



Course Specifications

Course Title:	Embryology
Course Code:	4014352-3
Program:	General Biology
Department:	Department of biology
College:	Faculty of Applied Science
Institution:	Um Al-Qura University

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A. Course Identification

1. Credit hours: 3 hours.
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4th Year / Level 8.
4. Pre-requisites for this course (if any): Vertebrates (4012322-3).
5. Co-requisites for this course (if any): NA.

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	50
2	Blended	-	-
3	E-learning	-	-
4	Correspondence	-	-
5	Other	30	50

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	42
3	Tutorial	-
4	Others (specify)	30
	Total	102
Other Learning Hours*		
1	Study	30
2	Assignments	8
3	Library	15
4	Projects/Research Essays/Theses	10
5	Others (specify)	-
	Total	63

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>Embryology is designed for the students to understand gamete formation, fertilization and embryo development concepts in animals. Also, comparison of the events of cleavage, blastulation and gastrulation in selected chordate embryos must be covered. Understanding the formation of some selected organs created by ectoderm, endoderm and mesoderm in addition to extra-embryonic membranes and their role in the formation of placenta. Knowing the different stages of pregnancy in humans and the events that happen in each stage with clear idea about multiple births and formation of twins.</p>
<p>2. Course Main Objective</p> <p>By the end of this course the students are expected to be able to:</p>

- After completing this course student should be able to:
- Define the process of embryonic development in general.
- Describe the major phenomena of development, growth and differentiation.
- Explain the process of fertilization.
- Comparison the events of cleavage, blastulation and gastrulation in selected chordate embryos.
- Understand the formation of some selected organs created by ectoderm, endoderm and mesoderm.
- Study the extra-embryonic membranes and their role in the formation of placenta.
- Know the multiple birth and formation of twins.
- Gain the scientific terms of embryology which allow the students how to deal with internet, text books and references.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Identify the different the process of embryonic development in general.	
1.2	Know the process of fertilization, cleavage, gastrulation and organogenesis in representative chordate embryos.	
1.3	Learn the fate maps and the origin of ectodermal, mesodermal and endodermal structures	
1.4	Distinguish the the extra-embryonic membranes and their role in the formation of placenta.	
1.5	Enumerate the structure and function of placenta to the mammalian embryos	
1.6	Remember the terms of embryology.	
1.7	Know the multiple birth and formation of twins.	
1.8	Follow embryonic stages and serial sections under light microscope.	
2	Skills:	
2.1	Explain the different stages of gametogenesis, fertilization and embryogenesis.	
2.2	Distinguish the embryonic regions and follow their early and late stages.	
2.3	Describe, draw steps of embryonic stages and formation of organs and systems from early to late stages.	
2.4	Define extraembryonic membranes in non-mammalian and mammalian embryos.	
2.5	Apply / study skills of microscopic examination (W.M. & serial sections) and models for different stages of chordate embryos.	
3	Competence:	
3.1	Developing oral presentations and leader ship activity	
3.2	Perform self-directed learning.	
3.3	Communicating personal ideas and thoughts	
3.4	Tabulate experimental data	
3.5	Work independently, Self-learning and as part of a team,	
3.6	To apply, describe, discuss, or contribute reports.	

C. Course Content

No	List of Topics (16 weeks)	Contact Hours
1	Introduction to the basis of embryology. <ul style="list-style-type: none"> History of embryology. Definition of Growth and cell differentiation. Brief of main embryonic stages. 	2
2	<ul style="list-style-type: none"> Reproduction, types of reproduction (asexual and sexual). Origin of sex cells and formation of gonads. Male reproductive system. Spermatogenesis. 	2
3	Female reproductive system; Oogenesis. <ul style="list-style-type: none"> Yolk and its role in egg formation. Types of eggs according to the amount and distribution of yolk granules. Ovum membranes (primary and secondary). Comparison of male and female gametes. Comparison of fertilization in some studied chordates Formation of eggs in frog, birds and mammals. 	2
4	<ul style="list-style-type: none"> Fertilization; Acrosomal reaction. Main embryonic stages: cleavage, gastrulation and embryogenesis. Types of Cleavage blastula; Fate maps 	2
5	Early embryonic development of amphioxus: cleavage, gastrulation and organogenesis, in addition, formation of early and late larva of amphioxus.	2
6	Midterm exam	2
7	Early embryonic development of frog: <ul style="list-style-type: none"> Organogenesis in frog: Neurole stage. Frog embryo 3mm. Frog embryo 4-5.5 mm. Formation of some ectodermal organs: <ul style="list-style-type: none"> Nervous system (central and peripheral system and neural crest). Sense organs (optic, otic and olfactory organs). Formation of some mesodermal organs: <ul style="list-style-type: none"> Heart and urino-genital systems. Formation of some endodermal organs: <ul style="list-style-type: none"> Alimentary canal, liver and pancreas. 	2
8	Early embryonic development of frog: Organogenesis <ul style="list-style-type: none"> Frog embryo 7-10mm. 	2
9	Early Embryonic development of chick embryo: <ul style="list-style-type: none"> Chick embryos 16, 18, 20, 24, and 33 hrs. Wholemout stages and serial sections to follow organogenesis. 	2
10	Embryonic development of chick embryo: at 40-72 hrs. <ul style="list-style-type: none"> Cephalic flexion and embryonic torsion. Heart formation; Blood circulation; Brain formation; limb and tail bud formation. 	2

