



UNIVERSITI TEKNOLOGI MARA

CSC645: ALGORITHM ANALYSIS AND DESIGN

Course Name (English)	ALGORITHM ANALYSIS AND DESIGN APPROVED
Course Code	CSC645
MQF Credit	3
Course Description	This course focuses on both the design and analysis of algorithms. It provides students with basic knowledge and techniques required to design efficient algorithms and analyse their efficiency, as well as demonstrate the key relationships between problem solving, algorithm design, data structures, programs and algorithm analysis, and the effects of the choices. This course provides a fundamental platform for the strategies and design ideas of algorithms for solving fundamental problems in computing science.
Transferable Skills	Demonstrate ability to provide effective solutions and innovative thinking or ideas to problem solving.
Teaching Methodologies	Lectures, Lab Work
CLO	CLO1 Apply concept and theory of algorithm complexity. CLO2 Demonstrate professionalism in selecting appropriate algorithm design technique for algorithm analysis in solving real world problems. CLO3 Determine the complexity of the algorithm for space and time
Pre-Requisite Courses	No course recommendations
Topics	
1. INTRODUCTION TO ALGORITHM 1.1) Algorithms, Data Structures and Programs 1.2) Characteristics of Algorithms 1.3) Fundamental Problems in Computer Science	
2. FUNDAMENTALS OF ALGORITHM ANALYSIS 2.1) Algorithm Analysis Framework 2.2) Asymptotic Notations 2.3) Asymptotic Efficiency Classes	
3. METHODS OF ALGORITHM ANALYSIS 3.1) Analysis of Iterative Algorithms 3.2) Analysis of Recursive Algorithms	
4. BRUTE FORCE 4.1) Introduction 4.2) Prime Number 4.3) Selection Sort	
5. DIVIDE AND CONQUER 5.1) Introduction And Properties 5.2) Merge Sort 5.3) Quick Sort	
6. GREEDY ALGORITHM 6.1) Introduction And Properties 6.2) Minimum Spanning Tree 6.3) Huffman Code	

7. DYNAMIC PROGRAMMING

7.1) Introduction And Properties

7.2) Coin Changing

7.3) All-pair Shortest Path

7.4) Transitive Closure

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Lab assignment	10%	CLO2
	Group Project	Group project	10%	CLO3
	Quiz	Quiz (3 quizzes)	10%	CLO1
	Test	Test 1	10%	CLO1
	Test	Test 2	10%	CLO1

Reading List	Recommended Text	• Amrinder Arora 2015, <i>Analysis and Design of Algorithm</i> [ISBN: 978-163487021]
	Reference Book Resources	<ul style="list-style-type: none"> • Mark A. Weiss 2014, <i>Data Structures and Algorithm Analysis in Java</i>, Prentice Hall [ISBN: 0132576279] • Robert Sedgewick, Philippe Flajolet 2013, <i>An Introduction to the Analysis of Algorithms</i>, Addison-Wesley [ISBN: 0133373487] • Scott Tilley, Harry J. Rosenblatt 2016, <i>Systems Analysis and Design</i>, Nelson Education [ISBN: 9781305494602] • Allen Downey 2018, <i>Think Complexity</i>, "O'Reilly Media, Inc." [ISBN: 1492040150] • Gerard Meurant 2014, <i>Algorithms and Complexity</i>, Elsevier [ISBN: 0080933912]
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	