	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Applied Pathological Analysis Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Microbiology			**Module Delivery**	
Module Type	CORE			☒ **Theory** ☐ **Lecture** ☒**Lab** ☒**Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	APPA 217				
ECTS Credits	6				
SWL (hr/sem)	175				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Applied Pathological Analysis		**College**	College of Science	
Module Leader	Dr. Wael Adil Obaid		**E-mail**	Waeladil@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
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Review Committee Approval	10/9/2024		**Version Number**	1.0	
Laboratory Staff	Dr. Nawfal Haitham Shakir, Dr. Mustafa Attiyah Hadid, MSc. Saddam Yahya Diwan, MSc. Mays Abdulhadi, MSc. Noor Dheyaa Jaafar, MSc. Zina Jabbar Ghaib Hassan, MSc. Alaa Mohsen.				

<table>
<tr><th colspan="4">Relation with Other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><th colspan="4">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td colspan="3">The course is designed to teach the students:
1. Comprehensive Introduction to Microbiology: Covers fundamental concepts and principles for studying microorganisms such as bacteria, viruses, fungi, and protozoa.
2. Classification of Microorganisms: Understand the various classification schemes applied to microorganisms, including those based on molecular criteria.
3. Diversity of Pathogens and Pathogenic Mechanisms: Explore the diversity of pathogens, including viruses, and the mechanisms through which they cause human infectious diseases.
4. Comparison of Bacterial and Eukaryotic Cells: Identify the key features of bacterial cells, particularly those that differ from eukaryotic cells, including genetic information and its transfer.
5. Study and Cultivation of Microorganisms: Equip students with knowledge on how to study and cultivate microorganisms.
6. Bacterial Cell Structure and Function: Outline the relationship between bacterial cell structure and their functions.
7. Fungi & Virology and Their Impact: Identify the main groups of fungi and viruses, understanding their life histories, economic significance, and their beneficial and detrimental effects on humans.
8. Overview of Microbiology and Infectious Diseases: Provide an overview of microbiology and infectious diseases in both community and hospital settings, introducing core concepts covering bacteriology, virology, mycology, parasitology, and the role of vaccines in disease prevention.
9. Bacterial Genetics: Study the genetic material of bacteria, including plasmids, replication, mutation, and genetic recombination, and understand their role in bacterial diversity and adaptation.
10. Antibiotic Resistance: Increase awareness of the mechanisms of antibiotic resistance in microorganisms and the challenges it presents to modern medicine.
11. Role of Microorganisms in Everyday Life: Examine the diversity of the structure and function of microorganisms, emphasizing their fundamental role in medicine, biotechnology, and the development of vaccines.
12. Vaccination: Understand the principles and importance of vaccination in preventing infectious diseases, and explore the development and application of vaccines.</td></tr>
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Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. **Molecular Structures and Functions:** Describe the specialized molecular structures found in prokaryotes (bacteria and archaea), viruses, and single-cell eukaryotes (algae, fungi, protozoa), and explain their functions. **Microorganisms as Disease Agents:** Explain how microorganisms act as disease agents, focusing on the molecular mechanisms responsible for different pathologies. 2. **Practical Applications:** Identify the practical applications of microorganisms in producing chemicals such as antibiotics and high-value metabolites. 3. **Microbial Structure and Function:** Demonstrate understanding of the fundamental concepts and principles related to microbial structure and function. 4. **Bacterial Isolation and Identification:** Demonstrate the ability to isolate and identify bacteria to the species level using appropriate culture and diagnostic techniques. 5. **Epidemiology and Control of Infectious Diseases:** Evaluate the factors involved in the epidemiology, pathogenesis, detection, diagnosis, and control of infectious diseases, including the use of antibiotics, vaccines, and antibody therapies. 6. **Microbial Pathogenesis:** Demonstrate knowledge of microbial pathogenesis mechanisms and the outcomes of infections, including chronic microbial infections. 7. **Laboratory Diagnosis:** Demonstrate knowledge and practical skills in the laboratory diagnosis of microbial diseases, including the isolation and characterization of specific microbes in clinical specimens. 8. **Pathogenic Microorganisms:** Demonstrate advanced knowledge of the nature and classification of pathogenic microorganisms, particularly viruses and bacteria. 9. **Microbiological Safety and Techniques:** Demonstrate the ability to perform standard microbiological techniques according to protocols, ensuring safety and minimizing infection risks in compliance with local microbiological safety regulations. 10. **Microbial Metabolic Processes:** Outline the major microbial metabolic processes and describe how these processes influence microbial growth and survival. 11. **Factors Affecting Growth and Survival:** Describe the factors that influence the growth and survival of microorganisms.
Indicative Contents المحتويات الإرشادية	1. **General & History of Microbiology:** Overview of the field and its historical development. 2. **Microbial Diversity and Classification:** Study of the diversity of microorganisms and their classification systems. 3. **Microbial Cell Shape and Structure:** Examination of the various shapes and structural components of microbial cells. 4. **Microbial Growth and Metabolism:** Understanding microbial growth processes and metabolic pathways. 5. **Bacterial Reproduction:** Exploration of bacterial reproduction mechanisms. 6. **Microbial Control and Sterilization** Methods of sterilization (autoclaving, filtration, radiation), Disinfection practices (chemical disinfectants, antiseptics), antimicrobial agents (antibiotics, antivirals, antifungals) and Mechanisms of action and clinical uses. 7. **Microbial Genetics:** Study of genetic material, gene expression, mutation, and genetic recombination in microorganisms.

