1.	Title of the course	Stochastic Network Optimization
2.	Course number	CS529L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To CS5230/15
6.	To be offered by	Department of Computer Science and Engineering
7.	To take effect from	January 2022
8.	Prerequisite	CoT
9.	**Course Objective(s):** To introduce the concepts of Lyapunov drift and Lyapunov optimization techniques for optimization in the field of stochastic networks.	
10.	**Course Content:** Introduction: review of probability concepts (including iterated expectation, telescopic sums), Markov chains, renewal processes; Queues stability: discrete-time queues, Little's theorem, rate stability, strong-stability theorem, Foster-Lyapunov theorem, scheduling for rate stability; Lyapunov optimization: Lyapunov drift for stability, max-weight algorithm, Lyapunov optimization for stability with energy minimization, virtual queues, placeholder-holder backlog, drift-plus-penalty algorithms for Markov-modulated processes; Optimizing function of time averages: Jensen's inequality, rectangle constraint, auxiliary variables; Optimization of renewal systems.	
11.	**Textbook(s):** 1. Michael J N, *Stochastic Network Optimization with Application to Communication and Queueing Networks*, 1st Edition, Morgan and Claypool (2010). 2. Rayadurgam S and Lei Y, *Communication Networks: An Optimization, Control, and Stochastic Networks Perspective*, 1st Edition, Cambridge University Press (2014).	
12.	**Reference(s):** 1. Dimitri P B, Angelia N and Asuman E O, *Convex Analysis and Optimization*, 1st Edition, Athena Scientific (2003). 2. Sheldon R, *Introduction to Probability Models*, Academic Press (2019). 3. Vidhyadhar G K, *Introduction to Modeling and Analysis of Stochastic Systems* , 2nd Edition, Springer (2011).	