



## UNIVERSITI TEKNOLOGI MARA

### BIO461: MICROBIOLOGY

<b>Course Name (English)</b>	MICROBIOLOGY <b>APPROVED</b>
<b>Course Code</b>	BIO461
<b>MQF Credit</b>	4
<b>Course Description</b>	Microbiology is the study of microbes (very small organisms that usually require a microscope to be seen) and is a wide ranging subject closely linked with a surprising variety of other sciences and human activities. This course emphasizes the relationship between microbes and our lives which involves not only the familiar harmful effects of certain microorganisms, such as disease and food spoilage, but also their many beneficial effects. Students will be introduced to the fascinating world of the microbes and in the process will come to realize that of all the groups of organisms studied by biologists, microbes rank as the most important in terms of their impact on our daily lives.
<b>Transferable Skills</b>	The study of this course will enable students to realise the importance of microbes in our daily lives in every aspects.
<b>Teaching Methodologies</b>	Lectures, Lab Work, Reading Activity, Discussion, Directed Self-learning
<b>CLO</b>	CLO1 Explain the fundamentals and importance of microorganisms in relationship with human activities which involves not only diseases and food spoilage but also their many beneficial effects CLO2 Analyse experimental data for problem solving in a scientific report.
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	
<b>1. Introduction</b> 1.1) Scope and subdivisions of microbiology 1.2) Microbes in our lives 1.3) History of microbiology 1.4) Modern developments in microbiology	
<b>2. Microscopy, Staining and Selected Structures of Bacterial Cells</b> 2.1) Size, shape and arrangement of bacterial cells 2.2) Selected important structures of the bacteria: glycocalyx, flagella, and endospores 2.3) Specimen preparations 2.4) Staining techniques in microbiology	
<b>3. Microbial Growth</b> 3.1) Requirements for growth 3.2) Culture media 3.3) Obtaining pure cultures 3.4) Preserving bacterial cultures 3.5) Growth of bacterial cultures 3.6) Biofilms	
<b>4. The Control of Microbial Growth</b> 4.1) Basic principles of microbial control 4.2) Microbial death rates 4.3) Action of antimicrobial agents 4.4) Physical and chemical methods of microbial control 4.5) Antimicrobial drugs 4.6) Spectrum and action of antimicrobial drugs 4.7) Commonly used antimicrobial drugs- A survey 4.8) Efficacy of chemotherapeutic agents 4.9) The future of chemotherapeutic agents	

<p><b>5. The Prokaryotes</b>  5.1) Domain Bacteria  5.2) Domain Archaea  5.3) Microbial diversity  5.4) Methods of classifying and identifying microorganisms</p>
<p><b>6. Viruses, Viroids, and Prions</b>  6.1) General characteristics and taxonomy of viruses  6.2) Isolation, cultivation and identification of viruses  6.3) Viral multiplication  6.4) Viruses and diseases  6.5) Prions  6.6) Plant viruses and viroids</p>
<p><b>7. Infectious Diseases and Epidemiology</b>  7.1) Koch's Postulates  7.2) Methods of epidemiology  7.3) Pathogenicity and virulence  7.4) Portals of entry and exit of microorganisms  7.5) Modes of disease transmission  7.6) Nosocomial Infections  7.7) Emerging infectious diseases</p>
<p><b>8. Introduction to Immunology</b>  8.1) Innate and adaptive immunity  8.2) Normal microbiota and innate immunity  8.3) Microbial evasion of phagocytosis  8.4) Selected practical applications of immunology</p>
<p><b>9. Environmental Microbiology</b>  9.1) Soil Microbiology  9.2) Bioremediation  9.3) Aquatic Microbiology and sewage treatment</p>
<p><b>10. Applied Microbiology</b>  10.1) Food Microbiology  10.2) Industrial Microbiology</p>
<p><b>11. Lab 1</b>  11.1) Practical 1: The use and care of the microscopes  11.2) Practical 2: Examination of prepared stained cells  11.3) Practical 3: Examination of living bacteria</p>
<p><b>12. Lab 2</b>  12.1) Practical 4: Preparation of films for staining and simple staining techniques  12.2) Practical 5: Differential stains</p>
<p><b>13. Lab 3</b>  13.1) Practical 5: Differential stains  13.2) Practical 6: Structural stains</p>
<p><b>14. Lab 4</b>  14.1) Practical 7: Preparation of culture media</p>
<p><b>15. Lab 5</b>  15.1) Practical 8: Examination of prepared bacterial plates  15.2) Practical 9: Pure culture techniques</p>
<p><b>16. Lab 6</b>  16.1) Practical 10: Biochemical actions of bacteria I  16.2) 1. CHO metabolism  16.3) 2. Protein and amino acid metabolism  16.4) : Biochemical actions of bacteria II  16.5) 1. Voges-Proskauer Test  16.6) 2. Catalase test  16.7) 3. Nitrate reduction test  16.8) 4. Urease test</p>
<p><b>17. Lab 7</b>  17.1) Practical 11: Antiseptic evaluation by the filter paper disc method</p>
<p><b>18. Lab 8</b>  18.1) Practical 12: Isolation of amylase producing bacterial strains from the soil and demonstration of amylase activity</p>

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Practical	Average of Lab reports	10%	CLO2
	Quiz	Quiz 1	10%	CLO1
	Quiz	Quiz 2	10%	CLO1
	Test	Test 1	15%	CLO1
	Test	Test 2	15%	CLO1

Reading List	Recommended Text	<ul style="list-style-type: none"> <li>• Tortora, G.J. 2016, <i>Microbiology-An Introduction</i>, 12th Edition Ed., Pearson</li> <li>• Willey J.M., Sherwood L.M. and Woolverton C.J. 2015, <i>Prescott's microbiology</i>, 10th Edition Ed., McGraw-Hill</li> </ul>
	Reference Book Resources	<ul style="list-style-type: none"> <li>• Jacquelyn Black 2013, <i>Microbiology: Principles and Explorations</i>, 8th Edition Ed., Wiley</li> <li>• Pommerville, J.C. Jones &amp; Bartlett Publishers 2014, <i>Fundamentals of Microbiology</i>, 10th Edition Ed., Jones &amp; Bartlett Publishers</li> <li>• Johnson and Case 2014, <i>Laboratory Experiments in Microbiology</i>, 10th Edition Ed., Pearson</li> <li>• Robert W. Bauman 2014, <i>Microbiology- with Diseases by Taxonomy</i>, 4th Edition Ed., Benjamin Cummings</li> </ul>
<b>Article/Paper List</b>	This Course does not have any article/paper resources	
<b>Other References</b>	This Course does not have any other resources	