 and 14) and one semester of Chemistry (Chem 11). Embryonic development and its regulatory mechanisms will be studied in representative invertebrate and vertebrate species, including the processes of gametogenesis and fertilization. Current experimental molecular and cellular techniques and results are interwoven with the historical evidence of the subject. Microscopic studies, films, drawings, models and student experiments are used to show the major stages of development and the dynamic processes of embryogenesis. This course satisfies the elective credit requirement for Biology majors.

Student Learning Outcomes

Course Outcomes

1. Demonstrate an understanding of the early stages of embryonic development in select model organisms including specific genes involved in these stages.
2. Understand and list the four main processes involved in animal development.
3. Demonstrate an understanding of basic experimental approaches used in developmental genetics.
4. Know the important experiments required to show proof that a gene product is responsible for a particular process.
5. Understand at the molecular level how selected organs, tissues, and cells develop and differentiate.
6. Demonstrate an understanding of the role, and potential therapeutic applications, of embryonic stem cells, tissue-specific stem cells, and induced pluripotent stem cell.

Required Textbooks:

Lecture - *Essential Developmental Biology*

by Jonathan M.W. Slack 3rd edition. Wiley-Blackwell 2013 ISBN 978-0-470-92351-1

Laboratory - The Lab manual can be purchased on line at <http://labs.devbio.com/> by clicking on the **Purchase Access Online** link.

You will also need to purchase a microdissection kit (~\$15) at the bookstore and bring it with you to lab each week. As in all KCC bio labs, you will also need a lab coat, eyewear, gloves and closed shoes (no sandals) every week.

Grading Structure

Lecture

3 Lecture Exams	10%
Weekly online quizzes	10%
In class assignments	10%
Final Exam	20%
Total	50%

Lab

Pre-lab questions	15%
Post lab questions	10%
Term paper/project	10%
Lab practical	15%
Total	50%

Academic Integrity Policy

Academic dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension, and expulsion. Examples of academic dishonesty include cheating, plagiarism, internet plagiarism, obtaining unfair advantage, and falsification of records. A full definition of each form of academic dishonesty, as well as procedures for imposition of sanctions for violations of the CUNY Policy on Academic Integrity, may be accessed at www.kingsborough.edu/Academic_Integrity_Policy.pdf.

Accessibility Statement

Access-Ability Services (AAS) serves as a liaison and resource to the KCC community regarding disability issues, promotes equal access to all KCC programs and activities, and makes every reasonable effort to provide appropriate accommodations and assistance to students with disabilities. Please contact this office if you require such accommodations and assistance. Your instructor will be glad to make the accommodations you need, but you must have documentation from the Access-Ability office for any accommodations.

Attendance

You are expected to attend all lectures and labs. It is ALWAYS better to see me BEFORE any absence. If you miss a lecture, please speak with me as soon as possible to find out what you missed. Make sure to get notes from a classmate. If you miss a lab, speak to me as soon as possible to find out how you can make up the work.

KCC policy states that students who are absent more than 15% of the class hours will be assigned a WU grade (Unofficial Withdrawal). For BIO 22 if you miss more than 9 hours in any combination of lecture and/or lab, you will receive a WU unless you have appropriate documentation for the absence, such as a doctor's note.

Quizzes and Exams

Weekly online quizzes will be given. These can be accessed through Blackboard.

The exams will contain multiple choice questions, matching columns, and short written answers based on the material discussed in lectures and on assigned reading in the textbook. The **final exam** is cumulative (comprehensive). The format will be similar to the lecture exams. The final is worth 20% of your total grade. I will announce the date, time and place of the final exam as soon as it is scheduled. If you are unable to take an exam on the scheduled date, you must see me BEFORE that date to discuss whether we can schedule a make-up. If the make-up is given after the scheduled exam date you will lose 10 points off the exam. Make-ups are only permitted under unusual circumstances. If you are late on the day of an exam, no extra time will be allowed. Any quizzes or exams that you do not take will be counted as a zero.

Assignments

Your assignments include pre-lab questions, post lab questions and a term paper or project. **Pre-lab** questions are found in the lab manual. These are to be completed *before* the lab and handed in at the beginning of each lab. During lab, you will be asked to make observations and drawings complete post lab questions, which will be submitted before you leave the lab. You will also complete a **creative project**, which will be presented to the class at the end of the semester. I will meet with each student to discuss this project. Late assignments will lose 5% of the grade for each day after they are due. See Assignment handout for details.

Lecture schedule

Week	Date	Lecture Topic	Reading assignment
1	March 3	Introduction to Developmental Biology Background	Chapter 1 Appendix
2	March 10	How development works Approached to Development: Developmental genetics	Chapter 2 Chapter 3 (Part 1)
3	March 17	Approached to Development: Developmental genetics Approached to Development: Experimental embryology Model Organisms	Chapter 3 (Part 2) Chapter 4 Chapter 6
4	March 24	Exam 1 <i>Gametogenesis in selected organisms: Xenopus</i>	Chapter 7
5	March 31	Cleavage & Gastrulation in selected organisms: <i>Xenopus</i> , Chick & <i>C. elegans</i>	Chapters 7, 9 & 12
6	April 7	Organogenesis in selected organisms; <i>Xenopus</i> , Chick & <i>C. elegans</i>	Chapters 7, 9 & 12
7	April 21	Exam 2 Development of the Nervous System	Chapter 14
8	April 28	Development of Mesodermal organs (selected) Development of Ectodermal organs (selected)	Chapter 15 Chapter 16
9	May 5	Tissue organization & Stem cells	Chapter 18
10	May 12	Exam 3 Regeneration of missing parts	Chapter 20
11	May 19	Application of Pluripotent and stem cells	Chapter 21
12	June 2	Growth, Aging and Cancer	Chapter 19
		Final Exam	

Laboratory Schedule

Week	Date	Lab Topic	Lab Assignment
1	March 4	Microscope	Chapter 3
2	March 11	Gametogenesis	Chapter 5
3	March 18	Echinoid fertilization & development	Chapters 6 and 7
4	March 25	Early development and environmental effects on the embryo – amphibian development	Chapter 14
5	April 1	Early development and environmental effects on the embryo – Brine shrimp development	Handout
6	April 22	Early Chick development	Chapter 9
7	April 29	33-hour Chick embryo	Chapter 10
8	May 6	Late Stage chick embryos	Chapter 11
9	May 13	Planarian Regeneration	Chapter 13
10	May 20	Fetal Pig dissection	Handout
11	May 27	Lab Practical	
12	June 3	Presentations	