هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	*Embryology*
Course Code:	*BIO1412*
Program:	*Bachelor of Science in Biology*
Department:	*Department of Biology*
College:	*Faculty of Science*
Institution:	*University of Tabuk*
Version:	***Course Specification Version Number***
Last Revision Date:	*September 2023*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:					
3 Credit (2 theoretical + 1 practical) hours.					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (8th Level / 4th year)					
4. Course general Description:					
The course provides topics on embryonic development in chordate animals; stages of embryonic formation, gamete formation, fertilization, and embryo development concepts in animals. Also, comparison of the events of cleavage, blastulation, and gastrulation in selected chordate embryos. 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 the placenta, embryonic development of the viscera, and genetic factors that affect the embryo and its development. Introduction to cloning in humans, ethics of cloning, and the possibility of benefit Including, experimental embryology and some application.					
5. Pre-requirements for this course (if any)**:**					
Vertebrates (BIO1207).					
6. Co-requirements for this course (if any)**:**					
None					

7. Course Main Objective(s):

By the end of this course the students are expected to be able to:

- Define the scientific terms of embryology.
- Recognize the process of embryonic development, and the main birth defects that occur at distinct developmental stages and organs.
- Study the different stages of embryos and their organs.
- Explain the significance of gametogenesis, spermatogenesis, organogenesis, and fertilization with relevant examples to various animals at different levels of the organization.
- Describe the steps in the cleavage formation; segmentation, gastrulation and
- invagination.
- Understand the similarities and differences of embryogenesis in different animals.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2	50%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		
5	**Others (Lab works)**	2	50%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the histological structure of the gonads, the basic steps of the process of gamete formation (spermatogenesis, oogenesis), and types of fertilization and cleavage in some vertebrates.	K1	-Lectures. -Class discussion. -Group discussion. -Case studies.	-Quizzes -Midterm examination. -Final examination. -Class discussion and participation.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				-Homework (Problem-solving).
1.2	Describe the major phenomenon of development, growth, and differentiation.	K2	-Lectures. -Class discussion. -Group discussion. -Homework assignments. -Case studies.	-Quizzes -Midterm examination. -Final examination. -Class discussion and participation. -Homework assignments.
2.0	**Skills**			
2.1	Differentiate various sectors and models of the embryonic stages for some vertebrates.	S1	-Lab work. -Class discussion. -Group discussion. -Brainstorming.	-Quizzes -reports -Final examination. -Class discussion and participation. -Homework (Problem-solving).
2.2	Apply study skills of microscopic examination and models for different stages of chordate embryos.	S2	-Lab work. -Class discussion. -Group discussion. -Brainstorming.	-Quizzes -reports -Final examination. -Class discussion and participation. -Homework (Problem-solving).
2.3	Draw sections in different embryonic stages for some vertebrates.	S3	-Lab work. -Class discussion. -Group discussion. -Brainstorming. -Field trip.	-Quizzes -reports -Final examination.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				-Class discussion and participation. -Homework (Problem-solving).
3.0	**Values, autonomy, and responsibility**			
3.1	Show the skill of self-learning, take responsibility and participate in group discussions and accept the opinions of others	V1	-Self-learning. -Lab work -Class discussion. -Group discussion. -Individual or group presentation,	-Class discussion and participation. -Homework (Problem-solving).

C. Course Content

No	List of Topics	Contact Hours
1.	Course Introduction	2
2.	Introduction to embryology, history, scientific terms, and concepts in the field of embryology	2
3.	Formation of both types of gametes (egg and sperm) - Spermatogenesis	2
4.	Formation of both types of gametes (egg and sperm) - Oogenesis	2
5	Fertilization, its mechanics, and the factors affecting fertilization; cleavage formation in the animal; Gastrulation, Invagination, Organogenesis Formation	2
6.	Morphogenesis: change in form in the early embryo	2
7.	Cell differentiation & stem cells	2
8.	Embryonic formation in chordates (e.g. Amphioxus)	2
9.	Embryonic formation in (e.g. zebrafish)	2
10.	The embryonic formation in amphibians (e.g., frogs)	2
11.	The embryonic formation in birds (e.g. chick)	2
12.	Embryonic formation in mammals (e.g. humans)	2
13.	Artificial insemination, its branches, fields, and importance	2
14.	Comparing the embryonic composition in all classes and highlighting the most important differences and characteristics for each class	2
15.	Growth, post-embryonic development and regeneration	2

Total	30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class Participation	During whole teaching period	5
2.	Homework (Problem-solving)	3 to 13	5
3.	Short Exams (Quizzes)	During whole teaching period	5
4.	Midterm Theoretical Examination	8-9	20
4.	Reports (For Practical)	During whole teaching period	10
5.	Final Practical Examination	15	15
6.	Final Theoretical Examination	17	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- Lewis Wolpert, Cheryll Tickle, Alfonso Martinez Arias (2015). Principles of Development 5th edition Oxford University Press. - Kenneth Kardong (2019). Vertebrates: Comparative Anatomy, Function, Evolution, 8th Edition. McGraw Hill
Supportive References	- Gavin De Beer; Vertebrate zoology: an introduction to the comparative anatomy, embryology, and evolution of chordate animals; New York: Macmillan, 1928 - Verma P.S. & Agarwal V. K. (1975). Chordate Embryology, Developmental Biology, Chano, S. & Co Pyt Ltd 1st edition (2006) ISBN13: 978-8121902618. - Eakin R. (1978). Vertebrate embryology: A laboratory manual 3rd edition, University of California Press.John, G.

	and Marc K. (1997). Cells, Embryos, and Evolution, Blackwell Science, ISBN 0-86542-574-4.
Electronic Materials	- Websites on the internet that are relevant to the topics of the course, https://embryology.med.unsw.edu.au/embryology/index.php/Animal_Development
Other Learning Materials	- Multi-media associated with the textbook and the relevant websites

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- Well-equipped classrooms and laboratories that accommodate a sufficient number of students
Technology equipment (projector, smart board, software)	- Multimedia projectors and smart boards.
Other equipment (depending on the nature of the specialty)	- Microscopic slider for chordate embryos - Models for embryonic stages and videos to follow the formation of chordate embryos

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	- Students. - Faculty members.	Indirect & direct: - Questionnaires. - Meetings.
Effectiveness of Students assessment	- Quality and development committee. - Department chair.	- Course report. - Program annual report.
Quality of learning resources	- Plan and program committee. - Students. - Staff members.	Indirect & direct: - Questionnaires. - Meetings. - Reports.
The extent to which CLOs have been achieved	- Quality and development committee. - Peer Reviewer. - Program leaders.	Indirect & direct: - Questionnaires. - Meetings. - Reports.
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PROGRAMS AND STUDY PLANS COMMITTEE
REFERENCE NO.	
DATE	SEPTEMBER 2023