	8. **Microbial Pathogenesis and Microflora:** Understanding how microorganisms cause disease and the role of normal Microflora. 9. **Host-Microbe Interactions: Normal Microbiota and Its Roles and** Roles of normal flora in health and disease prevention. 10. **Fungal Structure and Function:** Examination of the structure and function of fungi. 11. **Viral Structure and Replication:** Understanding the structure and replication processes of viruses and Study of vaccines and their role in preventing infectious diseases. 12. **Parasitology:** Types of parasites (protozoa, helminths), Characteristics and life cycles
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Learning Strategies:** Encourage students to take organized notes during lectures. Provide practice questions and problem-solving exercises. Participate actively in group discussions and collaborative activities. Use textbooks, online resources, and supplementary materials to reinforce learning. Provide constructive feedback on assignments and assessments. Feedback helps students understand their strengths and areas for improvement. **Teaching Strategies:** - Encourage students to actively engage with the material through discussions and group activities to promote deeper understanding. - Deliver well-structured lectures that provide a clear overview of the topic. - Incorporate videos, animations, and interactive simulations to illustrate complex biological processes. - Assign readings or video lectures as homework and use class time for discussions and activities.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	2,5	All
	Assignments& H.W	2	5% (5)	3, 11	All
	Projects / Lab.	1	15% (10)	Continuous	All
	Seminar	1	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Microbiology:** History of microbiology, The scope of microbiology Importance of microbes in nature and human health.
Week 2	**Microbial Diversity, Classification, and Taxonomy:** The five-kingdom and three-domain classification systems, Taxonomic hierarchy, Nomenclature rules.
Week 3	**Microbial Cell Structure and Function:** Bacterial cell wall (Gram-positive and Gram-negative), Cell membrane, cytoplasm, and ribosomes, Flagella, pili, and fimbriae
Week 4	**Bacterial Growth and Reproduction:** Bacterial growth phases, Binary fission and spore formation, Factors affecting bacterial growth (temperature, pH, oxygen, etc.).
Week 5	**Microbial Metabolism:** Catabolism and anabolism, Glycolysis, TCA cycle, fermentation, Electron transport chain and ATP production.
Week 6	**Microbial Genetics:** Structure of bacterial DNA and plasmids, Mechanisms of genetic variation (mutation, transformation, conjugation, transduction), Horizontal gene transfer.
Week 7	**Mid-Term Examination**
Week 8	**Microbial Control and Sterilization:** Sterilization and disinfection techniques, Antimicrobial agents: antibiotics, antivirals, and antifungals, Mechanisms of resistance.

Week 9	**Microbial Pathogenesis:** Mechanisms of bacterial infection (adherence, invasion, evasion of immune response), Toxins: exotoxins and endotoxins, Examples of bacterial diseases.
Week 10	**Host-Microbe Interactions:** Normal microbiota and its roles, The immune system's response to microbes, Vaccination and immunity.
Week 11	**Introduction to Mycology:** Structure and classification of fungi, Fungal reproduction and growth, Fungal pathogens and mycoses.
Week 12	**Introduction to Virology:** Structure and classification of viruses, Viral replication cycles, Pathogenesis of viral infections.
Week 13	**Parasitology:** Overview of parasitic organisms (protozoa, helminths, Life cycles of parasites Host-pathogen interactions in parasitic infections.
Week 14	Helminths
Week 15	**Preparatory Week**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Weeks 1-3	**Lab 1:** Orientation to the Microbiology Lab **Lab 2:** Laboratory Equipment and Microscopy **Lab 3**: Sterilization and Disinfection
Weeks 4-6	**Lab 4:** Media Preparation and Culturing Microbes **Lab 5:** Handling and Observation of Patient Specimens **Lab 6:** Diagnostic Methods for Microorganisms
Week 7	**Mid-Term Examination**
Weeks 8-10	**Lab 8:** Staining Techniques Overview **Lab 9:** Simple Staining Techniques **Lab 10:** Differential Staining Techniques
Weeks 11-13	**Lab 11:** Biochemical Tests for Bacterial Identification **Lab 12:** Antimicrobial Susceptibility Testing **Lab 13:** Microbial Enumeration and Counting
Week 14	**Lab 14:** Culture of Fungi and Virus
Week 15	**Preparatory Week before the final exam.**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Brock Biology of Microorganisms Microbiology: An Introduction	No
Recommended Texts	Microbiology Journal Microbiology and Virology Journal Cell Biology Journal DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	/https://www.khanacademy.org /https://www.microbelibrary.org	

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 بقرار	(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