

# Module Information FORM

## نموذج وصف المادة الدراسية

Module Information			
لومات المادة الدراسية			
Module Title	<b>Molecular Biology</b>		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	<b>UOMU0302023</b>		
ECTS Credits	5		
SWL (hr/sem)	<b>125</b>		
Module Level	1	Semester of Delivery	2
Administering Department	الأنظمة الطبية الذكية	College	العلوم
Module Leader		e-mail	
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	MSc
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules			
للعلاقة مع لومات دراسية الأخرى			
Prerequisite module		Semester	1
Co-requisites module	None	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

### هأأاف المأفة الءراسفة وناءاء الءعلم والمءءوااء الإراشاءفة

<p><b>Module Aims</b> هأف المأفة الءراسفة</p>	<p>Molecular biology is the study of biological systems at the molecular level. To provide a general introduction to the molecular basis of genetics, how genes are maintained from one generation to the next and how their expression is regulated in various systems.</p> <p>The main objectives of this course are:</p> <p><b>A. It aims to provide the student with basic information and develop his skills and abilities in the following topics:</b></p> <ul style="list-style-type: none"> <li>• Familiarize students with the cell and molecular biology of both Prokaryotes and Eukaryotes. This will be needed for any project work in modern biotechnology.</li> <li>• Describe the range of biology mechanisms that control the structure and stability of the genetic material.</li> <li>• Involve DNA replication, repair, transcription, protein synthesis and gene regulation in various organisms.</li> <li>• By doing this course students will acquire basic fundamental knowledge and explore skills in molecular biology and become aware of the complexity and harmony of the cells.</li> <li>• Use examples that help explain the molecular, genetic, and cellular bases of clinical problems.</li> </ul> <p><b>B. The ability of student to deal with the biological and diagnostic variables of the organism. And develop his critical thinking skills.</b></p> <p>1. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)</p>
<p><b>Module Learning Outcomes</b> بءاء الءعلم للمأفة الءراسفة</p>	<p><b>Upon successful completion of the course, the student will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Acquire the basic knowledge and concepts of molecular biology.</li> <li>2. Understand the process of DNA replication, DNA damage and repair, transcription and translation.</li> <li>3. Understand the relationship between molecular changes and the associated phenomena.</li> <li>4. Understand and explain the concepts of basic principles and techniques of molecular biology which prepares students for further education and/or employment in teaching, and basic research.</li> </ol>
<p><b>Indicative Contents</b> لامءءوااء لإراشاءفة</p>	<p><b>Indicative content includes the following.</b></p> <ul style="list-style-type: none"> <li>- Basic Biochemistry: The essential biological elements, basic biological molecules, biochemical properties of nucleic acids, proteins, carbohydrates, and lipids.</li> <li>- Molecular Structure: The molecular structure of nucleic acids, and the effect of molecular changes on function.</li> <li>- Molecular Biology Techniques: Molecular separation and analysis techniques, and techniques for determining molecular structure.</li> <li>- Biological Pathways: The principal biological pathways, and the mechanisms of control in biological pathways.</li> </ul>

	<b>Course Requirements:</b> <ul style="list-style-type: none"> <li>• Attend all lectures and participate in class discussions.</li> <li>• Complete all reading assignments before class</li> <li>• Attend all lab sessions.</li> <li>• Complete all homework assignments and quizzes.</li> <li>• Work collaboratively with peers on group project assignments.</li> <li>• Prepare for and take all exams as scheduled.</li> </ul>
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<b>Learning and Teaching Strategies</b> ستراتيجيات التعلم والتعليم	
<b>Strategies</b>	This course will be taught through: <ul style="list-style-type: none"> <li>- Lectures covering concepts, theories, and issues related to molecular biology.</li> <li>- Interactive seminars that allow students to interact with course materials and interact with each other and the instructor.</li> <li>- Practical exercises and workshops aimed at applying molecular biology concepts and techniques in the laboratory and training in the use of necessary tools and devices.</li> <li>- Reading and analyzing scientific articles and research in the field, and participating in group discussions on various topics related to molecular biology and its applications in smart medical systems.</li> </ul>

<b>Student Workload (SWL)</b> لاحتامل لادراسي للطالب			
<b>Structured SWL (h/sem)</b> لاحتامل لادراسي لامنتظم للطالب خلال لافصل	64	<b>Structured SWL (h/w)</b> لاحتامل لادراسي لامنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> لاحتامل لادراسي غير لامنتظم للطالب خلال لافصل	86	<b>Unstructured SWL (h/w)</b> لاحتامل لادراسي غير لامنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> لاحتامل لادراسي لأكلي للطالب خلال لافصل	150		

