

**NITK –Surathkal**  
**Department of Computer Science & Engineering**  
**Course Plan**

**CS253 – Design and Analysis of Algorithms**

Name of the Course: Design and Analysis of Algorithms	Course No: CS253	No. of Credits (L-T-P): 3-1-0 (4)
Year & Semester, Section: 2020, IV Sem	Course Type: Program Core (PC)	Academic Session: Even

Prerequisites (if any): Design and Analysis of Algorithms

Name and Contact Details of Course Instructor: Vani M, ([vani.nitk@gmail.com](mailto:vani.nitk@gmail.com) )

**Evaluation Scheme:** Surprise Test/Tutorials/Assignments - 40%, Mid Sem - 20%, End Sem - 40%.

**Course Objectives**

1. To provide an in-depth treatment of a broad range of algorithms and design techniques.
2. To teach how to measure the effectiveness (in terms of time and space complexities) of algorithms.
3. To teach students to formally prove the correctness of the algorithms they design and also to enhance the capability to come up with counter arguments in case a wrong algorithm.

**Course (Learning) Outcomes (COs)**

CO1 – Understand different design techniques that are helpful in coming up algorithms for given problem.

CO2 – Should be able to design and employ appropriate data structures for solving computing problems

CO3 – Possess the ability to design efficient algorithms for solving computing problems

CO4 – Possess the ability to identify and prove problems which do not seem to have efficient algorithms

**Mapping of COs with POs:**

(Strength of correlation: S-Strong, M-Medium, W-Weak)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	W	W	W	W	S	S	W
CO2	S	S	M	S	S	W	W	W	W	S	M	W
CO3	S	S	W	S	S	W	W	W	M	S	M	W
CO4	S	S	W	S	S	W	S	S	S	S	S	S

## 1. Teaching Learning Interaction

Module – Title		Content	L-T-P hours
M1	Introduction	The role of algorithms in computing, growth of functions, Solving recurrences	4-0-0
M2	Analysis techniques, Sorting and order statistics	Randomized select, Selection in worst case linear time	4-0-0
M3	Divide and conquer	Merge Sort, Strassen's Matrix multiplication,	6-0-0
M4	Greedy Algorithms	Interval scheduling, knapsack, Independent set on trees, Minimum Spanning Trees Algorithms	6-0-0
M5	Dynamic Programming	Weighted interval Scheduling, Edit Distance, Problems on DAGs	6-0-0
M6	Graph Algorithms	Traversals, Shortest distance algorithms, Network Flows	6-0-0
M7	NP-Completeness	Reducibility, Classes P, NP and NPC, Coping with NP-Completeness using approximation algorithms, exact exponential time algorithms	10-0-0

## 2. List of Text Books & Reference Books, On-line Course Resources

1. T.H Cormen, C.E Leiserson, R.L. Rivest, C. Stein, Introduction To Algorithms, Third edition, PHI, 2009.
2. Horowitz and Sahni, Fundamentals of computer algorithms
3. Donald E. Knuth, Art of Computer Programming, Volume 1-3
4. Aho,Hopcroft and Ullman ,Design and analysis of algorithms.
5. Jon Kleinberg, Eva tardos,Algorithms Design.
6. Sanjoy Dasgupta, C Papadimitriou,U. Vazirani,Algorithms

## 3. Assessment Pattern

(Use Bloom's Taxonomy to design rubrics for evaluating student performance)

Level No.	Knowledge Level	Evaluation Component	Assessment (%)
K1	Remember		10
K2	Understand		20
K3	Apply		20
K4	Analyse		25
K5	Evaluate		10
K6	Create		15

Sd/-

