DS803   PROGRAMMING AND OPTIMIZATION FOR DATA SCIENCE   3-0-0-3

Unit-I: Data Structures

Abstract data structures, stacks, queues, lists, trees, vectors, graph representations

Unit-II: Algorithms

Methodologies for analyzing algorithm, greedy method, divide-and-conquer, dynamic programming, matrix operations, algorithms on graphs, computational complexity

Unit-III: Linear Programming

Structure of a linear program, standard form of linear program, structure of feasible sets, simplex algorithm, duality in linear programming, slack variables, big M method

Unit-IV: Discrete Optimization

Integer Programming, combinatorial optimization, knapsack problem, minimum spanning tree, assignment problem, traveling salesman problem, branch and bound, cutting planes, Gomory algorithm, local search methods, variable neighbourhood search, genetic algorithms, multi-objective optimization.

Text Books/ References:

1. A. Aho, J. Ullman, and J. Hopcroft, "Data Structures and Algorithms", Pearson, 1983.
2. R. Arora, "Optimization: Algorithms and Applications", Chapman and Hall, 2015
3. G. Nemhauser and L. Wolsey, "Integer and Combinatorial Optimization", Wiley, 2014