

SUMMARY OF INFORMATION ON EACH COURSE

1.	Name of Course	Expert Systems							
2.	Course Code	TES3141							
3.	Status of Course [Applies to (cohort)]	Specialisation Core for B.IT (Hons) Artificial Intelligence							
4.	MQF Level/Stage Note : Certificate – MQF Level 3 Diploma – MQF Level 4 Bachelor – MQF Level 6 Masters – MQF Level 7 Doctoral – MQF Level 8	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 2014 Date of current version : June 2016							
6.	Pre-Requisite	TMA1211 Discrete Mathematics and Probability							
7.	Name(s) of academic/teaching staff	Lee Chin Poo Cheah Wooi Ping Tee Connie							
8.	Semester and Year offered	Trimester 1, Year 3							
9.	Objective of the course in the programme : To develop the knowledge and understanding of the nature of expert systems, as part of artificial intelligence and knowledge based systems. To develop an appreciation of the strengths and weaknesses of expert systems applications to engineering and other knowledge rich fields. To develop an awareness of the need, appropriateness, suitable methodology and the advantages of expert system applications.								
10.	Justification for including the course in the programme : Expert systems are designed to solve complex problems by reasoning about knowledge, like an expert, and not by following the procedure of a developer as is the case in conventional programming. This course will provide students with introductory concepts in expert systems as well as apply effective techniques to construct computer system that emulates the decision-making ability of a human expert.								
11.	Course Learning Outcomes :		Domain		Level				
	LO1 Explain the basic concepts of expert systems.		Cognitive		2				
	LO2 Compute and solve the problems of expert systems.		Cognitive		3				
	LO3 Apply the various techniques of expert systems.		Cognitive		3				
12.	Mapping of Learning Outcomes to Programme Outcomes :								
	Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
	LO1							x	
	LO2							x	
	LO3	x						x	x
LO4	x						x	x	

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13.	Assessment Methods and Types :				
	Method and Type	Description/Details		Percentage	
	Quiz	Written quiz		10%	
	Test	Written test		20%	
	Assignment	System and Report		30%	
	Final Exam	Written Exam		40%	
14.	Mapping of assessment components to learning outcomes (LOs)				
	Assessment Components	LO1	LO2	LO3	LO4
	Quiz	10	12		
	Test	20	25		
	Assignment	20		100	100
	Final Exam	50	63		
15.	Details of Course				
	Topics	Mode of Delivery			
		Lecture	Laboratory		
	1. Introduction to Expert Systems Definition, Why Build An Expert, Application Areas of Expert System, and How Are Expert Systems Used	1	1		
	2. Expert System Architecture Types of knowledge representation: object, rules, semantic networks, frames and logic	1	1		
	3. Knowledge Representation Types of knowledge representation: object, rules, semantic networks, frames and logic	2	2		
	4. Inference Techniques Types of reasoning: deductive, inductive, abductive, analogical, common-sense, and non-monotonic, types of inference: forward and backward chaining, search techniques: depth-first search, breadthfirst search, best first search	2	2		
	5. MYCIN : An Expert Systems Application Background, Features, Problem Solving Approach, Sample of MYCIN Session and Review of MYCIN evaluation	2	2		
6. Rule- Based Expert System Evolution, Architecture of Rule-Based Systems, Examples of RuleBased Systems (Backward Chaining and Forward Chaining RuleBased Systems), and Task on Designing Backward and Forward Chaining Rule – Based System	4	4			

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7. Reasoning Under Uncertainty Probability Theory, Bayesian Theory (Example, Variation, and Prospector (An Expert System Application that Employed Bayesian Approach)) , Certainly Theory (Overview, Uncertain Evidence, Uncertain Rules, Uncertain Inferencing, Certainly Factor, and Certainly Factor example Program)		4	4
8. Inexact Reasoning and Fuzzy Logic Dempter-Shafer Theory, Overview of Fuzzy Logic, Forming Fuzzy Sets, Fuzzy Set Representation, Hedges Set Operations, Inference of Fuzzy Logic, and Building a Fuzzy Logic expert System		4	4
9. Frame-Based Expert Systems Overview, anatomy of a class, Subclass, Instance, Properties, Inheritance, Facets, Methods, Encapsulation, Rules Interaction with Objects, and Design Methodology for Frame Based System (Define Problem, Analyse Domain, Define Classes, Instances, Rules, and Object Communications, Design Interface, Evaluate System and Expand System)		2	2
10. Phases Of Knowledge Engineering Problem Assessment, Knowledge Acquisition, Design, Testing, Documentation, and Maintenance		2	2
Total		24	24
Total Student Learning Time (SLT)		Face to Face / Guided Learning	
Lecture		24	
Tutorials			
Laboratory/Practical		24	
Presentation			
Assignment		-	
Mid Term Test		1	
Quiz		4 times	
Final Exam		2	
Sub Total		51	
Total SLT		120	
4.	Credit Value	3	
5.	Reading Materials :		
	Textbooks		
	Castillo, E. , Guttierrez, J. M., and Hadi, A. S. (2011). Expert systems and probabilistic network models. Springer Science & Business Media.		
	Reference Material (including 'Statutes' for Law)		
	Giarratano, J. & Riley, G. (2005). Expert Systems: Principles and Programming (4th ed.). PWS Publishing Company.		

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Neapolitan, R. E. (2012). Probabilistic reasoning in expert systems: theory and algorithms. CreateSpace Independent Publishing Platform.

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
TES3141	LO1 Explain the basic concepts of expert systems.		2	
	LO2 Compute and solve the problems of expert systems.		3	
	LO3 Apply the various techniques of expert systems.		3	
	LO4 Develop an expert system for real-world applications.		5	
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