

CSE12166	Design & Analysis of Algorithm Lab	L	T	P	C
Version 2.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Programming and Data structures and High Level programming Language like C, Java and Python anyone.				
Co-requisites	--				

Course Objective:

1. To develop a problem and design the solution for the problem.
2. To design and implement efficient algorithms for a specified application.
3. To provide the ability to identify and apply the suitable algorithm for the given real world problem

Course Outcomes:

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

- CO1. **Identify** the problem given and design the algorithm using various algorithm design techniques.
- CO2. **Implement** various algorithms in a high level language CO3. **Analyze** the performance of various algorithms.
- CO4. **Compare** the performance of different algorithms for same problem.

Catalog Description:

Algorithmic study is a core part of Computer Science. This study caters to all possible applicable areas of Computer Science. This study includes observation, design, analysis and conclusion. Various types of algorithms have different notion of implementation according to their cost (in terms their time and space complexity). This study also includes refinement of one algorithm as per the applicability to real problems. Categorization of algorithms according to different method of design also includes in this course. It also compares the same algorithm using different algorithm design methods. For example, Knapsack problem can be solved in Greedy approach and Dynamic approach, both are optimization method. This course enables the students to think analytically while applying, designing an algorithm to solve a specific problem.

Course Content:

Experiment 1:

Implementation based on Divide and Conquer: Binary Search using **Divide and Conquer** approach, Quick sort and Merge Sort

Experiment 2:

Implementation based on Dynamic Programming : Implement all pair of Shortest path for a graph (Floyd-Warshall Algorithm), **Dijkstra's** , Bellman Ford Algorithm and Implement Traveling Salesman Problem

Experiment 3:

Implementation based on **Brunch and Bound** :Implement 15 Puzzle Problem

Experiment 4:

Implementation based on **Backtracking** :Implement 8 Queen problem, Graph Coloring Problem, Hamiltonian Problem

Experiment 5:

Implementation based on **Greedy method**: Knapsack Problem and Job sequencing with deadlines, Minimum Cost Spanning Tree by Prim's Algorithm and Minimum Cost Spanning Tree by Kruskal's Algorithm

Experiment 6:

Implementation based on Graph Traversal Algorithm: Implement Breadth First Search (BFS) and Implement Depth First Search (DFS)

Text Books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest And Clifford Stein, MIT Press/Mcgraw-Hill.
- 2 Fundamentals of Algorithms – E. Horowitz Et Al.

Reference Books:

1. Algorithm Design, 1ST Edition, Jon Kleinberg and Évatardos, Pearson.
2. Algorithm Design: Foundations, Analysis, And Internet Examples, Second Edition, Michael T Goodrich And Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, Udimanber, Addison-Wesley, Reading, MA.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Continious Assessment	ETE
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Identify the problem given and design the algorithm using various algorithm design techniques.	PO1,PO2,PS01,PSO2,PS03
CO2	Implement various algorithms in a high level language	PO1,PO3, PS01,PSO2
CO3	Analyze the performance of various algorithms.	PO2,PO3,PO5 PSO2,PS03
CO4	Compare the performance of different algorithms for same problem.	PO2,PO4,PO3,PO5

Course Code	Course Title	
CSEI2012	Design & Analysis of Algorithm Lab	
2	PO1	Engineering knowledge
3	PO2	Problem analysis
3	PO3	Design/development of solutions
2	PO4	Conduct investigations of complex problems
2	PO5	Modern tool usage
-	PO6	The engineer and society
-	PO7	Environment and sustainability
-	PO8	Ethics
-	PO9	Individual and team work
-	PO10	Communication
-	PO11	Project management and finance
-	PO12	Life-long learning
2	PSO1	Adequate strong skills in learning new programming environments, analyse and design algorithms for efficient computer-based systems of varying complexity.
3	PSO2	The ability to understand the evolutionary changes in computing, apply standard practices and strategies in software project development using open-ended programming environments to
3	PSO3	Ability to analyse the impact of Computer Science and Engineering solutions in the societal and human context, design, model, develop, test and manage complex software and informati