University of Engineering and Technology Lahore - New Campus (Kala Shah Kaku)

Section Course Outline Report

Department: Computer Science (KSK) **Printed Date:** January 16, 2024

Section Course Detail	
Semester	SPRING 2024
Department	Computer Science (KSK)
Section	C
Subject Title	CS-272 Design and Analysis of Algorithms
Subject Domain	Non-Engineering
Subject Knowledge	Humanities
Contact	veracious.verve@gmail.com

Measureable Student Learning Outcomes

CLOs	Description	PLOs	Domain	Domain Level	Assessments
CLO1	Classify algorithms according to their complexity	PLO02	Cognitive	2. Understand	null
CLO2	Calculate time and space complexity of algorithms using algorithm analysis techniques	PLO02	Cognitive	3. Apply	null
CLO3	Demonstrate asymptotic analysis of recursive as well as non-recursive algorithms	PLO02	Cognitive	3. Apply	null
CLO4	Design efficient algorithms using various algorithm design techniques	PLO03	Cognitive	6. Create	null

Class Timings

Section Content

Week (Lec)	Topics	CLO's
week1	Algorithms- an Overview: Introduction to algorithms Role of Algorithms in Computing Fundamentals of Algorithmic Problem Solving Problem Types Fundamental Data Structures	CLO1

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Week (Lec)	**Topics**	**CLO's**
week2	The Analysis Framework: Fundamentals of the Analysis of Algorithm Efficiency Asymptotic Notations Mathematical Analysis of Recursive and Non-recursive algorithms Linear Search/Binary Search Tower of Hanoi	CLO2
week3	Recurrences: What is Recurrence? Methods to solve recurrences Substitution Method Recursion tree Master Theorem Sorting and Order Statistics	CLO2
week4	Brute Force Algorithms (with Analysis) Selection Sort Bubble Sort	CLO3, CLO2, CLO4
week5	Brute Force Algorithms (with Analysis) Sequential Search String Matching	CLO2, CLO3, CLO4
week6	Decrease and Conquer Algorithms (with Analysis) Insertion Sort Binary Search	CLO3, CLO2, CLO4
week7	Divide and Conquer Algorithms (with Analysis) Merge Sort Quick Sort	CLO2, CLO3, CLO4
week8	Divide and Conquer Algorithms (with Analysis) Binary Tree Traversal Strassens' Matrix Multiplication	CLO4, CLO2, CLO3
week9	Exhaustive Search Travelling Salesman Problem Knapsack Problem Assignment Problem Linear time Sorting Algorithms Counting Sort Radix Sort Bucket Sort	CLO1, CLO4, CLO3
week10	Limitation of Algorithm Power and Coping with Limitation of Algorithm Power P, NP and NP- Complete Problems Optimization Problems Maximization Problem Minimization Problem	CLO3, CLO4, CLO1

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	Backtracking N-Queens Problem Hamiltonian Circuit Subset Sum Problem	
week11	Limitation of Algorithm Power and Coping with Limitation of Algorithm Power Branch and Bound Travelling Salesman Problem Knapsack Problem Assignment Problem Hungarian Method (for Assignment Problem)	CLO3, CLO1, CLO4
week12	Dynamic Programming Coin Row Problem Coin Change Problem Travelling Salesman Problem Fibonacci Series and Memory Function	CLO3, CLO1, CLO4
week13	Dynamic Programming Knapsack Problem and Memory Function Optimal Binary Search Trees Warshall’s and Floyd’s Algorithms (All pair Shortest Path)	CLO3, CLO1, CLO4
week14	Space and Time Trade-off Hashing Open Hashing (separate chaining) Closed Hashing (Open Addressing) Transform and Conquer Algorithms Heaps and Heapsort	CLO3, CLO2, CLO4, CLO1
week15	Elementary Graph Algorithms Depth First Search Breadth First Search Minimum Spanning Trees Single Source Shortest Path All pair Shortest Path	CLO3, CLO4, CLO2, CLO1
week16	Greedy Algorithms Prims Algorithm Kruskals Algorithm Djikstras Algorithm Huffman Trees and code	CLO4, CLO3, CLO1