



UNIVERSITI TEKNOLOGI MARA

CBE551: GENETICS AND MOLECULAR BIOLOGY

Course Name (English)	GENETICS AND MOLECULAR BIOLOGY APPROVED
Course Code	CBE551
MQF Credit	3
Course Description	This course is to acquaint the students to versatile tools and techniques employed in genetic engineering and recombinant DNA technology. It covers topics relating to recombinant DNA enzymes, cloning strategies and bacterial transformation methodologies. Aspects of DNA amplification and analysis techniques, cloning and expression of mammalian and plant genes in bacteria and practical applications of genetic engineering and biotechnology are also covered in this course.
Transferable Skills	N/A
Teaching Methodologies	Lectures, Tutorial, Discussion
CLO	CLO1 Demonstrate an understanding of the principles of genetic engineering, biotechnology and recombinant DNA technology. CLO2 Show a basic level of competency in problem solving, data processing and analysis associated with the field of genetic engineering CLO3 Utilise and provide information on techniques used to manipulate living cells and overview genetic engineering methods
Pre-Requisite Courses	No course recommendations
Topics	
1. Chapter 1: Introduction to Genetic Engineering 1.1) Milestones in genetics: Mendel, Watson and Crick, Human genome Project 1.2) Structures of DNA and RNA 1.3) Gene organization and gene expression 1.4) Basic features of genetic engineering	
2. Chapter 2: Genetics of Microbes 2.1) Genetics of viruses 2.2) Genetics of bacteria 2.3) Genetics of fungi	
3. Chapter 3: Restriction Endonucleases and Other DNA Modifying Enzymes 3.1) Restriction modification system 3.2) DNA polymerases, RNA polymerases, Phosphatases, Ligases, Reverse transcriptases	
4. Chapter 4: Cloning, Expression and Analysis of Genes and Their Product 4.1) Concept of molecular cloning 4.2) Host cell types, Vectors 4.3) Cloning and expression of genes in bacteria 4.4) Synthetic DNA, Amplifying DNA: PCR	
5. Chapter 5: Selection, Screening and Analysis of Recombinants 5.1) Genetic selection and screening methods 5.2) Analysis: Restriction mapping, blotting techniques, DNA sequencing, Gel electrophoresis	
6. Chapter 6: Genetic Engineering and Biotechnology 6.1) Protein engineering 6.2) From lab to production plant: Biotechnology industry, Production systems, Scale-up considerations, downstream processing. 6.3) 6.4) 6.5) Case Study: Production of Human Insulin	

7. Chapter 7: Applications

- 7.1) Gene manipulation (rDNA technology)
- 7.2) Transgenic animals and plants
- 7.3) Production of enzymes and medicines
- 7.4) Production of mammalian products and vaccines

8. Chapter 8: Ethics, Legal and Bio-safety Aspects of Genetic Engineering

- 8.1) Institutional, national and international legal framework for biotechnology
- 8.2) Ethical concerns of genetic engineering: Culture, religion and trade
- 8.3) Safety and risks of genetically engineered products to human health and environment

Assessment Breakdown	%
Continuous Assessment	40.00%
Final Assessment	60.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Assignment 1	10%	CLO1
	Assignment	Assignment 2	10%	CLO2 , CLO3
	Test	Test 1	10%	CLO1 , CLO2
	Test	Test 2	10%	CLO2 , CLO3

Reading List	Recommended Text	<ul style="list-style-type: none"> • Snustad,D.P. 2006, <i>Principles of Genetics</i>, 4 Ed., John Wiley and Sons
	Reference Book Resources	<ul style="list-style-type: none"> • Lewin,B. 2006, <i>Essential Genes,International Edition</i>,, Pearson Education,inc • Elrod,S.and Stansfield,W. 2002, <i>Schaum's Outline of Theory and Problems of Ge</i>, 4 Ed., McGraw Hill
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	