

SUMMARY OF INFORMATION ON EACH COURSE

1.	Name of Course	Bioinformatics Algorithms II								
2.	Course Code	HPB3011								
3.	Status of Course [Applies to (cohort)]	Specialisation core for B.Sc (Hons) Bioinformatics								
4.	MQF Level/Stage	Bachelor – MQF Level 6								
5.	Version (State the date of the Senate approval – history of previous and current approval date)	Date of Previous Version:	June 14							
		Date of Current Version :	May 15							
6.	Pre-Requisite	HPB2031 Bioinformatics Algorithms I & TMA1211 Discrete Mathematics and Probability								
7.	Name(s) of academic/teaching staff	Ali AfzalianMand Mohammed Rajihuzzaman Teo Poh Nee ML Yong								
8.	Semester and Year offered	Trimester 1, Year 3								
9.	Objective of the course in the programme :	<ol style="list-style-type: none"> To further explore the algorithms in Bioinformatics especially in the area of computational models for analysis. To provide a basic introduction on the various modeling techniques used in Bioinformatics to help in visualizing and analyzing biological problems. 								
10.	Justification for Including the Subject in the Programme:	The subject provides specific knowledge required for bioinformatics students to learn advanced aspects in bioinformatics algorithm.								
11.	Course Learning Outcomes :	Domain	Level							
	LO1	Analyze the method and basic techniques of biological data acquisition and visualization computing	Cognitive	Level 4						
	LO2	Explain the concept of computational approaches in Bioinformatics	Cognitive	Level 2						
	LO3	Develop the machine learning approaches such as neural network and Hidden Markov Model	Cognitive	Level 5						
	LO4	Apply the knowledge acquired for biological analysis and to make logical predictions	Cognitive	Level 3						
12.	Mapping of Learning Outcomes to Programme Outcomes :	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
	Learning Outcomes									
	LO1							X	X	
	LO2							X	X	
	LO3							X	X	
	LO4	X							X	
13.	Assessment Methods and Types :									

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Method and Type		Description/Details				Percentage	
Final Exam						40%	
Quizzes		Written quizzes				30%	
Lab Test						10%	
Assignment		Report & Presentation				10%	
Lab Report						10%	
14.	Mapping of assessment components to learning outcomes (LOs)						
	Assessment Components	%	LO1	LO2	LO3	LO4	
	Final Exam	40	40	40			40
	Quizzes	30	30	30	75		30
	Lab Tests	10	10	10			10
	Assignment	10	10	10	25		10
	Lab Reports	10	10	10			10
15.	Details of Course						
Topics					Mode of Delivery		
					Lec		Lab
1. Algorithms in Transcriptomics – Microarrays Introduction to Gene expression Microarray Technology Gene Expression data Clustering Gene Expression data Classification					6		4
2. Statistical and Computational algorithms and models Intro to Clustering and Classification Algorithms Support Vector Machine Evaluation Measurements Bayesian and statistical fundamental Classification modules <i>In-silico</i> modeling Hidden Markov modeling Monte Carlo chain modeling Machine learning approaches Fuzzy logic and AI Neural networks					8		8

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3. Algorithms in Proteomics Proteomics: Definition and Scope Protein Domain Protein classification and structure prediction algorithms Protein structure and classification databases Alignment strategies and methods Protein secondary and tertiary structural prediction and modeling		8	4
4. Model visualization Visualizing protein structures, sequence data, networks and pathways Visualization modules – Printing, maps, trees, tables		4	2
5. Prediction of RNA structure Prediction algorithms and methods - self complementary regions, minimal free energy methods, sequence covariation, stochastic context-free grammar approach		2	2
Total		28	20
Laboratory			
Lab 1: Perform Clustering using Gene Expression data Lab 2: Introduction to Matlab and classification Lab 3: HMM with Matlab Lab 4 - 6: Using Matlab for classification with the iris dataset using SVM, Bayes and ANN Lab 7: Protein secondary structure prediction Lab 8: Protein structure prediction with I-Tasser Lab 9: 3D visualization with Cn3D			
	Total Student Learning Time (SLT)	Face to Face / Guided Learning	Independent Learning
	Lecture	28	28
	Tutorials	-	-
	Laboratory/Practical	20	10
	Assignment	-	10
	Final Exam	2	15
	Quizzes	4 times	4
	Lab Tests	1	2
	Sub Total	51	69
	Total	120	
16.	Credit Value	3	
17.	Reading Materials :		
	Textbooks		
	A First Course in Systems Biology, Bessant C, Oakley D, Shadforth I, ISBN-13: 978-0199658565 ISBN-10: 0199658560. Oxford University Press. 2012		

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Genome Annotation (Chapman & Hall/CRC Mathematical and Computational Biology), Soh J, Gordon P, Sensen C, ISBN-13: 978-1439841174 ISBN-10: 1439841179. Chapman and Hall/CRC. 2012
Reference Material (including 'Statutes' for Law)
Building Bioinformatics Solutions 2 nd edition, Bessant C, Oakley D, Shadforth I, ISBN-13: 978-0199658565. Oxford University Press. 2014

Appendix (to be compiled when submitting the complete syllabus for the programme) :

1. Mission and Vision of the University and Faculty
2. Programme Objectives or Programme Educational Objectives
3. Programme Outcomes (POs)
4. Mapping of POs to the 8 MQF domain
5. Summary of the Bloom's Taxonomy's Domain Coverage in all the Los in the format below :

Subject	Learning Outcomes (please state the learning outcomes)	Bloom's Taxonomy Domain		
		Affective	Cognitive	Psychomotor
ABC1234	Learning Outcome 1			
	Learning Outcome 2			
	Learning Outcome 3			
	Learning Outcome 4			
DEF5678	Learning Outcome 1			
	Learning Outcome 2			
	Learning Outcome 3			
	Learning Outcome 4			

6. Summary of LO to PO measurement
7. Measurement and Tabulation of result for LO achievement
8. Measurement Tabulation of result for PO achievement