



Faculty of Computer Studies (FoCS)

Course Name: Design and Analysis of Algorithms

(UG/PG): PG

Number of Credits: 3

Level: 4

Learning Objective(s):

The course aims to provide complexity perception to develop and implement problem solving abilities wrt time and space in distributed and concurrent environment.

Pedagogy:

- Lectures
- Class discussion followed by practical
- Problems

Course Outline

Sr. No.	Topic	Hours
1	Problem Solving and Analysis <ul style="list-style-type: none">• Efficiency of Algorithms,<ul style="list-style-type: none">○ Requirement of Efficient Algorithm ,• Asymptotic Notation<ul style="list-style-type: none">○ A Notation of “The Order Of”, Operations, Conditional Notations,• Analysis<ul style="list-style-type: none">○ Average ,Best and Worst case Analysis ,○ Amortized Analysis• Recurrences-Homegeneous, Heterogeneous, Change of Variable,Range Transformation	7
2	Greedy Algorithms and Dynamic Programming <ul style="list-style-type: none">• Minimal Spanning Trees• Shortest Path• Job Scheduling	8

	<ul style="list-style-type: none"> • Traveling Salesperson Problem Dynamic Programming <ul style="list-style-type: none"> • Chained Matrix Multiplication • Optimal Search Tree • 0/1 Knapsack 	
3	BackTracking <ul style="list-style-type: none"> • General Method • 8-Queens Problem • Sum of Subsets, • Graph Coloring • Hamiltonian Cycles 	8
4	Branch-and-Bound. <ul style="list-style-type: none"> • Least Cost(LC) Search • Control Abstraction for LC-Search • FIFO Branch and Bound • LC Branch and Bound • 0/1 Knapsack Problem 	8
5	Complexities Analysis <ul style="list-style-type: none"> • The Divide Line between Easy and Hard, • Measuring Computation Time, Space • The Complexities of Algorithmic Problem • Polynomial and Non-polynomial Problems, Deterministic and Non-Deterministic 	7
6	Concurrent Algorithms <ul style="list-style-type: none"> • Mutual Exclusion Problem • Lock Based Concurrent Objects • Transaction Memory Approach 	7
	Total	45

Books Recommended

- Algorithm Theory and Practices By Gilles Brassard, Paul Bratelly
- Computer Algorithms By Horowitz, Sahani, and Rajasekaran
- Complexity Theory: Exploring the Limits of Algorithms By Ingo Wegener,R. Pruim
- Concurrent Programming and Algorithms,Principles and Foundations By Michel Raynal

Suggested Evaluation Methods:

- Lab based Evaluations
- Assignments
- Presentation

Parallel/Similar courses the existing curriculum:

S.No.	Name of the course	Institute where it was offered
1	Design and Analysis of Algorithms	University of Pune
2	Analysis and Design of Algorithms	Sikkim Manipal University
3	Design and Analysis of Algorithms	University of Colorado

Name of Member	Prof. Harshad Gune				
Designation	Associate Professor and Dy. Director				
Org. / Inst.	SICSR				
Signature					

Name of the Expert:

Signature:

Date: