

1.	Name of Course/Module	Introduction to Molecular Cloning	
2.	Course Code	HMB2029	
3.	Status of Subject	Major for B. Sc Bioinformatics	
4.	MQF Level/Stage	Bachelor Degree – MQF Level 6	
5.	Version (state the date of the last Senate approval)	June 2012	
6.	Requirement for Registration	HMB2019 Introduction to Molecular Biology	
7.	Name(s) of academic/teaching staff	Ng Chong Han Tan Chai Hong Ong Chia Sui	
8.	Semester and Year offered	Trimester 1 (Delta level)	
9.	Objective of the course/module in the programme :		
	1. To teach the principles of DNA cloning and the techniques involved in DNA cloning 2. To provide students with practical experience in the construction and recovery of recombinant DNA molecules		
10.	Learning Outcomes :		
	At the completion of the subject, students should be able to:		
	LO1: To understand and explain the basic principles of DNA cloning [Cognitive, Level 2]. LO2: To apply basic laboratory techniques used in molecular cloning [Psychomotor, Level 3]. LO3: To depict basic principles of constructing DNA libraries and to understand and apply various DNA library screening methods [Cognitive, Level 3]. LO4: To explain and apply basic techniques and methods for the identification and characterization of cloned sequences [Cognitive, Level 3]. LO5: To understand the applications of gene cloning and DNA analysis in research and biotechnology [Cognitive, Level 3].		
11.	Synopsis:		
	The course will cover the various tools and techniques of DNA cloning. Topics to be covered will include (i) vector and host systems, (ii) introduction of DNA into living cells, (iii) construction of recombinant DNA, (iv) identification of recombinant clones, (v) analysis of cloned sequences, and (vi) applications of DNA cloning. The practical sessions will expose students to DNA extraction, restriction, ligation, creation of recombinant DNA, and identification of transformed host.		
	Kursus ini merangkumi pelbagai peralatan dan teknik bagi pengklonan DNA. Topik-topik termasuk vektor dan sistem perumah, pengenalan kepada DNA dalam sel hidup, pembinaan DNA rekombinan, pemastian klon rekombinan, analisa turutan klon, dan aplikasi klon DNA. Untuk sesi praktikal, pelajar akan menyelidik tentang "DNA extraction", "restriction", "ligation", pembuatan DNA rekombinan dan pemastian perumah transformasi.		
12.	Mapping of Subject to Programme Outcomes :		
	Programme Outcomes		% of Contribution
	PO1: Apply soft skills in work and career related activities		16.67
	PO7: Demonstrate knowledge and understanding of essential facts, concepts, principles, and theories relating to bioinformatics		66.67
	PO8: Apply principles and knowledge of bioinformatics in relevant areas		16.67
13.	Assessment Methods and Types :		
	Method and Type	Description/Details	Percentage
	Test		10%
	Quiz		10%
	Assignment	Report & Presentation	10%
	Practical		20%

	Final Exam		50%
14.	Details of Subject		
	Topics	Mode of Delivery	
		Lecture	Tutorial
	1. Overview and basic principles of DNA cloning	1	-
	2. Vector and host systems <ul style="list-style-type: none"> • Plasmids • Bacteriophage • Phagemids, Cosmids, YACs and BACs • Eukaryotic vectors 	2	1.0
	3. Introduction of DNA into living cells <ul style="list-style-type: none"> • Cloning DNA in <i>E.coli</i> • Cloning DNA in eukaryotic hosts • Cloning DNA in plant cells 	2	
	4. Construction of recombinant DNA molecules <ul style="list-style-type: none"> • Genomic Libraries • Chromosome specific libraries • cDNA libraries 	1	1.0
	5. Generation and identification of recombinant clones construction of <ul style="list-style-type: none"> • Probes to screen for specific clones • Screening libraries 	1	
	6. Methods for the analysis of cloned sequences <ul style="list-style-type: none"> • Restriction mapping • Southern and Northern blots • DNA sequencing • PCR analysis 	1	
	7. The application of gene cloning and DNA analysis in Biotechnology <ul style="list-style-type: none"> • Diagnosing and screening • Animal models of human genetic disease: Knockout Mice • Gene therapy • DNA fingerprints 	2	2.0
8. The application of gene cloning and DNA analysis in Research <ul style="list-style-type: none"> • Studies of the gene expression and function • Genome annotation • Studies of the transcriptome and proteome 	3		
	Total	13	4
15.	Tutorials		
	<ul style="list-style-type: none"> • Vector and host systems • Introduction of DNA into living cells • Construction of recombinant DNA molecules • Identification of recombinant clones, construction of probes, screening libraries • Methods for the analysis of cloned sequences • The application of gene cloning and DNA analysis in Biotechnology and Research 		
16.	Total Student Learning Time (SLT)	Face to Face (Hour)	Total Guided and Independent Learning

	Lecture	13	13
	Tutorials	4	4
	Laboratory/Practical	39	20
	Presentation	1	3
	Assignment	-	10
	Mid Term Test	1	5
	Lab test	-	1
	Final Exam	2	15
	Quizzes (2)	-	2
	Sub Total	60	73
	Total SLT	133/40 = 3.3 => 3	
17.	Credit Value	3	
18.	Reading Materials :		
	Textbook	Reference Materials	
	<ol style="list-style-type: none"> 1. Gene Cloning and DNA Analysis. 6th edition. T.A. Brown, ISBN-13: 978-1444334074. Wiley-Blackwell Publishing Ltd 2010 2. <i>Molecular Biology of the Gene</i>, 6th edition. James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick, ISBN 0-321-50781-9/978-0-321-50781-5. Benjamin Cummings. 2008. 	<ol style="list-style-type: none"> 1. <i>Gene Biotechnology. 2nd edition</i>. William Wu, Michael J. Welsh, Peter B. Kaufman, Helen H. Zhang. CRC Press. 2004. 2. <i>DNA Science. 2nd Edition</i>. David A. Miklos and Greg A Freyer with DA Crotty. Cold Spring Harbor Laboratory Press, 2003. 3. <i>The Condensed Protocols from Molecular Cloning: A Laboratory</i>. By Joseph Sambrook, David William Russell. Cold Spring Harbor 2006. 4. <i>DNA Microarrays: A Molecular Cloning Manual</i>. David Bowtell, Joseph Sambrook, CSHL Press. 2003. 	
19.	Appendix (to be compiled when submitting the complete syllabus for the programme) :		
	<ol style="list-style-type: none"> 1. Mission and Vision of the University and Faculty 2. Mapping of Programme Objectives to Vision and Mission of Faculty and University 3. Mapping of Programme Outcome to Programme Objectives 4. Programme Objective and Outcomes (Measurement and Descriptions) 		