



Khabat Technical Institute

Food Security and Public Health Department

# Module (Course Syllabus) Catalogue 2022-2023

College /Institute	Khabat Technical Institute
Department	Food Security and Public Health
Year (Stage)	1 <sup>st</sup>
Module Name	General Microbiology
Module Code	GEM204
Semester	2 <sup>nd</sup>
Credits	6
Module Type	Prerequisite □ Core ■ Assist. □
Weekly hours	2
Weekly hours (Theory)	(1) hr class () hr workload
Weekly hours (Practical)	(3) hr class () hr workload
Instructor (Theory)	Ausama Abdulwahab Safar
E-Mail & Mobile No.	ausama.safar@epu.edu.iq 07504678291
Lecturer (Practical)	Nahla Muhammad Ali Khalil
E-Mail & Mobile No.	nahla.ali@epu.edu.iq

# **Course Book**

Course Description	The fundamentals of microbiology: Lectures are focused on the structure of prokaryotic and eukaryotic microorganisms, and host-microbe interactions. Laboratory sessions are focused on pure culture techniques, methods of staining and the colonial and biochemical identification of microorganisms.
Course objectives	After completion of the lecture component of the course, successful students should be able to:  1. Explain the ubiquity and the wide range of ecological habitats of microorganisms in nature.





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	2. Appreciate the diversity of microorganisms and microbial
	communities and recognize how microorganisms solve the
	fundamental problems their environments present.
	3. Understand the role microorganisms play in the biotechnology and
	food industries, like wine and baking, that are important to human
	well-being.
	4. Identify methods used in the identification of organisms involved in
	diseases and disease treatment and prevention.
	5. Define and explain basic medical terminology as related to
	Microbiology.
	1. The Use and Care of the Microscope
	• Identify the parts of the microscope, and understand their functions.
	• Demonstrate the proper method of focusing, changing objectives,
	carrying the microscope, and cleaning the microscope.
	• Use the microscope, especially the oil immersion lens, effectively.
	• Define and understand the following terms and concepts: resolving
	power, parfocal, field of view, and magnification.
	2. Aseptic Techniques. Transfer and Colony Selection Techniques
	• To perform basic bacteriological transfer techniques using broth and
	agar cultures.
	• Handle bacteriological cultures and inoculation loops aseptically.
	• Recognize selected properties of bacterial broth and agar slant cultures.
	• Distinguish basic features of bacterial colonies, broth cultures, and agar
	slant growths
	3. Bacterial Smears and Simple Stains
	• Effectively perform the appropriate aseptic techniques required in the
Laboratory Learning	handling of bacterial cultures.
Outcomes	• Prepare and stain bacterial smears.
	Cate, examine, and interpret stained bacterial smears.
	Distinguish among basic bacterial shapes.
	• Develop a perspective on size relationships among bacteria, and blood
	cells.
	4. The Gram Stain
	• Carry out the Gram stain procedure correctly.
	• Differentiate between Gram-positive and Gram-negative reactions.
•	• Interpret Gram stain reactions with unknown specimens.
<b>*</b>	• Recognize the importance of the Gram stain in disease detection and
	diagnosis.
	• List at least two bacterial species to be Gram-positive and two species
	to be Gram-negative.
	5. Spore and Capsule Stains
	• Carry out a standard procedure for the demonstration of bacterial
	spores.
	• Detect the presence of bacterial spores in a culture.





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	• Distinguish between vegetative cells and bacterial spores.		
	• Carry out a negative staining technique.		
	6. The Use of Selective and Differential Media		
	• Understand the basic differences among differential, enriched,		
	selective, and combined media.		
	• Recognize the role of such media in the isolation and identification of		
	microorganisms.		
	7. The Fungus		
	• Recognize the macroscopic (mycelial phase) and microscopic features		
	of common molds and yeasts.		
	• Recognize the major structures of fleshy mushrooms.		
	• Identify fungal structures in foods and other materials.		
	• Learn the importance of fungi for causing infectious diseases in		
	humans and especially in immuno- compromised individuals, most		
	common pathogens and their diagnosis.		
	Identify fungi and spores in permanent smears.		
	1. Writing reports particularly in practical lessons as well as to		
	scientific excursion		
Student's Obligation	2. Planning scientific trips in order to introduce students to hospitals		
	and pathogen analysis centers, as well as to food industrial		
	companies.		
	3. Students are required to submit a seminar at the end of the semester.		
Forms of teaching	Theory lectures are presented in classes to students in different ways		
Forms of teaching	using projectors, posters, manual papers and white boards.		
	Methods used to assess students are different including:		
	• Mid-term exams (theorical & practical) 24%		
	Ouizzes 8%		
	Reports and seminar 16%		
Assessment scheme	• Homework 10%		
	• Class activity 2%		
	• Final exam (comprehensive) 40%		
	T mai exam (comprehensive) 4070		
	• Brock Biology of Microorganisms, 16th edition (2020); Michael		
	T. Madigan, Kelly S. Bender, Daniel H. Buckley, W Matthew		
	Sattley, David A. Stahl, Pearson Education Publication.		
4 +	• Ryan & Sherris Medical Microbiology, Eighth Edition		
<b>Course Reading List</b>	Paperback (2022); Charles Sterling, J. Andrew Alspaugh, Kenneth		
and References	Ryan, & 7 More.		
	• Microbiology: An Introduction, 13th edition, Pearson (2019);		
	Gerard J. Tortora, Berdell R. Funke, Christine L. Case.		
	• Sherris Medical Microbiology, Seventh Edition (2018); Kenneth		





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• Prescott's Microbiology, tenth edition (2017); Joanne M. Willey,		
Linda M. Sherwood, Christopher J. Woolverton,	McGraw-Hill	
Education Publication.		

