COURSE OUTLINE

INSTITUTION University of Management & Technology, Lahore

PROGRAM (S) TO BE EVALUATED BS Computer Science

Course Description:

Course Code	CS3044
Course Title	Analysis of Algorithms
Credit Hours	3
Prerequisites by Course(s) and Topics	Discrete Structures, Data Structures and Algorithms
Assessment Instruments with Weights (quizzes, assignments, midterms, final, etc.)	Assignments 20 % Quiz 20 % Midterm 25 % Final Term 35 %
Course Moderator	Amjad Ali
Current Catalog Description	
Textbook (s)	**T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein**: Introduction to Algorithms, MIT Press, 2nd Edition 2002.
Reference Material	• **Anany Levitin:** Introduction to the Design and Analysis of Algorithms, 3rd Edition, PEARSON • **Richard Neapolitan:** Foundations of Algorithms, Fourth Edition 2011. • **Parag Himanshu Dave**, Design and Analysis of Algorithms, PEARSON, 2nd Edition.
Course Goals	The major objective of this course is providing comprehensive knowledge of modern computer algorithms and solving scientific and engineering problems efficiently and accurately. The students will be motivated to think about procedures solving real world problems optimally and correctly. Real world problem will be taken as examples to create feelings about the usefulness of this course.

Course Learning Outcomes (CLOs):

Measurable Learning Outcomes	CLOs	Description	Domain & Level
	CLO 1	**ARGUE** and **PROVE** the correctness of algorithms using rigorous mathematical techniques taught in this course.	C4
	CLO 2	**ANALYZE** the time complexity of different algorithms.	C3
	CLO 3	**COMPARATIVE** analysis of different algorithm's design techniques.	C4
	CLO 4	**DESIGN** algorithms for different kind of problems using efficient algorithm design techniques for real life problems.	C4

Mapping of CLOs to Program Learning Outcomes (PLOs):

CLOs/PLOs	CLO 1	CLO 2	CLO 3	CLO 4
PLO 1: Academic Education				
PLO 2: Knowledge for Solving Computing Problems				✓
PLO 3: Problem Analysis	✓	✓	✓	
PLO 4: Design and Development of Solutions				✓
PLO 5: Modern Tool Usage				
PLO 6: Individual and Teamwork				
PLO 7: Communication				
PLO 8: Computing Professionalism and Society				
PLO 9: Ethics				
PLO 10: Life Long Learning				✓

Tentative Lecture Plan:

Topics Covered in the Course	Week	Topics	Assessments	CLOs
	1-2	Solving a Problem with a Computer What is Algorithm? Properties of Algorithm.	Quiz-1	CLO1
	3-4	**Analysis: Correctness** Correctness of Algorithms: Iterative and Recursive Algorithms	Quiz-2	CLO1
	5-6	**Analysis: Time Complexity** Time Complexity of Iterative Algorithms Time Complexity of Recursive Algorithms	Quiz-3	CLO2
	7	**Analysis: Time Complexity** Solving Recurrence Relations by ▪ Substitution Method ▪ Recursion Tree Method ▪ Mater Theorem	Assignment-1	CLO2
	8	**Analysis: Asymptotic Analysis** Orders of Growth ▪ Big *O* ▪ Big Omega ▪ Big Theta	Mid Term	CLO2
	9-10	**Algorithm Design:** Brute Force Technique (Exhaustive Search) ▪ Chain Matrix Problem ▪ 0-1 Knapsack Problem	Quiz-4 Assignment -2	CLO3, CLO4
	11-12	**Algorithm Design:** Divide and Conquer Paradigm ▪ Merge Sort ▪ Quick Sort	Quiz-5	CLO3, CLO4
	13-14	**Algorithm Design:** Dynamic Programming ▪ Rod Cutting Problem ▪ Chain Matrix Problem	Quiz-6, Quiz-7	CLO3, CLO4
	15	**Algorithm Design:** Dynamic Programming ▪ Assembly Line Scheduling	Assignment -3	CLO4
	16	**Algorithm Design:** Greedy Algorithms ▪ Dijkstra's algorithm ▪ Activity Selection	Quiz-8	CLO4

Class Time Spent on (in credit hours)	**3 hours per week**			

Mapping of CLOs to Direct Assessments

CLOs	Quiz 1	Quiz 2	Quiz 3	Quiz 4	Assignment 1	Assignment 2	project	Mid Term	Final Term
1	✓	✓							
2			✓		✓			✓	✓
3				✓		✓			✓
4				✓		✓	✓		✓

Instructor Name: Rana Marwat Hussain

Instructor Signature _____