

	Design and Analysis of Algorithm	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure					
Co-requisites	--				

Course Objectives

1. To understand the necessity of the algorithm design.
2. To write the algorithm to solve a problem.
3. To analyze the performance of the algorithm.
4. To implement the algorithm in C/C++.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Apply mathematical techniques to find the complexity of an algorithm
- CO2. Analyze algorithms and express asymptotically different case behaviour.
- CO3. Demonstrate good principles of algorithm designs.
- CO4. Design appropriate data structures to reduce the complexity of an algorithm.
- CO5. Differentiate among P, NP hard and NP Complete problems.

Catalog Description

This course deals with various aspects of designing algorithms and determining their mathematical characteristics. The broad focus lies on computational complexity, divide-and-conquer, dynamic programming, greedy approach, and backtracking algorithms. The clear distinction among P, NP Hard and NP Complete problems are covered in details.

Course Content

UNIT I: Introduction

9 lecture hours

Algorithm, Psuedo code, Performance Analysis- Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation with numerical, different algorithm design techniques, recurrence relation, solving methods: substitution, recursion tree, master theorem with numerical.

UNIT II: Divide and Conquer

6 lecture hours

Binary search, Quick sort: best case & worst case analysis, Merge sort, Strassen's matrix multiplication

UNIT III: Greedy Method

6 lecture hours

Activity selection problem, knapsack problem, Minimum cost spanning trees: Prims and kruskal, Single source shortest path problem: Bellman ford, dijkstra's, Huffman codes.

UNIT IV: Dynamic Programming

5 lecture hours

Matrix chain multiplication, 0/1 knapsack problem, All pairs shortest path problem, largest common subsequence.

UNIT V: Sorting In Linear Time

6 lecture hours

Lower bounds for sorting, counting sort, radix sort, bucket sort, Backtracking: N-queen problem, sum of subsets problem,

UNIT VI: Branch and Bound Method and Its Applications.**4 lecture hours**

Travelling salesman problem, NP-Hard and NP-Complete problem and concepts

Text Books

1. Thomas H. Cormen (2009) Introduction to Algorithm (Third Edition), The MIT Press. ISBN: 978-0-262-03384-8
2. John Kleinberg and Eva Tardos (2005), Algorithm Design, ISBN: 0-321-29535-8

Reference Books

1. Rajesh K. Shukla (2015) Analysis and Design of Algorithms: A Beginner's Approach, Wiley, ISBN-10: 8126554770
2. S.Sridhar (2014), Design and Analysis of Algorithms 1st Edition, Publisher: Oxford University Press ISBN: 9780198093695, 0198093691

Modes of Evaluation: Quiz/Assignment/ Presentation/ Extempore/ Written Examination**Examination Scheme:****Relationship between the Course Outcomes (COs), Program Outcomes (POs) and Program Specific Objectives (PSOs)**

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2									3	1	
CO2	3	3	2	2									3	1	
CO3	2	2	2	1									3	1	
CO4	2	3	2	1									3	1	
CO5	3	2	1	3									3	1	
Average	2.6	2.6	1.6	1.8									3	1	

1= Weak

2= Moderate

3 = Strong