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SUMMARY OF INFORMATION ON EACH COURSE

1.	Name of Course	Algorithm Design and Analysis	
2.	Course Code	TDA3231	
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	TCS1011 Data Structures and Algorithms	
7.	Name(s) of academic/teaching staff	Cheah Wooi Ping Lim Kian Ming Tan Shing Chiang	
8.	Semester and Year offered	Trimester 2, Year 3	
9.	Objective of the course in the programme : To convey the analysis of algorithms, as a design process that begins with problems arising across the full range of computing applications, build on an understanding of algorithm design techniques, and results in the development of efficient solutions to these problems.		
10.	Justification for including the course in the programme : Every branch of computer science relies on efficient and correct algorithms, so it is imperative that students have a deep understanding of the analysis and design of algorithms in general. This course provides an introduction to mathematical modelling of computational problems. It covers the common algorithms, algorithmic paradigms, and data structures used to solve these problems. The course emphasizes the relationship between algorithms and programming, and introduces basic performance measures and analysis techniques for these problems.		
11.	Course Learning Outcomes :	Domain	Level
	LO1 Comprehend the essential concept behind algorithms analysis and design.	Cognitive	2
	LO2 Demonstrate a familiarity with major algorithms.	Cognitive	3
	LO3 Analyse the asymptotic performance of algorithm.	Cognitive	4

MULTIMEDIA UNIVERSITY®

SUMMARY OF INFORMATION ON EACH COURSE

	LO4 Apply important algorithmic design paradigms and methods of analysis.	Cognitive	3

12. Mapping of Learning Outcomes to Programme Outcomes :

Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
LO1	X								
LO2	X	X							
LO3	X		X						
LO4	X	X	X						
Percentage	50.0	25.0	25.0						

13. Assessment Methods and Types :

Method and Type	Description/Details	Percentage
Quiz	Written quiz in the class	15%
Assignment	Written report, group project, with presentation	25%
Test	Written examination	20%
Final Examination	Written examination	40%

14. Mapping of assessment components to learning outcomes (LOs)

Assessment Components	LO1	LO2	LO3	LO4
Quiz	20.00	20.00	20.00	
Assignment				100.00
Test	27.00	27.00	27.00	
Final Examination	53.00	53.00	53.00	

15. Details of Course

Topics	Mode of Delivery (eg : Lecture, Tutorial, Workshop, Seminar, etc.) Indicate allocation of SLT (lecture, tutorial, lab) for each subtopic	
	Lecture	Lab
1 Introduction: Some Representative Problems Stable Matching, Five Representative Problems, Interval Scheduling, Weighted Interval Scheduling, Bipartite Matching, Independent Set, Competitive Facility Location.	2	2
2 Basics of Algorithms Analysis Computational Tractability, Asymptotic Order of Growth Notation, Common Running Times.	2	2

MULTIMEDIA UNIVERSITY®

SUMMARY OF INFORMATION ON EACH COURSE

	3 Graphs Basic Definitions and Applications, Graph Connectivity and Graph Traversal, Testing Bipartiteness, Connectivity in Directed Graphs, Directed Acyclic Graphs and Topological Ordering.	2	2
	4 Greedy Algorithms Interval Scheduling, Scheduling to Minimize Lateness, Optimal Caching, Shortest Paths in a Graph, Minimum Spanning Tree, Clustering, Huffman Codes and Data Compression.	4	4
	5 Divide and Conquer Merge Sort Algorithm, Counting Inversions, Closest Pair of Points, Integer Multiplication.	2	2
	6 Dynamic Programming Weighted Interval Scheduling, Segmented Least Squares, Knapsacks Problem, RNA Secondary Structure, Sequence Alignment, Sequence Alignment in Linear Space, Shortest Path, Distance Vector Protocol.	4	4
	7 Network Flow Maximum Flow and Minimum Cut, Ford-Fulkerson Algorithm, Choosing Good Augmenting Paths, Bipartite Matching, Disjoint Paths, Extensions to the Maximum Flow.	4	4
	8 NP and Computational Intractability Polynomial-Time Reductions, Reductions via Gadgets, Definition of NP, NP-Completeness, Sequencing Problems, Partitioning Problems, Graph Coloring.	6	6
	Total	**26**	**26**

	Total Student Learning Time (SLT)	Face to Face / Guided Learning	Independent Learning
	Lecture	26	26
	Tutorials	0	0
	Laboratory/Practical	26	13
	Quizzes	3 times	3
	Assignment	0	10
	Mid Term Test	1	5
	Final Exam	2	15
	Sub Total	55	72
	Total SLT	**127**	
16.	Credit Value	**3**	
17.	Reading Materials :		

MULTIMEDIA UNIVERSITY®

SUMMARY OF INFORMATION ON EACH COURSE

	Textbooks
	1. Jon Kleinberg (2015). Algorithm Design (2nd ed.). Addison Wesley.
	Reference Material (including 'Statutes' for Law)
	1. Robert Sedgewick and Philippe Flajolet (2013) Introduction to the Analysis of Algorithms (2nd ed.). Addison Wesley.
	2. Mark A. Weiss (2014). Data Structures and Algorithm Analysis in C++ (4th ed.). Prentice Hall.
	3. Anany Levitin (2013). Introduction to the Design and Analysis of Algorithms (3rd ed.). Addison Wesley.

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 0utcomes)**	**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