MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	**Microbial Genetics**	**Module Delivery**
Module Type	**Core**	☒ **Theory**
Module Code	**UOMU0307042**	☒ **Lecture** ☒ **Lab**
ECTS Credits	**5**	☐ **Tutorial** ☐ **Practical**
SWL (hr/sem)	**125**	☐ **Seminar**

Module Level	**2**	Semester of Delivery	**4**
Administering Department	Biotechnology Medical	**College**	Sciences of college
Module Leader	Hasanain Khaleel Ibrahim	**e-mail**	Hasanain.Khaleel.Ibrahim@uomus.edu.iq
Module Leader's Acad. Title	**Professor**	**Module Leader's Qualification**	**Ph.D**
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**MBT-2309**	**Semester**	**3**
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- This module gives an overview of microbial genetics and its importance. 2- Clarifying and describing molecular processes related to the prokaryotic and eukaryotic genomes including nuclear and mitochondrial genomes. 3- Endeavoring to provide the required fundamental details on DNA mutation and its type in microbial organisms. 4- Providing essential information on molecular mechanism of recombination and its application. 5- Basic and updated knowledge will be covered on horizontal and vertical gene transfers in microbial organisms. 6- Understanding the genomic plasticity and mechanisms of transposition. 7- Vital scientific materials on genetic diversity microbial evaluation 8- Development practical skills for several molecular techniques in microbial genetic lab after obtaining.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students will be able to 1- Clarify and explain processes related to microbial genetics such as nuclear and mitochondrial genomes including coding-noncoding genes. 2- Illustrate basic genetic principles related to mutations and their application in different scientific fields. 3- Explain the mutagen and its types and its effects on microbial genetics. 4- Process microbial molecular techniques for extraction, amplification and detection of molecular molecules. 5- Analyze microbial DNA sequence for species identification and gene sequences for regulatory regions and functions based on available webbased tools and databases. 6- Relate modern DNA technology for disease diagnostics and therapy. 7- Read, discus and evaluate some scientific references. 8- Develop written skills and scientific analyses through weekly lab reports. 9- Improve some skills for future academic and career responsibilities

Indicative Contents المحتويات الإرشادية	Based on SSWL (h/sem.) In lecture lab #1-3 they will need (15 hr). In lecture lab #4- 6 they will need (10 hr). In lecture lab #8-10 they will need (15hr). In lecture lab #11-14 they will need (15hr). In lecture lab #15 they will need (5hr).

Learning and Teaching Strategies استراتيجيات التعلم والتعلي م	
Strategies	1- Lectures using different references, PowerPoints and videos. 2- Questions and writing answering and other activities in online section. 3- Questioning and dialogue in the classroom.
	4- Practical lab and writing reports 5- Problem based learning.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**64**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.27**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**61**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**4.07**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10	4, 6, 10	#1 and#2, #3-#5, #9
	Assignments	2	10	13 and 14	#1 and #12
	Projects / Lab.	1	10	continuous	all
	Report	1	10	15	#14
Summative assessment	**Midterm Exam**	2h	10	7	#1-#6, #8-#14
	Final Exam	3h	50	16	all
Total assessment			100% (100 Marks)		

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Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظر ي

	Material Covered
Week 1	**Introduction to Microbial Genetics**
Week 2	**Genomes in microbial organisms: sizes and structures of nuclear and mitochondrial genomes including coding-noncoding genes**
Week 3	**Mutation and its types, including microbial organisms in prokaryotes and eukaryotes, Practical applications of mutations**
Week 4	**Mutagens and its types, including microbial organisms in prokaryotes and eukaryotes.**

Week 5	Recombination and its types: Recombination- Types of Recombination.
Week 6	Homologous Recombination in Prokaryotes and Eukaryotes- In vitro homologous recombination/ models for homologous recombination, molecular mechanism of homologous recombination.
Week 7	Mid-term Exam
Week 8	Vertical gene transfer in prokaryotes and eukaryotes
Week 9	Horizontal gene transfer in prokaryotes and eukaryotes
Week 10	Genomic plasticity: transposable elements and mechanisms of transposition
Week 11	Genetics of phages; classification and techniques for studying phages
Week 12	Plasmids and its types, replication of plasmids
Week 13	Methods of genetic analyses: Genetic analyses of mutants and DNA sequence determination
Week 14	Population genetics of microorganisms
Week 15	Microbial evaluation
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختب ر	
	Material Covered
Week 1	Biosafety and equipment for microbial genetics
Week 2	Bacterial and fungal genomic DNAs: extraction, detection and comparison.
Week 3	PCR amplification and electrophoresis of 16S rRNA gene in bacterial cells.
Week 4	PCR amplification and electrophoresis of internal transcribed spacer region in fungal cells.
Week 5	PCR-based methods for mutation detection.
Week 6	RNA extraction of specific genes in different microorganisms
Week 7	Mid-term Exam

Week 8	Preparing cDNAs for previous specific genes
Week 9	Quantification of gene expression using RT-PCR
Week 10	Isolation, digestion and quantification of plasmid DNA from bacteria
Week 11	Preparation of Competent cells of *E.coli* and its Transformation
Week 12	Sequencing methods for identification and functional genomes.
Week 13	Next generation sequencing
Week 14	Phylogenetic analysis and evolution
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	- Chaudhari, Keya. *Microbial Genetics*. The Energy and Resources Institute (TERI), 2014. - Moore, D., and LilyAnn N.F. 2007 *Essential fungal genetics*. Springer Science & Business Media.	
Recommended Texts	- Frayling, I. M., Monk, E., & Butler, R. (2005). PCRbased methods for mutation detection. *Molecular Diagnostics: For the Clinical Laboratorian*, 65-74.	
Websites	Different available webs and databases such as https://blast.ncbi.nlm.nih.gov/Blast.cgi,	

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

Note: 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.