

1.	Name of Course/Module	Pattern Recognition
2.	Course Code	TPR 3411
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	TCP1241 Computer programming II
7.	Name(s) of academic/teaching staff	Pang Ying Han Tee Connie Jin Zhe
8.	Semester and Year offered	Trimester 1 (Gamma level)
9.	Objective of the course/module in the programme :	
	To provide a good understanding of pattern recognition systems, algorithms and their applications.	
10.	Learning Outcomes :	
	At the completion of the subject, students should be able to:	
	LO1: Recognize a wide spectrum of techniques in pattern recognition (Cognitive, Level 1)	
	LO2: Explain the pattern recognition procedures and algorithms (Cognitive, Level 5)	
	LO3: Plan and design practical pattern recognition solutions (Cognitive, Level 5)	
	LO4: Develop a pattern recognition system for real-world applications (Cognitive, Level 5)	
11.	Synopsis:	
	This course provides an introduction to the field of pattern recognition, including its application area and an overview of both classical and recent methods. The course covers an elaborate discussion on feature selection, generation and classification.	
	Kursus ini memberikan pengenalan kepada kajian pengecaman corak, termasuk penggunaannya dan kedua-dua kaedah klasik dan moden di dalam bidang ini. Kursus ini merangkumi pembincangan mendalam bagi pemilihan fitur, pembentukan dan klasifikasi.	
12.	Mapping of Subject to Programme Outcomes :	
	Programme Outcomes	% of Contribution
	PO1: Apply soft skills in work and career related activities.	25

	PO7: Demonstrate knowledge and understanding of essential facts, concepts, principles, and theories relating to bioinformatics.	50
	PO8: Apply principles and knowledge of bioinformatics in relevant areas.	25
13.	Assessment Methods and Types :	
	Method and Type	Description/Details
		Percentage
	Mid Test	Written Exam
	Assignment	Report and presentation
	Tutorial (quizzes)	Written Exam
	Final Exam	Written Exam
14.	Details of Subject	
	Topics	Mode of Delivery
		Lecture Laboratory
	Introduction Machine Perception, Pattern Analysis and Recognition, Sensing, Segmentation, Feature Extraction, Classification.	4 4
	Review of Probability and Statistics Probability law, Sample Space, Conditional Probability, Bayes Theorem, Cumulative Distribution Function, Probability Density Function, Random Vectors, Covariance Matrix.	2 2
	Bayesian Decision Theory Overview of Bayesian Decision Theory, Loss function, Conditional Risk, Normal Density, Discriminant Function.	4 4
	Maximum-Likelihood & Bayesian Parameter Estimation Parameter Estimation Techniques, Maximum-Likelihood, Bayesian Estimation.	2 2
	Principal Component Analysis and Fisher's Linear Discriminant Dimensionality Reduction, Principal Component Analysis, Fisher's Linear Discriminant.	2 2
	Non-Parametric Techniques Generative Method, Discriminative Method, Parzen Window, K-Nearest Neighbor Estimation.	2 2
	Unsupervised Learning Techniques Basic Concepts, Clustering Algorithms, K-means clustering, Hierarchical Algorithms, Dendrogram.	4 4
	Neural Networks Basic Concepts, Applications, Activation functions, Training Methods, Perceptrons, Feedforward NN, Backpropagation, Learning Rule.	4 4
	Total	24 24

15.	Laboratory/Practical		
	<ul style="list-style-type: none"> • Image analysis for pattern recognition • Overview of application areas – examples • Neural networks – examples • Linear classifiers • Non-linear classifiers • Feature representation and extraction • Clustering algorithms • Hierarchical algorithms 		
16.	Total Student Learning Time (SLT)	Face to Face (Hour)	Total Guided and Independent Learning
	Lecture	24	24
	Tutorials	-	-
	Laboratory/Practical	24	12
	Presentation	-	-
	Assignment	-	10
	Mid Term Test	1	3
	Lab Test	-	-
	Final Exam	2	18
	Quizzes (x4)	-	4
	Sub Total	51	71
	Total SLT	$122/40 = 3.05 \Rightarrow 3$	
17.	Credit Value	3	
18.	Reading Materials :		
	Textbook	Reference Materials	
	S. Theodoridis, K. Koutroumbas, "Pattern Recognition (3 rd edition)", Academic Press (2006)	Richard O. Duda, Peter E. Hart , David G. Stork. "Pattern Classification (2nd Edition)", John Wiley & Sons Inc. (2001)	
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) 		