<b>Module Evaluation</b> قتييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	<b>Assignments</b>	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	
	<b>Report</b>	1	10% (10)	13	LO # 5, 8 and 10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	2hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

للمناهج الاسبوعي للناظري

	Material Covered
<b>Week 1</b>	DNA the Genetic Material
<b>Week 2</b>	Structure of Nucleotides, Nucleic Acids and DNA
<b>Week 3</b>	DNA replication in prokaryotes and eukaryotes ( DNA replication: semi-conservative replication, DNA polymerases, events at the replication form, replication of the lagging strand, telomeres, consequences of defects in telomerase).
<b>Week 4</b>	DNA damage and repair
<b>Week 5</b>	RNA structure and synthesis, (Transcription and Posttranscriptional Modification)
<b>Week 6</b>	Posttranscriptional Modification of RNA (e.g., RNA splicing, alternative splicing, editing)
<b>Week 7</b>	<b>Exam</b>
<b>Week 8</b>	Genetic Code and Mutation, (Gene mutations: missense versus nonsense mutations, insertions, deletions and frameshifts. Genetic reversion and suppression)
<b>Week 9</b>	Protein Biosynthesis (translation) , and posttranslational Modifications
<b>Week 10</b>	Eukaryote Regulation of Gene Expression
<b>Week 11</b>	How to study chromosome Cytogenetic diagnostic techniques and their indications
<b>Week 12</b>	Molecular Biology of Cancer, Apoptosis and Angiogenesis.
<b>Week 13</b>	Recombinant DNA Technology (Principles of Genetic Engineering: gene cloning and genomics)
<b>Week 14</b>	<b>Preparatory week before the final Exam</b>

## Delivery Plan (Weekly Lab. Syllabus)

للمناهج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Lab 1: Laboratory Safety Rules, Requirements and Regulations
<b>Week 2</b>	Lab 2: completion Laboratory Safety Rules, Requirements and Regulations
<b>Week 3</b>	Lab 3: DNA Extraction, purification of nucleic acids and detection techniques.
<b>Week 4</b>	Lab 4: Gel Electrophoresis
<b>Week 5</b>	Lab 5: Molecular analysis techniques, Polymerase Chain Reaction (PCR)
<b>Week 6</b>	Lab 6: Molecular analysis techniques, Molecular hybridization.
<b>Week 7</b>	Lab 7: Molecular analysis techniques, Microarray Analysis.
<b>Week 8</b>	Lab 8: completion Molecular analysis techniques, Microarray Analysis.
<b>Week 9</b>	Lab 9: Exam
<b>Week 10</b>	Lab 10: Gene editing techniques, CRISR and Zing Fingers.
<b>Week 11</b>	Lab 11: completion Gene editing techniques, CRISR and Zing Fingers.
<b>Week 12</b>	Lab 12: DNA Cloning.
<b>Week 13</b>	Lab 13: completion DNA Cloning
<b>Week 14</b>	Exam
<b>Week 15</b>	<b>Preparatory week before the final Exam</b>

Learning and Teaching Resources ادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Denise R. Ferrier, (2014). Biochemistry (Lippincott's Illustrated reviews) 6th Edition Lippincott Williams & Wilkins.	Yes
Recommended Texts	<ul style="list-style-type: none"> <li>Weaver R. F. (2008). Molecular Biology. McGraw Hill Higher Education; 4th edition.</li> <li>Brown, TA 2000, <i>Essential Molecular Biology: A Practical Approach</i>, 2nd edn, IRL Press, Oxford.</li> <li>Alberts, B, et al 2008, <i>Molecular Biology of the Cell</i>, 5th edn,</li> <li>In addition, students should have access to recent textbooks in genetics, biochemistry and cell biology.</li> </ul>	No
Websites	<ul style="list-style-type: none"> <li><a href="https://www.coursera.org">https://www.coursera.org</a></li> <li><a href="https://www.edx.org">https://www.edx.org</a></li> <li><a href="https://www.edx.org">https://www.edx.org</a></li> <li><a href="https://www.ncbi.nlm.nih.gov/">https://www.ncbi.nlm.nih.gov/</a></li> <li><a href="https://www.labxchange.org/library">https://www.labxchange.org/library</a></li> </ul>	

Grading Scheme ظ الدرجات				
Group	Grade	لاتقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	ماتياز	90 - 100	Outstanding Performance
	B - Very Good	د جدا	80 - 89	Above average with some errors
	C - Good	د	70 - 79	Sound work with notable errors
	D - Satisfactory	تموسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	بول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	لبي (فالمعالجة)	(45-49)	More work required but credit awarded
	F – Fail	لبي	(0-44)	Considerable amount of work required
<p><b>Note:</b> Marks 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.</p>				