



وزارة التعليم العالي والبحث العلمي
جامعة المستقبل
كلية العلوم
قسم الكيمياء الحياتية



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Nucleic Acids Chemistry I		Module Delivery
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	UOMU036353		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	3	Semester of Delivery	
Administering Department	Biochemistry department	College	College of Science
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Review Committee Approval Date		Version Number	1.0

RelationwithOtherModule العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	none	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<ul style="list-style-type: none"> • Provide a detailed understanding of the chemical structure and properties of nucleic acids (DNA and RNA). • Explore the molecular mechanisms underlying the biosynthesis, replication, and degradation of nucleic acids. • Understand the physical and chemical interactions that govern nucleic acid stability and function. • Develop foundational knowledge for future studies in molecular biology, genetics, and biotechnology.
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>By the end of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the molecular structure and components of DNA and RNA. 2. Differentiate between types of nucleotides and nucleosides. 3. Explain the physical and chemical properties of nucleic acids. 4. Extract and purify nucleic acids from biological samples. 5. Use electrophoretic methods to separate and identify nucleic acids. 6. Apply safety and quality procedures in handling nucleic acid samples.
<p>Indicative Contents المحتويات الإرشادية</p>	<ol style="list-style-type: none"> 1. Introduction to Nucleic Acids; Historical background and biological significance 2. Structure of Nucleotides and Nucleosides; Purine and pyrimidine bases, ribose, deoxyribose, phosphate linkage 3. Primary, Secondary, and Tertiary Structures of DNA; Double helix, base pairing, A-DNA, B-DNA, Z-DNA 4. RNA Structure and Types; mRNA, tRNA, rRNA, structural features and modifications 5. Chemical Synthesis of Oligonucleotides; Solid-phase synthesis, protecting groups, phosphoramidite chemistry 6. Thermodynamic and Kinetic Properties; Melting temperature (T_m), hydrogen bonding, base stacking 7. DNA Supercoiling and Topology; Linking number, topoisomerases, DNA packaging 8. Nucleic Acid-Protein Interactions; DNA-binding proteins, RNA-binding motifs 9. Mutagenesis and Chemical Modifications; Depurination, deamination, alkylation, UV damage 10. Analytical Techniques in Nucleic Acid Chemistry; UV spectroscopy, electrophoresis, chromatography, hybridization
<p>Learning and Teaching Strategies استراتيجيات التعلم والتعليم</p>	

Strategies	<p>This course introduces the chemistry of nucleic acids, focusing on the structure, properties, and biological significance of DNA and RNA. Topics include nitrogenous bases, nucleotides, phosphodiester linkages, and structural conformations of genetic material.</p> <p>The practical component involves DNA/RNA extraction, separation techniques (e.g., electrophoresis), and analysis of nucleic acid purity and concentration.</p>
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	65	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	85	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	5	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	5% (5)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Nitrogenous bases and nucleosides
Week 2	Nucleotides and phosphate linkages
Week 3	DNA double helix: structure and properties
Week 4	RNA: types and structures
Week 5	DNA vs RNA comparison
Week 6	Denaturation and renaturation of nucleic acids
Week 7	DNA topology and supercoiling
Week 8	Properties of prokaryotic vs. eukaryotic genomes
Week 9	Functions of DNA and RNA in cells
Week 10	Chromosomal DNA and extrachromosomal elements
Week 11	Review of nucleic acid analytical techniques
Week 12	Practical exam
Week 13	Theoretical review
Week 14	Final written exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1 -2	Preparation of nucleotide standards
Week 2 -4	DNA model construction and structure analysis
Week 3	Extraction of genomic DNA from animal tissues
Week 4	Extraction of total RNA from plant cells
Week 5	Spectrophotometric analysis of DNA and RNA
Week 6	Temperature effect on nucleic acid stability
Week 7	Agarose gel electrophoresis (DNA)

Week 8	Discussion + Case study-based quiz
Week9	Observation of RNA integrity on gels
Week 10	Mini-prep DNA extraction (plasmid isolation)
Week 11	Final practical project preparation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. <i>Molecular Biology of the Gene</i> – James D. Watson 2. <i>Lehninger Principles of Biochemistry</i> – Nelson & Cox 3. <i>Biochemistry</i> – Berg, Tymoczko, Stryer	Yes
Recommended Texts	<ul style="list-style-type: none"> Lab manuals and protocols from the department Peer-reviewed articles on nucleic acid analysis Handouts and instructional videos prepared by the instructor 	
Websites	https://en.wikipedia.org/wiki/Nucleic_acid	

APPENDIX:

GRADING SCHEME مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	مقبول بقرا ر	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.



ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي