

Branch Name:	Information and Communication Technology
Program Code:	ET208
Course Name:	Design and Analysis of Algorithm(Elective – III)
Course Code:	2ET2080301T
Pre-requisite Course:	Fundamentals of Data Structures and Algorithms

Course Objective:

1. To understand and apply the algorithm analysis techniques.
2. To critically analyze the efficiency of alternative algorithmic solutions for the same problem
3. To understand different algorithm design techniques.
4. To understand the limitations of Algorithmic power.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme(Marks)									Total(Marks)
					Theory(Marks)				Practical(Marks)					
	L	T	P	Total	SEE		CCA		SEE		CCA			
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
3	3	-	-	3	24	60	16	40	-	-	-	-	100	

Subject Contents:

Sr. No	Topic	Total Hours	Weight (%)
1	Introduction: Problem solving approach, Basics of set theory, Functions and relations, Designing algorithms, Combinations, Vectors and matrices, Linear inequalities and linear equations, Recursive mathematical definitions.	4	10
2	Analysis of Algorithms Asymptotic Analysis: Analyzing algorithms, Asymptotic Notations, Standard complexity classes, Empirical measurements of performance, Time and space tradeoffs in algorithms.	5	14
3	Divide and Conquer: Analyzing recursive algorithms using recurrence relations (The substitution method for solving recurrences, Master method), Strassen's algorithm for matrix multiplication, Binary search, Binary search tree.	7	18
4	Dynamic Programming: Making change problem, The principle of optimality, The knapsack problem, Floyd's algorithm for shortest paths, Dynamic Programming using Memoization.	4	10
5	Greedy Algorithms: Making change problem, Knapsack problem, Shortest Path – Dijkstra's algorithm, Huffman codes	5	14
6	Amortized Analysis: Aggregate analysis, accounting method, Potential method, Single source shortest paths, Bellman Ford.	4	10
7	String Matching: The naïve string matching, Introduction to NP completeness, The class P and NP, Polynomial reductions, NP complete problems	5	14

8	Heuristic Algorithm: The travelling salesperson, Approximate algorithms-knapsack problem.	4	10
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Text Books:

1. Introduction to Design and Analysis of Algorithms, AnanyLevitin, Pearson.

Reference Books:

1. Introduction to Algorithms. Thomas Cormen, Charles Leiserson, Ronald Rivest. PHI publication.
2. Fundamentals of Algorithms. Gilles Brassard, Paul Bratley. PHI publication.
3. Foundations of Algorithms, Shailesh R Sathe, Penram.
4. Design and Analysis of Algorithms, Dave and Dave, Pearson.

List of Open Source Software/learning website:

1. <http://www.nptel.ac.in/courses/106101059/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Analyze the asymptotic performance of algorithms.	4 Analyze
CLO2	Demonstrate a familiarity with major algorithms and data structures.	1 Remembering, 5 Evaluate
CLO3	Apply important algorithmic design paradigms and methods of analysis.	3 Applying, 2 Understanding
CLO4	Synthesize efficient algorithms in common engineering design situations.	4 Analyze
CLO5	Compare between different data structures. Pick and appropriate data structure for a design situation.	5 Evaluate, 2 Understanding
CLO6	Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.	4 Analyze 6 Creating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes(POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	M	L	L				M				M		H	M	M	M
CLO2	M	L	L	L							L		H	M	M	M
CLO3	M	L	L			L		L					H	M	M	M
CLO4	M	L	L	M									M	M		M
CLO5	H	M	M								L		M		M	
CLO6	H	M	M					L		L		M		M	M	M

H:High, M:Medium, L:Low