Course Specification
(Bachelor)

Course Title:	Epigenetics
Course Code:	EVS 1356
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammed Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (Lecture 2 + 0+ 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 5 / 3rd Year)					
4. Course General Description:					
This course is designed to introduce students into the rigorous foundation in epigenetics. It will emphasize various epigenetics process, how the epigenetic status of the genome forms and maintains, role of epigenetic processes in gene regulation, its involvement in disease development, and recent advances in assessing epigenetic changes of the genome. Based on the review of the seminal works in epigenetics field, this course will familiarize the student with current technology and driving principles of the field of epigenetics. The budding field of Ecological Epigenetics seeks to extend our knowledge of epigenetic mechanisms and processes to natural populations, and recent conceptual and technical advances have made progress toward this goal more feasible.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110 EVS 1112					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
The objective of this course is to identify the fundamental theoretical understanding of complex Epigenetic Phenomena as well as the state-of-the-art of the experimental approaches in current ecological Epigenetic. In particular, ecological epigenetics has the potential to explain how populations endure (or fail to endure) profound and rapid environmental change.					

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		30

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Explain how epigenetic inheritance from genetic inheritance and various methods to assess gene specific and genome wide epigenetic changes**	K1	Course lectures	Quiz Midterms Final Exam
1.2	**Outline the structure and organization of chromatin and how it plays a role in epigenetic regulation**	K2	Course lectures	Quiz Midterm Final Exam
2.0	Skills			
2.1	**Analyze the role of DNA methylation in epigenetic gene regulation**	S1	Course lectures	Quiz Midterm Final Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	**Relate between epigenetic changes and various disorders**	S2	Course lectures	Lab Midterm Final Exam
2.3	**Interpret epigenetic data**	S3	Course lectures	Midterm Final Exam
3.0	Values, autonomy, and responsibility			
3.1	**Demonstrate independence and ability to cooperate with a team**	V1	Discussion	Performance Evaluation
3.2	**Share in scientific activities and present data effectively**	V2	Discussion	Performance Evaluation

C. Course Content

No	List of Topics	Contact Hours
1.	**Fundamental principles about epigenetics:** - *Epigenetics as a new frontier in biology* - *Genetics to epigenetics* - *The Epigenome*	**4**
2.	**The mechanisms and molecules that regulate epigenetic processes** - *Chromatin modifications* - *DNA methylation and non-coding RNAs* - *Dynamic organization of the genome and epigenetic processes*	**4**
3.	**Epigenetic phenomena in different animal model organisms** - *X chromosome inactivation in Mammals* - *Transgenerational epigenetic inheritance in animals*	**4**
4.	**How can epigenetics influence the life of an organism?** - *Inheritance of chromatin modifications* - *Epigenetic reprogramming and genomic imprinting* - *Epigenetic and cell differentiation* - *Epigenetic variations in human populations*	**4**
5.	**Environmental epigenetics** - *nutrition drives heritable epigenetic changes* - *Epigenetic inheritance of environmental stresses* - *Epigenetic control of selfish elements during environmental changes*	**4**

6.	**Epigenetic mechanisms in diseases** *- Epigenetics and aging* *- Epigenetic mechanisms in metabolic diseases* *- Epigenetic in cancer* *- Therapeutic epigenetic approaches to cancer*	**8**
7.	**Future perspective** *- New frontiers of epigenetic research* *-Epigenetic discoveries for human society*	**2**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	Around 4th - 5th week	20%
2.	Midterm 2	Around 7th - 8th week	20%
3.	Quizzes, Participation, Attendance, Presentations, Data search	During the semester	20%
4.	Final Exam	16th week	40%
Total			**100%**

*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. 7th edition W.H. Freeman. ISBN-13-978-1319216801.
Supportive References	
Electronic Materials	https://my.clevelandclinic.org/health/articles/epigenetics
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories

Items	Resources
Technology equipment (projector, smart board, software)	Projector and Smart board
Other equipment (depending on the nature of the specialty)	Environmental Epigenetics-related instruments

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of Students assessment	Program Leader	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leader	Direct
Other	-	-

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Head of Biology Department**
REFERENCE NO.	
DATE	