1.	Name of Course/Module	Computational Intelligence II
2.	Course Code	TCI3371
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	TCI2261 Computational Intelligence I
7.	Name(s) of academic/teaching staff	Tan Shing Chiang G. Hanifa
8.	Semester and Year offered	Trimester 1 (Delta Level)

9. Objective of the course/module in the programme :

To introduce the concepts of genetic algorithms and its application in optimization. The students will be also exposed to combination use of computing methods (fuzzy logic, artificial neural networks, and genetic algorithms) in different application areas. By using the MATLAB the students can implement the techniques of genetic algorithms and other methods and thus, gain hands on experience through the development of the models and algorithms.

10. Learning Outcomes :

At the completion of the subject, students should be able to:

LO1: Explain the principles and theories of Genetic Algorithms (GAs), neural-fuzzy and fuzzy-genetic models (Cognitive, Level 2)
LO2: Explain applications of GAs, neural-fuzzy and fuzzy-genetic models (Cognitive, Level 2)
LO3: Build applications of GAs, neural-fuzzy and/or fuzzy-genetic models (Psychomotor, Level 5)
LO4: Evaluate the applications of GAs, neural-fuzzy and/or fuzzy-genetic models (Cognitive, Level 6)

11. Synopsis:

This subject is an extension from Computation Intelligence I. In this subject, the state-of-the-art methods of genetic algorithms and advanced techniques of combining the computing methods (fuzzy logic and artificial neural networks, and fuzzy set and genetic algorithms) will be presented.

Subjek ini ialah kesinambungan daripada Kepintaran Komputasi I. Dalam subjek ini, teknik-teknik berkenaan dengan algoritma genetik and kacukan daripada teknik-teknik lain (logic kabur dengan rangkaian neural buatan, dan set kabur dengan algoritma genetic) diperkenalkan.

12. Mapping of Subject to Programme Outcomes :

Programme Outcomes	**% of Contribution**
PO1: Apply soft skills in work and career related activities	33.33
PO7: Demonstrate knowledge and understanding of essential facts, concepts, principles, and theories relating to artificial intelligence	33.33
PO8: Apply principles and knowledge of artificial intelligence in relevant areas	16.67
PO9: Demonstrate the ability in analysing, modelling, designing, developing and evaluating computing solutions	16.67

13. Assessment Methods and Types :

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

14. Details of Subject

Topics	Mode of Delivery	
	Lecture	Tutorial
1. Genetic Algorithms: An Overview History of evolutionary computation; the appeal of evolution, biological terminology, search spaces and fitness landscapes, elements of genetic algorithms, a simple genetic algorithm, Genetic Algorithms and Traditional Search Methods.	4	2
2. Genetic Algorithms in Problem Solving Evolving Computer Programs, Data Analysis and Prediction, Evolving Neural Networks	4	2
3. Genetic Algorithms in Scientific Models Modeling interactions between learning and evolution, modeling sexual selection, modeling ecosystems, measuring evolutionary activity	4	1
4. Theoretical Foundations of Genetic Algorithms Schemas and the two-armed Bandit problem, Royal roads, Exact mathematical models of simple genetic algorithms. Statistical-mechanics approaches.	4	1
5. Implementing a Genetic Algorithm When should a genetic algorithm be used, encoding a problem for a genetic algorithm, adapting the encoding, selection methods, genetic operators, parameters for genetic algorithms.	4	2
6. Neuro-Fuzzy Modelling and Applications Adaptive Neuro-Fuzzy Inference Systems and their applications, Neuro-Fuzzy Control and applications	5	2
7. Applications of Fuzzy Sets and Genetic Algorithms Literature review, Game playing	3	-
Total	**28**	**10**

15. Tutorials

- Genetic Algorithms: An Overview
- Genetic Algorithms in Problem Solving
- Genetic Algorithms in Scientific Models
- Theoretical Foundations of Genetic Algorithms
- Neuro-Fuzzy Modelling and Applications

Laboratory/Practical (Complete assignment phase-by-phase in the lab):

- Write a GA program for an application, and/or
- Write a Neuro-Fuzzy program for an application

16.	Total Student Learning Time (SLT)	Face to Face (Hour)	Total Guided and Independent Learning
	Lecture	28	28
	Tutorials	10	10
	Laboratory/Practical	14	7
	Presentation	1	3
	Assignment	-	10
	Mid Term Test	1	3
	Final Exam	2	15
	Quizzes	2 times	2
	Sub Total	56	78
	Total SLT	134/40 = 3.35	
17.	Credit Value	3	
18.	Reading Materials :		
	Textbook	Reference Materials	
	1. Melanie Mitchell, "An Introduction to Genetic Algorithms"; The MIT Press.1998.	2. Engelbrecht, A.P., "Computational Intelligence: An Introduction," 2nd edition, Wiley, 2007.	
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)		