MODULE DESCRIPTOR FORM

Module Information					
Module Title	MOLECULAR BIOLOGY			**Module Delivery**	
Module Type	CORE			**Theory ✓** **Lab ✓** **Tutorial ✓**	
Module Code	MPH2202				
ECTS Credits	7 ECTS				
SWL (hr/sem)	175				
Module Level	2		**Semester of Delivery**	2	
Administering Department	MPH		**College**	College of Sciences	
Module Leader	Ali Hamed Arebe		**e-mail**	ali.h@uowa.edu.iq	
Module Leader's Acad. Title	Lecturer Assistant		**Module Leader's Qualification**	MS.c.	
Module Tutor	Ali Hamed Arebe		**e-mail**	ali.h@uowa.edu.iq	
Peer Reviewer Name	Ismail Mohamed Eldesoky		**e-mail**	ismail.m@uowa.edu.iq	
Review Committee Approval	2025-01-20		**Version Number**	1.0	

Relation With Other Modules			
Prerequisite module	General Biology	**Semester**	UG I, 1st Semester
Co-requisites module	None	**Semester**	None

Department Head Approval **Dean of the College Approval**

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	.1 To provide the student with an in-depth understanding of the fundamental concepts in molecular biology and genetics, together with relevant skills. .2 To develop a core understanding of genome structure, organization and packaging; genome replication and repair; the process of gene expression through transcription, RNA processing and translation; protein targeting; regulation of gene expression. .3 This module will give you a sound understanding of types of mutations and factors that cause mutations, essential for laboratory-based jobs in this area. .4 To develop the necessary analytical skills to understand the nature of scientific inquiry by practicing inquiry in the laboratory and by addressing the right questions and applying the appropriate methodology.
Module Learning Outcomes	-1 Identifying the history of molecular biology and some of the scientific experiments that contributed to its development. -2 Describe the basic structure and biochemistry of nucleic acids and proteins and discriminate between them. -3 Chromosome recognition and telomere maintenance mechanism by telomerase. -4 Identify the principles of DNA replication, transcription and translation and explain how they relate to each other. -5 Describe the main principles of methods for preparation of DNA, such as DNA extraction, and PCR, and analyses their applications. -6 Discuss the ways in which mutations occur, what are the factors that cause them, and what are the most important methods used by the cell to repair the mutation. -7 Identify, build and interpret the structure of a protein and study ways to modify and manipulate it after its translation process. -8 Discuss the importance of DNA manipulation and gene isolation, as well as the significance of gene transfer in mammalian cells. -9 Describe the main principles of methods for analysis of DNA, such as hybridization, restriction analysis and DNA sequencing and analyses their applications. -10 Interpret the molecular basis and origin of cancer.
indicative Contents	ITheory Lectures Learning

	concepts of each theoretical lecture or groups of lectures. [SSWL= 28 hrs] Lab Lectures Learning concepts of each laboratory lecture or groups of lectures. [SSWL= 30 hrs] Total hrs = 28 + 30+1+3=62 hrs

Learning and Teaching Strategies	
Strategies	● Class lectures, interactive learning (class discussions, group work) video presentations, and practical problems solved in class. ● Exercises and primary source documents are assigned as homework, the solutions of which are reviewed in class. ● Tutorials: Tutorials are small-group sessions led by a tutor, where students can ask questions, receive individualized support, and clarify concepts covered in lectures or readings. ● Seminars: Seminars involve smaller groups of students engaging in discussions, presentations, and collaborative activities related to the course material. ● Laboratory sessions: In science, engineering, and other experimental disciplines, laboratory sessions allow students to apply theoretical knowledge through practical experiments and investigations. ● Reflective practice: Incorporating reflective exercises, such as journaling, self- assessments, or group reflections, encourages students to think critically about their learning process, identify areas for improvement, and connect new knowledge to their own experiences. ● Online learning platforms: With the rise of online education, many university modules incorporate online learning platforms such as learning management systems (LMS) or virtual classrooms. These platforms offer a variety of resources, including readings, videos, quizzes, and discussion forums.

Student Workload (SWL)			
Structured SWL (h/sem)	68	**Structured SWL (h/w)**	4.8
Unstructured SWL (h/sem)	104	**Unstructured SWL (h/w)**	6.9
Total SWL (h/sem)	172 + final3 = 175		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10%	2,10	1,6,7
	Reports	2	10%	9,10	2,4,9,10
	Lab Report	1	5%	14	5
	Project	2	5%	13	8
Summative assessment	**Midterm Exam**	1	10% (10)	8	1,2,3,4,5
	Final Exam	1	50% (50)	16	1,2,3,4,5,6,7,8,9,10
Total assessment			100%		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**History and introduction of molecular biology**
Week 2	**DNA & RNA structure**
Week 3	**Structure of chromosomes and DNA packaging**
Week 4	**DNA replication and telomere maintenance**
Week 5	**Stages of transcription in eukaryotes**
Week 6	**Translation and post-translational modifications.**
Week 7	**Mid. Exam**
Week 8	**Protein structure and function**
Week 9	**Protein folding, modification and processing**
Week 10	**Types of mutations and factors that cause mutations**
Week 11	**Regulation of the cell cycle and DNA repair pathways**
Week 12	**Principles of genetic engineering: gene cloning and genomics**
Week 13	**Essentials of gene cloning**
Week 14	**Nucleic acid hybridization to detect genes**
Week 15	**Molecular biology of cancer**

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Introduction to molecular techniques and laboratory safety**
Week 2	**Principle, applications, and types of centrifugations**
Week 3	**Bacteria cultivation (isolation and preparation of pure culture bacteria)**
Week 4	**Preparation of buffers and reagents**
Week 5	**DNA extraction from bacterial cells.**
Week 6	**DNA extraction from eukaryotic cells (Human Blood Cells) I**
Week 7	**DNA extraction from eukaryotic cells (Human Blood Cells) II**
Week 8	**DNA and RNA concentration and quantification by UV-Visible spectrophotometer**

Week 9	**Basic concept Polymerase Chain Reaction (PCR) and Reverse Transcription**
Week 10	**Electrophoresis analysis**
Week 11	**Agarose gel electrophoresis I**
Week 12	**Agarose gel electrophoresis II**
Week 13	**Extraction and purification of native proteins**
Week 14	**Separation and estimation of proteins by chromatographic techniques**
Week 15	**Thin-layer chromatography (TLC)**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**Molecular Biology, Third Edition , David P. Clark, Nanette J. Pazdernik and Michelle R. McGehee,2019**	No
Recommended Texts	**Fundamental Molecular Biology Lizabeth A. Allison,2007**	No
Websites	MedlinePlus: Genetics **Genetics Home Reference** **DNA Learning Center** Page not found - CSHL DNA Learning Center	

APPENDIX:

GRADING SCHEME				
Group	**Grade**		**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	**Very Good**	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.