



## UNIVERSITI TEKNOLOGI MARA

### BIO301: TECHNIQUES AND SKILLS IN BIOLOGY

<b>Course Name (English)</b>	TECHNIQUES AND SKILLS IN BIOLOGY <b>APPROVED</b>
<b>Course Code</b>	BIO301
<b>MQF Credit</b>	4
<b>Course Description</b>	This course emphasizes the laboratory techniques and methods commonly applied in biological studies. A theory on the application of the technology and instruments used is also included. The topics include techniques in fieldwork investigation, techniques in microbiology, histological methods, biochemical analysis and instrumentation, and DNA technology.
<b>Transferable Skills</b>	Knowledge, Practical Skills, Information Management and Life Long Learning, Management and Entrepreneurship
<b>Teaching Methodologies</b>	Lab Work, Discussion, Self-directed Learning, Journal/Article Critique, Supervision
<b>CLO</b>	CLO1 Apply the concepts and theories in biological techniques and skills CLO2 Perform (plan, conduct and analyse) scientific investigations using different biological techniques and skills CLO3 Work on new ideas to solve scientific problems with relevant reference CLO4 Demonstrate innovative vision in solving scientific problems
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	
<b>1. Techniques in Microbiology</b> 1.1) 1.1 Introduction to microbiology 1.2) 1.2 Safety rules 1.3) 1.3 Microorganism control 1.4) 1.3.1 Sterilization & Disinfection 1.5) 1.3.2 Aseptic technique 1.6) 1.4 Media preparation 1.7) 1.4.1 Type of media 1.8) 1.4.2 Bacterial cultures 1.9) 1.5 Preservation of microorganism 1.10) 1.6 Microbiological analysis 1.11) 1.6.1 Viable cells analysis	
<b>2. Techniques in Histology</b> 2.1) 2.1 Introduction to histology 2.2) 2.2 Safety rules 2.3) 2.3 Histological preparation for tissues and cell 2.4) 2.3.1 Fixation 2.5) 2.3.2 Dehydration 2.6) 2.3.3 Embedding 2.7) 2.3.4 Sectioning 2.8) 2.3.5 Staining 2.9) 2.3.6 Mounting 2.10) 2.4 Gram staining	
<b>3. Techniques in Field Investigation</b> 3.1) 3.1 Introduction to field investigation 3.2) 3.2 Safety rules 3.3) 3.3 Sampling techniques 3.4) 3.4 The preservation and mounting techniques in plants 3.5) 3.5 The preservation and mounting techniques in animals	

**4. Techniques in DNA Technology**

- 4.1) 4.1 Introduction to DNA technology
- 4.2) 4.2 DNA extraction
- 4.3) 4.3 Gel electrophoresis
- 4.4) 4.4 Polymerase Chain Reaction (PCR)
- 4.5) 4.5 recombinant DNA and DNA Cloning
- 4.6) 4.5.1 Plasmid vector
- 4.7) 4.5.2 Restriction endonucleases
- 4.8) 4.5.3 DNA ligase
- 4.9) 4.6 DNA Sequencing
- 4.10) 4.6.1 Sanger method
- 4.11) 4.7 Application of DNA technology

**5. Techniques in Biochemical Analysis**

- 5.1) 5.1 Introduction to biochemical analysis
- 5.2) 5.2 Extraction methods
- 5.3) 5.3 Chromatography principles and techniques
- 5.4) 5.3.1 Paper Chromatography
- 5.5) 5.3.2 Thin Layer Chromatography (TLC)
- 5.6) 5.3.3 High Performance Liquid Chromatography (HPLC)
- 5.7) 5.3.4 Gas Chromatography (GC)
- 5.8) 5.3.5 Size-Exclusion Chromatography (SEC)
- 5.9) 5.3.6 Ion Exchange Chromatography
- 5.10) 5.3.7 Affinity Chromatography
- 5.11) 5.4 Spectrophotometry
- 5.12) 5.4.1 Beer's Law

Assessment Breakdown	%
Continuous Assessment	100.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Final Project	Mini Project Final Report Writing	10%	CLO4
	Final Project	Mini Project Final Report Writing	30%	CLO3
	Practical	Laboratory Reports (1)	30%	CLO2
	Test	Ongoing Online Test 1	12%	CLO1
	Test	Ongoing Online Test 2	18%	CLO1

Reading List	Recommended Text	<ul style="list-style-type: none"> <li>Wan Siti Atikah Wan Omar, Sarina Hashim, Nor Lailatul Wahidah Musa, and Low Kim Fatt 2019, <i>Laboratory Manual – Techniques &amp; Skills in Biology</i>, JAPENA Universiti Teknologi MARA Cawangan Pahang Pahang</li> </ul>
	Reference Book Resources	<ul style="list-style-type: none"> <li>Reece, J. B., Urry, L.A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., and Jackson, R. B. 2014, <i>Campbell Biology</i>, Tenth Edition Ed., Person Benjamin Cummings USA</li> <li>Dubey, R.C and Maheswari D. K. 2015, <i>Practical Microbiology</i>, Revised Edition Ed., S. Chand &amp; Company LTD New Delhi</li> <li>Jones, A., Reed, R. and Weyers, J. 2016, <i>Practical Skill in Biology</i>, Sixth Edition Ed., Pearson Prentice Hall Great Britain</li> <li>Henderson, P. A. and Southwood T. R. E. 2016, <i>Ecological Methods</i>, Fourth Edition Ed., Wiley-Blackwell Publishing United Kingdom</li> </ul>
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	