

Branch Name:	Computer Engineering / Information Technology / Information and Communication Technology
Program Code:	ET103/ ET105 / ET107
Subject Title:	Design and Analysis of Algorithm
Subject Code:	2ET1030401T
Pre-requisite:	Fundamentals of Data and file Structures

Course Objective: Obtaining efficient algorithms is very important in modern computer engineering as the world wants applications to be time and space efficient. This course enables to understand and analyze efficient algorithms for various applications.

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	60	-	-	-	-	100

Subject Contents				
Sr. No	Topic	Total Hours	Weightage (%)	
1	Analysis of Algorithm: Characteristic of algorithm, The efficient algorithm, Average, Best and worst case analysis, Asymptotic Notations, Sorting Algorithms and analysis: Bubble sort, Selection sort, Insertion sort, Shell sort, Heap sort, Sorting in linear time : Bucket sort, Radix sort	7	15	
2	Divide and Conquer Algorithm: Introduction, Recurrence and different methods to solve recurrence, Multiplying large Integers Problem, Problem Solving using divide and conquer algorithm -Binary Search, Sorting (Merge Sort, Quick Sort), Matrix Multiplication - Strassen's Algorithm	8	20	
3	Greedy Algorithm: General Characteristics of greedy algorithms, Problem solving using Activity selection problem, Elements of Greedy Strategy, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm) Graphs: An introduction, Traversing Trees – Preconditioning, Depth First Search - Undirected Graph, Directed Graph, Breath First Search, Backtracking, Shortest paths, The Knapsack Problem, Job Scheduling Problem, Huffman code	9	20	
4	Dynamic Programming: Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming, Making Change Problem, Assembly Line Scheduling, Knapsack problem, All Points Shortest path, Matrix chain multiplication, Longest Common Subsequence.	7	15	
5	Backtracking and Branch and Bound: Introduction, The Eight queens problem , Knapsack problem, Travelling Salesman problem, Min-max principle	4	10	
6	String Matching: Introduction, The naive string matching algorithm, The Rabin-Karp algorithm, Knuth-Morris-Pratt Algorithm (KMP), Boyer-Moore Algorithm, String Matching with finite automata	3	10	
7	Introduction to NP-Completeness: The class P and NP, Polynomial reduction, NP-Completeness Problem, NP-Hard Problems	3	10	

List of 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. Design Analysis and Algorithms by Hari Mohan Pandey
4. Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson.
5. Design and Analysis of Algorithms, Dave and Dave, Pearson.
6. Fundamentals of Algorithms.-E. Horowitz et al.

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Discuss the fundamental concepts problem solving algorithm, its types and the parameters to analyze those algorithms	2 Understanding 4 Analyze
CLO2	Apply Brute Force method and Divide and Conquer method to solve computing problems.	1 Remembering 3 Applying
CLO3	Apply the dynamic programming and greedy techniques to solve computing problems.	2 Understanding, 3 Applying
CLO4	Describe how scientific problems can be solved using iterative method and how to cope with limitations of algorithm power.	3 Applying, 2 Understanding
CLO5	Critically analyze the different algorithm design techniques for a given problem based on its time and space complexity.	3 Applying, 4 Analyze, 5 Evaluate
CLO6	Modify existing algorithms to improve efficiency	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	-	-	-	-	-	-	-	-	-	H	M	-	-
CLO2	M	L	L	-	-	-	-	-	-	-	-	-	H	M	-	-
CLO3	M	L	L	-	-	-	-	-	-	-	-	-	H	M	-	-
CLO4	M	L	L	-	-	-	-	-	-	-	-	-	M	M	-	-
CLO5	H	M	M	-	-	-	-	-	-	-	-	-	M	-	M	-
CLO6	H	M	M	-	-	-	-	-	-	L	-	M	-	M	-	-

H: High, M: Medium, L: Low