



DEPARTMENT OF BIOLOGY  
College of Arts and Sciences  
University of the Philippines Manila



<b>Course Code:</b> BIO 133 (animal part)	<b>Course Title:</b> Animal Development
<b>Credit Units:</b> 5 units (3 units lecture, 2 units lab)	
<b>Pre-requisite:</b> Bio 126 (Animal Morphology and Physiology)	
<b>Course Description:</b> The early ontogenetic development of vertebrates	
References:	
<b>Lecture :</b>	
<ol style="list-style-type: none"><li>1. Carlson, B.M. 1996. Patten's Foundation of Embryology. 6th ed. New York, N.Y.: McGraw Hill Book Company.</li><li>2. Gilbert, S. F. &amp; Barresi, M. J. F. 2016. Developmental Biology. 11th ed. Sinauer Associates, Inc.</li><li>3. Wilt, F &amp; S. Hake. 2004. Principles of Developmental Biology. New York: W.W. Norton &amp; Company.</li><li>4. Sadler, T.W. 2015. Langman's Medical Embryology Thirteenth Edition. Philadelphia: Wolters Kluwer Health</li></ol>	
<b>Laboratory:</b>	
<ol style="list-style-type: none"><li>1. Eakin, Richard. 1978. Vertebrate Embryology. A Laboratory Manual. 3<sup>rd</sup> ed. Barkely &amp; Los Angeles: University of California Press.</li><li>2. Gilchrist, Francis. 1968. A Survey of Embryology. New York: McGraw Hill Book Company.</li><li>3. Huettner, A.F. 1949. Comparative Embryology of Vertebrates. Rev. Ed. New York, N.Y. McMillan.</li><li>4. Matthews, W.W. &amp; G.C. Schoenwolf. 1998. Atlas of Descriptive Embryology. 5<sup>th</sup> ed. New Jersey: Prentice Hall. Inc.</li><li>5. Oppenheimer, Steven and R. Chao. Atlas of Embryonic Development. Boston London: Allyn &amp; Bacon, Inc.</li><li>6. Rugh, Roberts. 1951. The Frog. Its Reproduction and Development. New York, N.Y.: The McGraw-Hill Book Company.</li></ol>	

**B.S. Biology Program Objectives:**

1. To develop substantial understanding of life and living processes.
2. To demonstrate proficiency in oral and written communication skills.
3. To engage in cutting-edge research with minimal supervision.
4. To formulate methods and strategies to address health and environmental problems through a systems approach.

5. To demonstrate competencies in areas of ecology, genetics, molecular biology, physiology, and developmental biology.
6. To demonstrate social and professional responsibility and ethical behavior in multi-cultural settings and scenarios.

**Lecture Course Plan** (The course plan is subject to change as circumstances warrant).

<b>WEEK</b>	<b>Topic</b>	<b>Learning Outcome</b>	<b>Assessment</b>	<b>Teaching and Learning Activities</b>
		At the end of this lesson, the student should be able to:		
Oct. 16	Key concepts in ontogenetic development	At the end of this lesson, the student should be able to: <ol style="list-style-type: none"> <li>1. Define terms commonly used in animal development.</li> <li>2. Analyze embryonic events based on the defined terms.</li> </ol>	Discussion questions	Lecture and recitation
Oct. 23	Transport of Gametes and Fertilization	At the end of this lesson, the student should be able to: <ol style="list-style-type: none"> <li>1. Describe the events in the transport of animal gametes from the male to the female parent.</li> <li>2. Discuss the events that happen during the fertilization of the egg cells, including the acrosomal reaction.</li> <li>3. Explain the role of calcium ions during the cortical reaction and how the egg cell is activated to develop.</li> </ol>	Discussion questions	Lecture and discussion after the journal reports  Journal Reports on the following: Oogenesis Spermatogenesis Fertilization
Nov. 6	Cleavage, Blastula and Gastrula <ul style="list-style-type: none"> <li>● Formation of the germ layers and early derivatives</li> <li>● Establishment of the</li> </ul>	At the end of this lesson, the student should be able to: <ol style="list-style-type: none"> <li>1. Describe the process of making a fertilized egg become a multicellular embryo.</li> </ol>	Discussion questions	Lecture and discussion after the journal report  Journal Report on the following: Gastrulation

	basic embryonic body plan	<ol style="list-style-type: none"> <li>2. Differentiate the different patterns of cleavage seen in different animals</li> <li>3. Explain how the process of cleavage is regulated in a fertilized zygote.</li> <li>4. Discuss the formation of a blastula and gastrula in the early stages of development.</li> <li>5. Discuss how the process of gastrulation transforms the blastula into an embryo with three germ layers.</li> <li>6. Identify what organs are derived from the three germ layers and other mesenchymal cells.</li> </ol>		
Nov. 13	Development of the body systems: Integument, Skeleton and Muscular systems	<p>At the end of this lesson, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Discuss how the ectoderm and mesoderm layer differentiates into the skin, skeletons and muscles of animals, particularly the vertebrates.</li> <li>2. Explain how certain abnormalities or anomalies in these organ systems are formed during embryonic development.</li> </ol>	Discussion questions	<p>Lecture and discussion after the journal reports</p> <p>Journal Reports on the following: Development of the Skin Development of the Skeletal System Development of the Muscular System</p>
Nov. 20	Nervous system Neural crest Sense organs	<p>At the end of this lesson, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Discuss how the ectoderm differentiates and develops into the nervous system, including the sense organs of</li> </ol>	Discussion questions	<p>Lecture and discussion after the journal reports</p> <p>Journal reports on the following: Development of the Nervous System Development of the Eyes</p>

