1.	Title of the course	Computational Methods in Optimization
2.	Course number	CS515L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To CS5107/12
6.	To be offered by	Department of Computer Science and Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	**Course Objective(s):** To develop an understanding of analytical and computational approach to different optimization techniques. To impart skills to model problems in the context of an optimization framework.	
10.	**Course Content:** Linear programming: introduction to linear optimization, geometry of linear programming, simplex method, duality theory, sensitivity analysis, integer programming formulations; Nonlinear programming: convex set, Lagrange multiplier, gradient methods, necessary and sufficient condition, Karush-Kuhn-Tucker (KKT) conditions; Stochastic optimization: stochastic gradient descent, dynamic programming, Markov Chain Monte Carlo (MCMC) based optimization; Introduction to heuristic search.	
11.	**Textbook(s):** 1. Nocedal J and Wright S, *Numerical Optimization*, 2nd Edition, Springer (2006). 2. Winston W L, *Operations Research: Applications and Algorithms*, 4th Edition, Thomson Learning (2004).	
12.	**Reference(s):** 1. Bertsekas D P, *Dynamic Programming and Optimal Control Volume I*, 4th Edition, Athena Scientific (2005). 2. Bertsekas D P, *Nonlinear Programming*, 2nd Edition, Athena Scientific (1999). 3. Bertsimas D and Tsitsiklis J N, *Introduction to Linear Optimization*, 1st Edition, Athena Scientific (1997). 4. Schrijver A, *Theory of Linear and Integer Programming*, 1st Edition, Wiley (1998).	