

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information			
معلومات المادة الدراسية			
Module Title	<b>Microbial genetic</b>		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar
Module Code	BIOT35028		
ECTS Credits	6		
SWL (hr/sem)	<b>60h</b>		
Module Level	3	Semester of Delivery	5
Administering Department	Biotechnology	College	College of Science
Module Leader	Athmar Adnan Hakman	e-mail	<a href="mailto:athmaradnan@uodiyala.edu.iq">athmaradnan@uodiyala.edu.iq</a>
Module Leader's Acad. Title	phD	Module Leader's Qualification	Ph.D.
Module Tutor	Athmar Adnan Hakman	e-mail	<a href="mailto:athmaradnan@uodiyala.edu.iq">athmaradnan@uodiyala.edu.iq</a>
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2024	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Molecular and microorganism	Semester	1
Co-requisites module	None	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"><li>1- This course introduces the basic concepts of genetics in microorganisms and explains how they differ from genetics in eukaryotic cells. It focuses on how genetic information is stored, expressed, and transferred in bacteria and other microbes.</li><li>2- Students will learn the fundamental definitions of the gene as a unit of heredity and the genome as the complete set of genetic material in a cell. The course also highlights the main differences between prokaryotic and eukaryotic genetics, including DNA organization and gene regulation.</li><li>3- The course covers the main methods by which microorganisms exchange genetic material, including transformation (uptake of free DNA), conjugation (direct transfer between cells), and transduction (transfer via bacteriophages).</li><li>4- Different types of mutations will be introduced in a simple way, including point mutations, insertions, deletions, and frameshift mutations, along with their basic effects on gene function.</li><li>5- Students will also be introduced to common genetic vectors such as plasmids and bacteriophages and their basic use in research and biotechnology.</li><li>6- In addition, the course explains simple concepts of genetic mapping in microorganisms and how scientists determine gene locations.</li><li>7- Finally, the course discusses the causes of DNA damage and the basic mechanisms cells use to repair DNA, helping maintain genetic stability.</li></ol>
<p><b>Module Learning Outcomes</b></p>	<ol style="list-style-type: none"><li>1. Understand the fundamental principles related to the course content.</li><li>2. Recognize and comprehend all types of mutations.</li><li>3. Understand the different DNA repair mechanisms operating in</li></ol>

مخرجات التعلم للمادة الدراسية	microorganisms. 4. Explain how genetic traits evolve in microorganisms.
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<ul style="list-style-type: none"> <li>• <b>Introduction to Microbial genetic</b> <ul style="list-style-type: none"> <li>• Basic concepts and definitions</li> <li>• Important microbial genetic in biotechnology</li> </ul> </li> <li>• Bacterial genetics <ul style="list-style-type: none"> <li>• Difference between bacterial and viral genetic and genetic material of eukaryotic</li> <li>• Elements of gene and gene expression</li> </ul> </li> <li>• Gene transfer <ul style="list-style-type: none"> <li>• Comparison of vertical gene transfer and horizontal gene transfer</li> <li>• Explain of type gene transfer</li> </ul> </li> <li>• Transformation <ul style="list-style-type: none"> <li>• Defition , Mechanism .</li> <li>• Competence cell natural and artificial for transformation</li> </ul> </li> <li>• Conjugation <ul style="list-style-type: none"> <li>• Defition , importance</li> <li>• <b>Mechanism of plasmid mobilization by conjugation</b></li> <li>• <b>Properties of F plasmid</b></li> </ul> </li> <li>• Transdution process <ul style="list-style-type: none"> <li>• Defition</li> <li>• Type of transdution (Generallized and specialized transdution)</li> </ul> </li> <li>• Recombination <ul style="list-style-type: none"> <li>• Different of recombination between Eukaryotic and microorganism.</li> <li>• Recombination type and important of recombination enzyme in recombination process.</li> </ul> </li> <li>• Plasmid <ul style="list-style-type: none"> <li>• Study of type of plasmid</li> <li>• Important of plasmid in genetic transfer.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• Geneotype and phenotype <ul style="list-style-type: none"> <li>• Definition , Type , application of vectors</li> <li>• Cloning, type of cloning</li> </ul> </li> <li>• DNA Damage and repair <ul style="list-style-type: none"> <li>• Sources of DNA damage.</li> <li>• DNA repair mechanisem</li> </ul> </li> <li>• Mutation <ul style="list-style-type: none"> <li>• Definition of mutation</li> <li>• Type of mutation</li> </ul> </li> </ul>
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<p style="text-align: center;"><b>Learning and Teaching Strategies</b></p> <p style="text-align: center;">استراتيجيات التعلم والتعليم</p>	
<b>Strategies</b>	<ol style="list-style-type: none"> <li>1. <b>Lectures</b> <ul style="list-style-type: none"> <li>• Deliver fundamental concepts and scientific principles.</li> <li>• Use presentations and multimedia tools to illustrate practical applications.</li> </ul> </li> <li>2. <b>Laboratory Sessions / Practical Work</b> <ul style="list-style-type: none"> <li>• Train students in gene transfer techniques.</li> <li>• Conduct experiments on growth, genetic modification, and data analysis.</li> </ul> </li> <li>3. <b>Classroom Discussions</b> <ul style="list-style-type: none"> <li>• Enhance critical thinking and scientific analysis skills.</li> <li>• Discuss case studies and recent research in microbial genetic.</li> </ul> </li> <li>4. <b>Projects and Assignments</b> <ul style="list-style-type: none"> <li>• Design short research projects on genetic experments .</li> <li>• Encourage self-directed learning and use of up-to-date scientific resources.</li> </ul> </li> <li>5. <b>Student Presentations</b> <ul style="list-style-type: none"> <li>• Develop scientific communication and presentation skills.</li> <li>• Facilitate knowledge sharing and analysis of applied studies.</li> </ul> </li> <li>6. <b>Simulation and Computational Tools</b> <ul style="list-style-type: none"> <li>• understand gene functions , microbial plasmid and applications.</li> </ul> </li> <li>7. <b>Interactive Learning</b> <ul style="list-style-type: none"> <li>• Employ short quizzes, polls, or in-class problem-solving to reinforce engagement.</li> <li>• Involve students in practical and theoretical problem-solving activities.</li> </ul> </li> </ol>