11	Embryonic development of chick embryo: at 72-96 hrs. <ul style="list-style-type: none"> • Herat formation; Blood circulation; Brain formation; limb and tail bud formation. 	2
12	Extra-embryonic membranes in birds: <ul style="list-style-type: none"> • Yolk sac; Amnion and chorion; Allantois. 	2
13	Embryonic development of rat embryo: <ul style="list-style-type: none"> • Cleavage, blastocyst, implantation and formation of placenta. 	2
14	Placenta: <ul style="list-style-type: none"> • Definition, function, formation. • Role of extra-embryonic membranes and endomertrium. • Formation of chorio-vitelline and chorio-allantoic placenta. • Types of placenta according to: • Number of parries (epithelochorial, syndesmochorial, endotheliochorial and haemochorial placenta). • Shape (diffuse, cotyledonary, zonary and discoidal). • Fate of placentas (non-deciduous and deciduous placenta). 	2
15	Revision	2
16	Final exam.	
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		
1.1	Identify the different the process of embryonic development in general.	1.Lectures and student research papers. 2.The using of visual display such as PowerPoint. 3.Homework assignments. Discussions (connecting what they learn in the class and applying this information in laboratory).	- Homework and Quizzes. - Midterm and final written exams. - Evaluation of reports. - Group discussions and participation in the lecture. Course work reports.
1.2	Know the process of fertilization, cleavage, gastrulation and organogenesis in representative chordate embryos.		
1.3	Learn the fate maps and the origin of ectodermal, mesodermal and endodermal structures.		
1.4	Distinguish the the extra-embryonic membranes and their role in the formation of placenta.		
1.5	Enumerate the structure and function of placenta to the mammalian embryos.		
1.6	Remember the terms of embryology.		
1.7	Know the multiple birth and formation of twins.		
1.8	Follow embryonic stages and serial sections under light microscope.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	Skills		
2.1	Examine and describe glands.	<ol style="list-style-type: none"> Interactive lectures. Seminars. Participation of students in discussions during the lecture. Trying to explain the issues in regular and motivated manner. Follow up the students in lab and during carryout all analytical techniques.	<ul style="list-style-type: none"> - Exam must contain questions that can measure these skills. - Quiz and exams. - Discussions after the lecture. Practical exam.
2.2	Determine hormonal impact and syndromes.		
2.3	Use computers and internet to search for the latest information in endocrinology and its applications.		
3.0	Competence		
3.1	Personal leadership activity	<ul style="list-style-type: none"> • Oral presentations. • Internet search assignments and essays. • Incorporating the use and utilization of computer in the course requirements. 	<ul style="list-style-type: none"> - Evaluation of student essays and assignments. - Marks given to for good reports and presentations. Evaluating during the discussion in lecture and reports. Part of the grad is put for student's written participation.
3.2	Teamwork activity		
...	Reports and presentations		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodical Exam(s)	4	10 %
2	Mid Term Exam (Theoretic)	8	20 %
3	Mid Term Exam (practical)	9	10 %
4	Reports and essay	11	5 %
5	Final Practical Exam	15	15 %
6	Final Exam	16	40 %
	Total		100 %

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

2 Office hours/week

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Developmental Biology (8th edition) Gilbert, Scott F. Sunderland (MA): Sinauer Associates, Inc.; c 2000.
Essential References Materials	<p>Cells, Embryos, and Evolution by John Gerhart and Marc Kirschner, 1997, Blackwell Science, ISBN 0-86542-574-4.</p> <p>Larsen's human embryology 4th ed. Schoenwolf, Gary C; Larsen, William J, (William James). Philadelphia, PA: Elsevier/Churchill Livingstone, c2009.</p> <p>The developing human: clinically oriented embryology 8th ed. Moore, Keith L; Persaud, T V N; Torchia, Mark G Philadelphia, PA: Saunders/Elsevier, c2008.</p> <p>Developmental Biology, 2003. Sinauer. Scott F. Gilbert. ISBN 0-87893-258-5.</p> <p>Principles of Development by Lewis Wolpert Oxford University Press, 2006. ISBN 0-19-927536-X.</p> <p>Human embryology and developmental biology. Carlson, Bruce M.; Kantaputra, Piranit N. (2014). Philadelphia, PA: Elsevier/Saunders. ISBN 978-1-4557-2794-0</p>
Electronic Materials	https://embryology.med.unsw.edu.au/embryology/index.php/Animal_Development.
Other Learning Materials	<p>CD prepared by the staff members containing U-tube videos.</p> <p>Multi- media associated with the text book and the relevant websites.</p> <p>Biological charts.</p> <p>Microsoft office package.</p>

2. Facilities Required

Item	Resources
<p>Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>The areas of class rooms are suitable, concerning the number of enrolled students; and air conditioned.</p> <p>Lecture room equipped with a black board and Data show. Instructors use their own laptop.</p> <p>Physiology lab well equipped.</p>
<p>Technology Resources (AV, data show, Smart Board, software, etc.)</p>	<p>Class rooms are already provided with data show, audio-visual equipment.</p>
<p>Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	<p>Microscopic slider for chordate embryos.</p> <p>Models for embryonic stages and videos to follow formation of chordate embryos.</p>

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student Feedback on Effectiveness of Teaching	Students.	Class room discussions. Questionnaires.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Evaluation of Teaching	Instructor or by the Department	Revision of student answer paper by another staff member. Analysis the grades of students.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Dr. Azzam Nasry Al-Yaakob. Prof. Osama Mohamed Sarhan.	
Reference No.		
Date	21/11/2019	