University of Engineering and Technology Lahore

Course Outline Report

Subject: EE-517 Design and Analysis of Algorithms

Department: Electrical Engineering

Course Description

This course introduces students to the field of analysis and design of computer algorithms. Students will be able to analyze asymptotic performance of algorithms in terms of computational time. They will study advanced design and analysis techniques such as dynamic-programming, greedy algorithms and amortized analysis. Hundreds of interesting computational problems are couched in terms of graphs. The students will be able to explain the working of major graph algorithms and how these algorithms can be used to solve real-world problems. Finally, they will be able to understand string matching algorithms.

Course Detail

Faculty	Dr Kashif Javed
Contact	kashif.javed@uet.edu.pk
Credit Hrs	3.0
Pre-requisite	

CLOs	Description	PLOs	Domain	Domain Level
Measureable Student Learning Outcomes				
CLO1	Analyze the asymptotic performance of algorithms.	PLO1	Cognitive	4. Analyze
CLO2	Apply working of algorithms to solve real-world problems.	PLO2	Cognitive	2. Understand
CLO3	Apply important algorithmic design paradigms and methods of analysis.	PLO3	Cognitive	3. Apply
CLO4	Determine efficient algorithms in common engineering design situations.	PLO4	Cognitive	5. Evaluate

Text Books

1. T.H. Cormen et. al., "Introduction to Algorithms", McGraw Hill, 3rd Edition, 2009
2. J. Kleinberg and E. Tardos, "Algorithm Design", Pearson Education, 2006

Grading Policy
Quizzes 15.0%
Mid 30.0%
Final 40.0%
Project 10.0%
Assignments 5.0%

Tentative Weekly Lecture Plan

Week (Lec)	Topics	CLOs
1	Foundations: Introduction, algorithmic complexity and asymptotic analysis, Divide-and-conquer and recursive algorithms,	CLO1
2	Growth of Functions: Asymptotic notation, Solving recurrences: substitution method	CLO1
3	Solving recurrences: recursion-tree, and master methods	CLO1
4	Probabilistic Analysis and Randomized Algorithms: The hiring problem, Indicator random variables, Randomized algorithms	CLO1
5	Dynamic programming: Matrix-chain multiplication	CLO2 , CLO3
6	Elements of dynamic programming, Longest common sub sequence.	CLO2 , CLO3
7	Greedy Algorithms: An activity-selection problem, Elements of the greedy strategy, Huffman codes	CLO2 , CLO3
8	Amortized Analysis: The accounting method, The potential method	CLO2 , CLO3
9	Elementary Graph Algorithms: Breadth-first search, Depth-first search, Topological sort, Minimum spanning trees: The algorithms of Kruskal and Prim,	CLO2 , CLO3
10	Single-Source Shortest Paths: The Bellman-Ford algorithm, Single-source shortest paths in directed acyclic graphs, Dijkstra's algorithm,	CLO3
11	All-Pairs Shortest Paths: Shortest paths and matrix multiplication,	CLO3
12	The Floyd-Warshall algorithm, Johnson's algorithm for sparse Graphs,	CLO3
14	Maximum Flow: Flow networks, The Ford- Fulkerson method	CLO3

15	String Matching: The naive string-matching algorithm, The Rabin-Karp algorithm	CLO3
16	Student Course Project Presentations	CLO4