



UNIVERSITI TEKNOLOGI MARA

BDY514: MICROBIAL DIVERSITY

Course Name (English)	MICROBIAL DIVERSITY APPROVED
Course Code	BDY514
MQF Credit	4
Course Description	Microbial Diversity is designed to provide in-depth understanding of the significance of prokaryotic diversity to biology, the origin of life, and our current world. Although relatively simple and primitive, microorganisms are considered as the most successful form of life. They are virtually every where and they are in tight relationship with other forms of life on earth. Microorganisms carry out their life processes such as energy metabolism, growth, and reproduction independently from other cells. This unique feature makes microorganisms a great tool to understand the nature of life. This course is to introduce the remarkable environmental and metabolic diversity of microorganisms. Topics to be covered in addition to microbial diversity include phylogeny and taxonomy of microorganisms. However, not all major groups of microorganisms will be specifically covered; rather a snapshot of selected groups of microorganisms will be chosen to give a flavor both of diversity and of the range of current research progress.
Transferable Skills	Scientific Writing Skill, Conducting experiment, Knowledge, Communication Skill
Teaching Methodologies	Lectures, Lab Work, Discussion, Presentation, Self-directed Learning
CLO	CLO1 Describe the significance of prokaryotic diversity to Biology (i.e. origin of life, evolution, and current global ecosystem). CLO2 Understand how microbiologists establish evolutionary relationship between groups of prokaryotes and how this relates to the classification of prokaryotes. CLO3 Comprehend the microbiology of specialized microbial habitats and how ecology, phylogeny, and structure of prokaryotic groups are/can be related to one another.
Pre-Requisite Courses	No course recommendations
Topics	
1. Principles of microbial diversity 1.1) Species concepts for prokaryotes 1.2) Theoretical mechanisms of speciation 1.3) Microbial speciation 1.4) Practical 1: Making the Winogradsky Column	
2. Principles of physiology 2.1) Cell Structure (Cell wall, Glycocalyx, Flagella, Axial filament, Fimbriae and Pili) 2.2) Factors affecting growth (Nutrient, Oxygen, Carbon Dioxide)	
3. Physiological and metabolic diversity of microorganisms and their importance 3.1) Microbial Physiology 3.2) Microbial Metabolism	
4. Microbial diversity and physiology of extreme environment 4.1) Methanogens group 4.2) Extreme halophiles group 4.3) Thermophiles group	
5. Advances in metabolism and regulation 5.1) Photoautotroph, Photoheterotrophs, Chemoautotrophs, Chemoheterotrophs 5.2) Anaerobic respiration and fermentation	

6. Biosynthesis and regulation

- 6.1) Biosynthesis of polysaccharide
- 6.2) Biosynthesis of amino acids and lipids
- 6.3) Biosynthesis of purines and pyrimidines

7. Bacterial genetics and plasmid biology

- 7.1) Structure and function of genetic material
- 7.2) Changes in genetic materials
- 7.3) Genetic transfer and recombination (Transformation, Conjugation, Transduction, Plasmid and Transposons)

8. Genetic of microorganism

- 8.1) The molecular context of microbial diversity (Fatty acids profiles, DNA base composition, DNA fingerprinting, Protein profiles)
- 8.2) Phylogenetic analysis (Case study of phylogenetic relationship and niche diversity)

9. Microbial diversity and global environmental issues

- 9.1) Microbial diversity and indexes of environmental change
- 9.2) Global climate change
- 9.3) Conservation of global biodiversity

Assessment Breakdown		%		
Continuous Assessment		100.00%		
Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Presentation	Chapter 8	15%	CLO2
	Test	Test	20%	CLO1
	Test	Final Test	50%	CLO3
	Written Report	Lab Report (Lab 5)	15%	CLO3
Reading List	Recommended Text	<ul style="list-style-type: none"> • Oladele, O. 2008, <i>Microbial Diversity: Form and Function in Prokaryotes</i>, John Wiley & Sons New York 		
Article/Paper List	This Course does not have any article/paper resources			
Other References	<ul style="list-style-type: none"> • Book Alan. T.B. 2004, <i>Microbial Diversity & Prospecting.</i>, ASM Press, Washington • Book Been, H.N., Hai, M.T. & Ken-Ichiro, S. 2001, <i>Microbial Diversity in Asia: Technology and Prospect</i> , World Scientific Publishing Co. Pte. Ltd., Singapore • Book Byung Hong Kim & Geoffrey Michael Gadd 2019, <i>Prokaryotic metabolism and physiology, 2 edition</i> , Cambridge University Press, United Kingdom • Book Gentry, T.R., Pepper, I.L. & Gerba, C.P. 2015, <i>Environmental Microbiology</i>, Elsevier, Amsterdam • Book Gerard, J. Tortora 2016, <i>Microbiolog: An Introduction, 12 edition</i> , Benjamin Cummings • Book Helga, Stan-Lotter. & Sergiu Fendrihan 2017, <i>Adaptation of Microbial Life to Environmental Extremes Novel Research Results and Application.</i> , Springer, Switzerland • Book James, T.S. & Anna-Louise, R. 2002, <i>Biodiversity of microbial life: Foundation of earth"s biosphere</i> , John Wiley & Sons, New York 			