1.	Name of Course/Module	Expert Systems
2.	Course Code	TES3211
3.	Status of Subject	Major for B.IT Artificial Intelligence
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	TDS1191 Discrete Structures OR TCP1211 Logic Programming
7.	Name(s) of academic/teaching staff	Leow Meng Chew Cheah Wooi Ping Tee Connie
8.	Semester and Year offered	Trimester 1 (Delta Level)
9.	Objective of the course/module 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.	Learning Outcomes :	
	At the completion of the subject, students should be able to: LO1: Describe and comprehend the nature of expert systems, as part of artificial intelligence and knowledge-based systems (Cognitive, Level 1) LO2: Summarize the strengths and weaknesses of expert systems and their applications to engineering and other knowledge rich fields (Cognitive, Level 2) LO3: Apply expert system techniques to construct expert systems in different problem domains (Cognitive, Level 3) LO4: Design medium sizes expert systems using different knowledge representations for the hybrid systems (Cognitive, Level 5) LO5: Describe different uncertainty handling techniques in the expert systems based on the situation at hand (Cognitive, Level 6)	
11.	Synopsis:	
	To provide the introduction of expert systems and the programming concept/languages related with the combination of the knowledge of engineering.	
	Untuk memberikan kemahiran mengguna system pengkomputeran dan juga pengetahuan di dalam kejuruteraan perkakasan.	
12.	Mapping of Subject to Programme Outcomes :	
	Programme Outcomes	**% of Contribution**

	PO1: Apply soft skills in work and career related activities	11.11
	PO7: Demonstrate knowledge and understanding of essential facts, concepts, principles, and theories relating to artificial intelligence	55.56
	PO8: Apply principles and knowledge of artificial intelligence in relevant areas	33.33

13. Assessment Methods and Types :

Method and Type	Description/Details	Percentage
Test	Written Exam	20%
Quiz	Written Exam	10%
Assignment	Report & Presentation	20%
Final Exam	Written Exam	50%

14. Details of Subject

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	-
2. Expert System Architecture Types of knowledge representation: object, rules, semantic networks, frames and logic	1	2
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, breadth-first 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 Rule-Based Systems (Backward Chaining and Forward Chaining Rule-Based Systems), and Task on Designing Backward and Forward Chaining Rule – Based System	8	8
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	**28**	**28**

15. Laboratory

Mainly CLIPS (JESS) programming and Problem Solving:

1. Develop a Small Backward Chaining Rule-Based Expert System
2. Develop a Small Forward Chaining Rule-Based Expert System
3. Develop a small Frame-Based Expert System

16.

Total Student Learning Time (SLT)	Face to Face (Hour)	Total Guided and Independent Learning
Lecture	28	28
Tutorials		
Laboratory/Practical	28	14
Presentation		
Assignment	-	10
Mid Term Test	1	3
Final Exam	2	20
Quiz	-	1
Sub Total	59	76
Total SLT	135/40 = 3.375 => 3	

17. Credit Value: 3

18. Reading Materials :

Textbook	Reference Materials
1. Giarratano, J. & Riley, G. (2005) Expert Systems: Principles and Programming (Fourth Edition), PWS Publishing Company, ISBN : 978-0534384470	1. Schalkoff, R. J. (2009) Intelligent Systems: Principles, Paradigms and Pragmatics, Jones & Bartlett Publishers, ISBN: 978-0763780173. 2. Akerkar, R. & Sajja, P. (2009) Knowledge-Based Systems, Jones & Bartlett Publishers, ISBN: 978-0763776473

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