

Course Specification

— (Postgraduate Programs)

Course Title: Developmental Genetics
Course Code: BIO-6010
Program: Master of Science in Applied Biology (Cell and Molecular Biology)
Department: Biology
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: <i>Pick Revision Date.</i>

Table of Contents

A. General information about the course:	3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:	Error! Bookmark not defined.
C. Course Content:.....	Error! Bookmark not defined.
D. Students Assessment Activities:	6
E. Learning Resources and Facilities:.....	6
F. Assessment of Course Quality:.....	7
G. Specification Approval Data:.....	7

عبد المحسن بن أحمد العزيمي عبد الله بن محمد بن الناصر

عبد المحسن بن أحمد العزيمي عبد الله بن محمد بن الناصر



A. General information about the course:

1. Course Identification:

1. Credit hours: (Lecture 2+ Lab 0)

2. Course type

A. ☐ University ☐ College ☐ Department ☒ Track

B. ☐ Required ☒ Elective

3. Level/year at which this course is offered: (undetermined level)

4. Course General Description:

This graduate course introduces the students to the basic concepts and general principles of developmental biology. The main features of the embryonic development of important animal models such as mice, frogs, and fruit flies are described to provide a basis for understanding the underlying control mechanisms. The course contents also illustrate genetic and experimental methods that are in use to investigate these mechanisms. Special attention is paid to explaining the regulation of the early steps of embryonic development. The course contents develop the student's critical thinking to be able to explain how mutations of developmental genes can result in malformations.

5. Pre-requirements for this course (if any):

None

عبدالمطهر عبدالمعز يونس عبدالحلوم رحيمي الناصر

6. Co-requirements for this course (if any):

None

7. Course Main Objective(s):

The main objective of this graduate course is to develop a fundamental theoretical understanding of the complex "Epigenetic Phenomena". The course also aims to introduce the state-of-the-art modern approaches in epigenetics and chromatin research.

عبدالمطهر عبدالمعز يونس عبدالحلوم رحيمي الناصر

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning		-
3	Hybrid - Traditional classroom - E-learning		-
4	Distance learning		-

3. Contact Hours: (based on the academic semester)

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

B.Course Learning Outcomes, Teaching Strategies, Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Outline basic concepts, principles and methods in developmental biology	K1	Two credits weekly lectures	-Quizzes -Written exams -Presentations -Assignments
1.2	Describe the main features of embryonic development of the frequently used animal models	K2	Two credits weekly lectures	-Quizzes -Written exams -Presentations -Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.3	Explain genetic control of the skeletal pattern and the main causes of malformations	K3	Two credits weekly lectures	-Quizzes -Written exams -Presentations -Assignments
2.0	Skills			
2.1	Apply basic concepts and principles in developmental biology	S1	-Two credits weekly lectures -Group discussions	-Quizzes -Written exams -Presentations -Assignments
2.2	Analyze and interpret simple data from experimental embryology and developmental genetics.	S2	-Two credits weekly lectures -Group discussions	-Quizzes -Written exams -Presentations -Assignments
3.0	Values, autonomy, and responsibility			
3.1	Communicate the scientific issues in developmental biology and present the research results orally or in a written format	V1	-Group discussions	-Presentations
3.2	Demonstrate independence in performing the research work and effective cooperation in teamwork	V2	-Group discussions -Presentations	-Reports

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to developmental genetics: - A history of developmental biology and developmental genetics	3
2.	Basics of Embryology and Cell Types and Polarity	3
3.	Cell specification and types of development: - instructive development - determinative development	4
4.	Forward and Reverse Genetics: -Forward genetic approaches: Mutagens, Breeding Schemes, Modifier Screens, Phenotyping, Causative Mutations etc...	3

	-Reverse Genetics approaches: Morpholino-Mediated Gene Knockdown, Targeting Induced Local Lesions in Genomes, Targeted Gene Inactivation et c...	
5.	Model Systems for the Genetic Control of Development: -The Development of the Fruit Fly - Egg-Polarity Genes - Segmentation Genes - Homeotic Genes in Drosophila - Hohomeobox Genes in Other Organisms	3
6.	Gene Regulation in Development: - Wnt signalling - Notch signaling - Non-coding RNAs - Left-right asymmetry	4
7.	Development Patterns and Processes of Evolution: -Programmed Cell Death (PCD) and Development - Common genes in developmental pathways - Evolution through change in gene expression	4
Total		30

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam-1	5 th week	20%
2.	Midterm exam-2	10 th week	20%
3.	Assignments, presentations, Attendance, data search, participation	Throughout the course duration	20%
4.	Final exam	16 th week	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	-Benjamin A Pierce.(2020). Genetics: a conceptual approach. 7 th edition W.H. Freeman. ISBN-13-978-1319216801.
Supportive References	https://www4.uib.no



Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of students assessment	Faculty	Direct
Quality of learning resources	Faculty	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	BIOLOGY DEPARTMENT COUNCIL
REFERENCE NO.	23
DATE	23/8/1445

