



UNIVERSITI TEKNOLOGI MARA

BIO615: MOLECULAR BIOLOGY

Course Name (English)	MOLECULAR BIOLOGY APPROVED
Course Code	BIO615
MQF Credit	3
Course Description	This is a course on molecular basis of biology. Genetic engineering and regulation of gene expression will be discussed. This course will interactively engage students cognitively and scientifically. Students will define concepts, state and explain theories, make predictions as to the possible outcome of an event, perform investigations via laboratory exercises. They also will discuss verbally and in writing with peers and facilitators. The outcomes shall be assessed through a variety of tools which include tests, examination, presentation and classroom/laboratory engagement.
Transferable Skills	Practical, Thinking and Scientific Skills, Professionalism
Teaching Methodologies	Lectures, Lab Work, Presentation
CLO	CLO1 Perform practical skills in experimental laboratory related to molecular biology CLO2 Demonstrate self-confidence in a group project CLO3 Construct solutions and strategies related to molecular biology techniques
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.0 History and development of Molecular Biology 1.1) 1.1 Molecular biology involvement in scientific development timeline	
2. 2.0 DNA Nucleosome 2.1) 2.1 The Lowest Level of Chromosome Organisation 2.2) 2.2 Chromosomes and Chromatin 2.3) 2.3 Heterochromatin and Euchromatin	
3. 3.0 Cloning Vectors 3.1) 3.1 Restriction Endonuclease 3.2) 3.2 Plasmid vectors 3.3) 3.3 Phage vectors 3.4) 3.4 Cosmid vectors 3.5) 3.5 Formation of recombinant DNA	
4. 4.0 Techniques in Molecular Biology 4.1) 4.1 PCR, RT-PCR and qPCR 4.2) 4.2 DNA Separation 4.3) 4.3 DNA Hybridization 4.4) 4.4 DNA Polymorphism 4.5) 4.4 DNA Sequencing	
5. 5.0 Transgenesis 5.1) 5.1 Gene Transfer Methods 5.2) 5.2 Transgenic Animals 5.3) 5.3 Transgenic Plants 5.4) 5.4 Therapeutic Protein	
6. 6.0 Recombination/ DNA Repair 6.1) 6.1 The Holliday Model for Homologous Recombination 6.2) 6.2 Alkylation of base 6.3) 6.3 Radiation damage of DNA 6.4) 6.4 BER vs NER	

7. 7.0 Mobile Genetic Elements

- 7.1) 7.1 Transposable elements/transposon
- 7.2) 7.2 Transposon mechanism
- 7.3) 7.3 Autonomous vs Nonautonomous Transposon
- 7.4) 7.4 Transposon and evolution

8. 8.0 Regulation of Gene Activity

- 8.1) 8.1 Mechanism of transcription in prokaryotes
- 8.2) 8.2 Lac operon
- 8.3) 8.3 Trp operon
- 8.4) 8.4 Ara operon

9. 9.0 Data analysis

- 9.1) 9.1 Bioinformatics, Genomics and Proteomics
- 9.2) 9.2 Website and softwares
- 9.3) 9.3 BLAST Analysis

10. 10.0 Genome Libraries

- 10.1) 10.1 Formation of a DNA Library
- 10.2) 10.2 cDNA Libraries
- 10.3) 10.3 Screening Libraries

11. 11.0 Genome sequencing of model organisms

- 11.1) 11.1 Bacteriophage, *Saccharomyces cerevisiae*, *Caenorhabditis elegans*, *Arabidopsis thaliana* and *Drosophila melanogaster*
- 11.2) 11.2 Human Genome Project (HGP)

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Lab Exercise	A lab report comprising of three cumulative and continuous practicals and lab skill marks assessed by lab instructor.	20%	CLO1
	Presentation	Presentation slides and a short video on Topics in Molecular Biology	10%	CLO2
	Test	A test that covers questions from Chapter 1-Chapter 4	20%	CLO3

Reading List	Recommended Text	• Robert F. Weaver 2012, <i>Molecular Biology. 6th Edition.</i> , Ed., , McGraw-Hill International Edition. USA
	Reference Book Resources	• Gerald Karp, Janet Iwasa, Wallace Marshall 2020, <i>Karp's Cell and Molecular Biology, 9th Edition, Asia Edition, 9th Ed., 18,</i> John Wiley & Sons, Inc.
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	