		<p>vertebrates.</p> <ol style="list-style-type: none"> <li>2. Explain how the neural crest is formed during the differentiation of the ectoderm and enumerate derivatives from it.</li> <li>3. Explain how certain abnormalities or anomalies of the brain, spinal cord and sense organs of vertebrates are formed during embryonic development.</li> </ol>		Development of the Ears
Nov. 27	<p>Body cavities Digestive system Respiratory system Urogenital system</p>	<p>At the end of this lesson, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Discuss how the embryo forms its body cavities during gastrulation.</li> <li>2. Discuss how the internal organs of breathing, digestion, excretion and reproduction are formed from either the endoderm or mesoderm or from both during the embryonic development.</li> <li>3. Explain how certain abnormalities or anomalies of the respiratory, digestive and urogenital systems of vertebrates are formed during embryonic development.</li> </ol>	Discussion questions	<p>Lecture and discussion after the journal reports</p> <p>Journal Reports on the following: Development of the Respiratory System Development of the Digestive System Development of the Female Reproductive System Development of the Male Reproductive System Development of the Excretory System</p>
Dec. 4	Cardiovascular system	<p>At the end of this lesson, the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Discuss how the mesoderm differentiates and develops into the cardiovascular system</li> </ol>	Discussion questions	<p>Lecture and discussion after the journal reports</p> <p>Journal Report on the following:</p>

		<p>of vertebrates.</p> <p>2. Explain how the heart, blood vessels, blood cells and blood are formed during the differentiation of the mesoderm.</p> <p>3. Discuss the pattern of establishing connections between the organs and the vascular system.</p> <p>4. Explain how certain abnormalities or anomalies of the brain, spinal cord and sense organs of vertebrates are formed during the embryonic development.</p>		Development of the Circulatory System
Dec. 11	First Lecture Exam in Embryology			
Dec. 16	Second Lecture Exam in Embryology			
Dec. 19	Final Exam in Embryology			

**December 10 - End of classes**

**GRADING SCALE**

93 – 100 = 1.00  
90 – 92 = 1.25  
87 – 89 = 1.50

75 – 79 = 2.25  
70 - 74 = 2.50  
65 - 69 = 2.75

84 – 86 = 1.75  
80 – 83 = 2.00

60 - 64 = 3.00  
54 - 59 = 4.00  
**BELOW 54 = 5.00**

## **PASSING THE COURSE**

In order to pass this course, the student should meet all of the following:

1. Has satisfied all the course requirements in both lecture and laboratory parts.
2. Has passed in both lecture and laboratory (has a grade of 3.0 or better in each component).
3. Has a final grade (60% lecture + 40% lab) of 3.0 or better.

## **Exemption Grade**

1. **Students who obtain a prefinal grade of 2.5 will be exempted from the final exam.**
2. **For students who are exempted from the final exam, the grade distribution in the Embryology part will be 45% for the two long exams and 5% for the journal report.**

## **MODE OF DELIVERY**

This course will be conducted onsite. Online sessions will be held depending on certain situations.

## **COMMUNICATION**

Announcements will be posted on VLE. Please check the course page regularly, especially during the official class schedule, for updates. For consultation, questions or concerns, you may contact the lecturers through email or through the learning management system. For questions sent outside of the official class schedule, expect a reply within one to two days during working hours (Monday to Friday, 8:00 AM to 5:00 PM). Please do not expect a reply outside of working hours, during weekends and holidays.

## **ETIQUETTE FOR SYNCHRONOUS SESSIONS.**

Please observe the following etiquette for synchronous meetings:

1. Be on time. Join at least 5 minutes before the scheduled meeting.
2. Use your UP email account to join, then rename yourself (First name, Last name)
3. Mute your microphone if it is not your turn to talk.
4. Turn on your video when requested to do so. We want to make sure that we are talking to real people who are actually “present” and paying attention to the meeting.

5. Dress appropriately. Please do not show up in your pajamas, undershirts or revealing outfits.
6. Do not post pictures of the meeting online or anywhere public. Let us respect and protect each other's privacy.

## UNIVERSITY POLICIES

1. **ACADEMIC INTEGRITY.** The rules on the academic integrity will be strictly enforced. However, these will not be prejudiced to any disciplinary action that might be imposed by college authorities. Any form of cheating during online exams and plagiarism merits a grade of 5.0 for that course. The student cannot avoid getting a 5.0 by dropping the course. At the start of any assignment, quiz or exam, the student would be reminded of this pledge:

*As a student of the University of the Philippines. I pledge to act ethically and uphold the value of honor and excellence. I understand that suspected misconduct on given assignments/examinations will be reported to the Appropriate office and if established, will result in disciplinary action in accordance with University rules, policies and procedures. I may work with others only to the extent allowed by the Instructor.*

2. **COPYRIGHT NOTICE.** The students must observe fair use of copyrighted materials. Based on the OVPAA Memorandum No. 2020-105:

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The **Acceptable Use Policy** :

- (a) May be agreed to by students when they access the respective Constituent University's Learning Management System (e.g. CRS or SAIS).
- (b) The [CU LMS] is covered by the University of the Philippines' Acceptable Use Policy, which can be accessed at <https://upd.edu.ph/aup/>.

(c) By logging into [CU LMS], the student agrees to the Acceptable Use Policy of the University.

**CONFORME OF THE STUDENT (requires a signature from the student)**

I, \_\_\_\_\_, have fully and completely read and understood the content of this course syllabus especially on the University Policies. I will strictly abide by these stipulated rules, guidelines and policies. Any act that proves my violation of any of the given stipulations will result in disciplinary action.

Signature of student: \_\_\_\_\_ Date: \_\_\_\_\_