Course Specification
(Bachelor)

Course Title:	Molecular Biology
Course Code:	BIOL 352
Program:	Bachelor of Science (B.Sc)
Department:	Biology
College:	College of Science in Al-Zulfi
Institution:	Majmaah University
Version:	3 rd
Last Revision Date:	27 december 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (2 + 2)					
ECTS credits = 4.5					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th/ 3)					
4. Course General Description:					
Molecular biology studies the relationship between the structure and function of biological molecules and how these relationships contribute to the operation and control of biochemical processes. Of principal interest are the macromolecules and macromolecular complexes of DNA, RNA and protein and the processes of replication, transcription and translation. The new experimental technologies involved in manipulating these molecules are central to modern molecular biology. Not only does it yield fundamental information about the molecules, but it has tremendous practical applications in the development of new and safe products such as therapeutics, vaccines and foodstuffs, and in the diagnosis of genetic disease and in gene therapy					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
▪ **Student will study the structure of biological molecules like DNA & RNA and protein.** ▪ **Student will be able to know how the biological molecules perform the molecular function necessary for biological processes.** ▪ **Student will understand the technologies that allow the characterization of different molecules.**					
7. Course Main Objective(s):					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	80
2	E-learning	15	20

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning	5	10
4	Distance learning		

Workload **(based on the academic semester)**

No	Activity	Work Load /Hours
1.	**Contact hours**	60
2.	**Self-study (Assignments, quizzes, reports, Discussions, Library, research)**	60
	Total Workload	120
Equivalent to **ECTS credit points**		**4.5**

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 PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
1.3	Recognize the advanced knowledge of the structure of DNA, RNA and protein	K3	Lectures, individual and group discussion, and project works, videos	MCQs, long and short essays, Diagram

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.3	Describe –how the molecules perform their functions.	K3	-do-	-do-
2.0	**Skills**			
2.1				
2.3	Illustrate the DNA & Chromosome showing the structure and mechanism of compacting	S3	-do-	Illustrate the DNA & Chromosome showing the structure and mechanism of compacting
2.3	Describing the manipulations of biological molecules.	S3	-do-	Describing the manipulations of biological molecules.
2.4	Be able to recognize various bimolecular techniques.	S4	-do-	Be able to recognize various bimolecular techniques.
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2	Communicate and work effectively in groups as well as individually to differentiate the various concepts of chromosome structure and compact mechanism & Gene manipulation.	V2	-do-	-do-
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Macro-Molecules of Life	2
2.	The Structure and Function of Nucleic Acids	2

3	The Central Dogma of Molecular Biology	2
4	The Structure and Function of Proteins	2
5	Prokaryotic and eukaryotic chromosome structure I	2
6	Prokaryotic and eukaryotic chromosome structure II	2
7	DNA replication	2
8	DNA damage, repair and recombination Gene manipulation	4
9	Cloning vectors	4
10	Gene libraries and screening	4
11	Functional genomics and new technologies & Bioinformatics	4
		30
	Practical	
1	General Lab Safety in Molecular Biology	2
2	Extraction of genomic DNA	4
3	Polymerase Chain Reaction (PCR)	2
4	Characterization of the DNA by Agarose gel electrophoresis	4
5	Characterization of the DNA by Spectrophotometric Assay	2
6	Primer Design	4
7	Sanger sequencing	4
8	RNA Extraction	4
9	Real-Time Quantitative Reverse Transcription PCR	4
		30
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Mid-term exam	7th week	10%
2.	Second Mid-term exam	12th week	10%
3.	Two E-exam (online)	4th and 10th weeks	10%
4.	Two home works	6th and 8th weeks	5%
5.	Presentation	15th week	5%
6.	Lab reports	During the semester	10%
7.	Lab exam	17th week	10%
8.	Final exam	18th 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	**Molecular Biology of the Cell (6th Edition)** Authors: Alberts, Bruce; Johnson, Alexander; Lewis, Julian; Raff, Martin; Roberts, Keith; Walter, Peter Publisher: Garland Science
Supportive References	**Journals and Articles** Journal of Molecular Biology (Elsevier) Pubmed
Electronic Materials	• **The availability of lecture notes, PowerPoints, and other learning materials on Blackboard**

2. Required Facilities and equipment

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)	**Library and seminar room** **Wifi internet connections**

F. Assessment of Course Quality

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

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	**7**

DATE	**4/4/1446 [07/10/2024]**