		Name of Course/Branch	L	T	P	Credit
DC	NMCC526	Design and Analysis of Algorithms	3	1	0	4

Course Objective

- The objective of the course is to present the analysis of algorithms pertains to time and space complexity and their performance.

Learning Outcomes

Upon successful completion of this course, the students would be acquiring:

1. Have a broad understanding of complexity of algorithms.
2. Be able to use the techniques of algorithms for real life systems where performance is primary goal.
3. Would be able to implement for science and engineering applications of interest.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
I	Introduction to algorithms; Analyzing algorithms: space and time complexity; growth of functions; asymptotic notations (omega, theta, big oh notations), summations; recurrences;	10L+2T	This unit will give a broad instruction of algorithms and their significance
II	Greedy Technique: General characteristics; interval selection problem, Huffman algorithm, Knapsack problem, Review of graphs, BFS and DFS, Kruskal and Prim's algorithms and their proof of correctness, Stable matching problem, Dijkstra's shortest path algorithm, union-find data structures,	8L+3T	Network flow problems of real systems and finding shortest paths
III	Divide and Conquer and Dynamic Programming Technique: Binary search, Merge Sort, Quick Sort, Finding Max Min element, Stassen's matrix multiplication, Closest pair of points, Edit distance, LCS problem, Matrix-chain multiplications, string matching algorithms, Bellman-Ford algorithm, All pairs shortest path problem.	8L+3T	Complexity of graph algorithms
IV	Polynomials and FFT: Representation of polynomials; The DFT and FFT; Efficient FFT implementation	8L+3T	Polynomial complexity
V	Beyond Polynomial Solvability: NP-hardness and introduction to approximation algorithms	8L+3T	Approximation algorithms of science and engineering problems of interest
Total		**42L+14T**	

Text Books:

1. Goodrich and Roberto Tamassia: Algorithms Design, Foundations, Analysis and Internet Examples, Wiley India.

Reference Books:

2. Carmen: Introduction to Algorithms, Pearson Education Asia