Week No.	Theory	Theoretical aspect	Practical aspect	
19-2- 2023	1 <sup>st</sup> Week An introduction to microbiology	<ul> <li>The origin and development of microorganisms, Science goals and fields.</li> <li>Naming and Classification - binary designation.</li> </ul>	Study the Fundamentals, applications and learning the methods and skills for important devices used in microorganism labs with laboratory safety practice	
26-2- 2023	2 <sup>nd</sup> Week Microbial techniques (microscopes)	• General characteristics of the different microbial aggregates that are acellular (viruses - viroids - and prions) and cellular prokaryotic and eukaryotic (bacteria - fungi - algae - protozoa).	methods about sterilizers and disinfections.  Physical sterilization (heat - filtration - radiation).  Chemical sterilization (types examples-working methods).	
5-3- 2023		Holiday		
12-3- 2023		Spring Holiday		
19-3- 2023		Spring Holiday		
26-3- 2023	3rd Week Microbial techniques (microscopes)	The history of the discovery of microorganisms, Theories of spontaneous generation.  The development of microbial techniques - fermentation techniques etc.,  The contributions of scientists to the development of microorganisms (briefly).	- Definition of microscope, types of electron microscopes - different types of microscopes Simple (anatomical) and compound microscopes (BFM, DFM, PCM, FM) Electron microscopy (principle of work - structure - types - TEM, SEM, STEM and its use)	
2-4- 2023	4 <sup>th</sup> Week Bacteria	Their presence, characteristics, shape, cell arrangement, bacterial cell structure.	Aerobic and anaerobic cultivation- different bacterial media- Isolation of microorganisms from different sources.	





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9-4- 2023		Holiday	
16-4- 2023	5 <sup>th</sup> Week Bacteria	Cell wall of positive and negative bacteria, gram stain, capsule, cell membrane, cytoplasm, nucleotides, plasmid, flagella, and filaments.	Study of some bacterial genera
23-4- 2023	6 <sup>th</sup> Week Fungi	Their environment, general characteristics, thallus structure (cell wall, plasma membrane, growth of fungal hyphae, sexual and asexual reproductive structures)	Staining Methods of bacterial and fungal cells and methods identification
30-4- 2023	7 <sup>th</sup> Week Fungi	Nutrition and reproduction in fungi - the economic importance of fungi - a study of some fungal examples	Study of some fungal genera
	8 <sup>th</sup> Week Viruses	Define viruses Its history, its discovery, and its general characteristics (presence, size, shape, structure, classification, reproduction).	Study of some viral genera
	9 <sup>th</sup> Week Viruses	The economic importance of viruses - viroids - prions - phages of bacteria	Study of some genera of algae
	10 <sup>th</sup> Week	Seminar	Seminar
	11 <sup>th</sup> Week		
	Algae and Protozoans		
	5		

# Typical questions

Q--/ Complete the table of differences between Simple and Compound Microscope below?

Characteristics	Simple Microscope	Compound Microscope
Number of lenses		
Condenser lens		
Light source		Illuminator



Concave reflecting



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Mirror type

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A concave mirror on one side and a

Mirror type	Concave reflecting	plane mirror on the other side
Level of magnification	One level only	
Magnifying power	Up to 300X	2,000X
Adjusting Magnification	No	Yes
•/ Complete the foll	owing sentences:	
1- There are many	types of microscopes like	,,
2- Gamma irradi	ation – used for sterilizing larg	e batches of small volume items such
	,, and	
as	,, and	
	used to produce particles and p	
		<pre>yrogen-free fluid, composed of and physical pore size, purify</pre>
nitrocellulose, v		and physical pore size, purify
nitrocellulose, v  Q/ Match the microor	work by electrostatic attraction	and physical pore size, purify
nitrocellulose, v  Q/ Match the microor column B.	work by electrostatic attraction	and physical pore size, purifycriptions in
nitrocellulose, v  O Match the microor column B.  Column A	ganisms in column A to their des	and physical pore size, purifycriptions in
nitrocellulose, v  O Match the microor column B.  Column A a. Archaea	ganisms in column A to their des  Column B  1. Not composed of	criptions in
nitrocellulose, v  O Match the microor column B.  Column A a. Archaeab. Algaec. Bacteriad. Fungi	ganisms in column A to their des  Column B  1. Not composed of column ande of column and column	criptions in
nitrocellulose, v  Of Match the microor column B.  Column A  a. Archaea b. Algae c. Bacteria d. Fungi e. Helminth f. Protozoa	ganisms in column A to their des  Column B  1. Not composed of column ande of column and column	criptions in  cells chitin ceptidoglycan cellulose;
nitrocellulose, v  O/ Match the microor column B.  Column A a. Archaeab. Algaec. Bacteriad. Fungie. Helminth	column B  1. Not composed of a Cell wall made of a photosynthetic s. Unicellular, complete to the composed of a Cellular, complete to the complete to	criptions in  cells chitin ceptidoglycan cellulose; ex cell structure





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20. Extra notes:	
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