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	<b>109</b>	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	<b>7.26</b>
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	<b>91</b>	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	<b>6.06</b>
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>200</b>		

### Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 4 and 6
	Assignments	2	10% (10)	2, 12	LO # 3, 4 and 6
	Projects / Lab.	1	10% (10)	Continuou s	All
	Report	1	10% (10)	13	LO # 5, 8 and 6
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Introduction to Plant Biotechnology
<b>Week 2</b>	Growth and Development Regulation in Plants
<b>Week 3</b>	Factors Affecting Plant Growth
<b>Week 4</b>	The Role of Nitrogen in Plant Growth and Development
<b>Week 5</b>	Photosynthetic Pathways – C3, C4, and CAM
<b>Week 6</b>	Photosynthetic Pathways – C3, C4, and CAM
<b>Week 7</b>	MID EXAM
<b>Week 8</b>	Genetically Modified Agriculture in Plants
<b>Week 9</b>	Plant Genomics and Functional Genomics
<b>Week 10</b>	Omics and Computational Approaches in Plant Science
<b>Week 11</b>	Crop Improvement and Stress Tolerance
<b>Week 12</b>	Plant Tissue Culture
<b>Week 13</b>	Industrial and Commercial Applications
<b>Week 14</b>	Industrial and Commercial Applications
<b>Week 15</b>	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction in Genetic microbiology
Week 2	Definition of genetics and genome
Week 3	Gene transfer, transformation
Week 4	Conjugation
Week 5	Transduction
Week 6	Genetic vectors
Week 7	<b>Mid exam</b>
Week 8	<b>Mutation</b>
Week 9	Gene mapping
Week 10	DNA damage and repair
Week 11	Regulation of gene expression in prokaryotic
Week 12	Clones
Week 13	Transposition of DNA
Week 14	Final exam

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<ul style="list-style-type: none"> <li>Chaudhari, K. (2014). Microbial Genetics. The Energy and Resources Institute (TERI).</li> </ul>	
Recommended	<ul style="list-style-type: none"> <li>Nakatsu, C. H. (2021). Microbial genetics. In Principles and Applications of Soil Microbiology (pp. 89-109). Elsevier</li> </ul>	

Texts	
Websites	<ul style="list-style-type: none"> <li>• <a href="https://www.nature.com/subjects/microbial-genetics">https://www.nature.com/subjects/microbial-genetics</a></li> </ul>

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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>				