1.	Title of the course	Reinforcement Learning Algorithms
2.	Course number	CS533L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To CS5224/18
6.	To be offered by	Department of Computer Science and Engineering
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	**Course Objective(s):** To provide a theoretical and algorithmic perspective of the sequential decision-making paradigm under uncertainty with an emphasis on reinforcement learning.	
10.	**Course Content:** Basics: sequences, probability theory, stochastic processes, discrete-time Markov chain, stochastic approximation theory; Reinforcement Learning (RL) framework: Markov decision process, value function, optimal policy/value function, Bellman equations; Exact solution methods: dynamic programming; Prediction methods: Monte-Carlo methods, temporal difference methods; Control methods: Q-learning, sarsa, expected sarsa, dyna; Eligibility traces; Approximation methods: fitted value and policy iteration, on/off-policy prediction using linear and nonlinear function approximations, policy gradient method, actor-critic method; Advanced topics: deep RL, generalized Bellman equation, stochastic recursive inclusions, proof of convergence of RL methods.	
11.	**Textbook(s):** 1. Bertsekas D P, *Reinforcement Learning and Optimal Control*, 1st Edition, Athena Scientific (2019). 2. Sutton R S and Barto A G, *Reinforcement Learning: An Introduction*, 2nd Edition, MIT Press (2018).	
12.	**Reference(s):** 1. Ash R B, *Real Analysis and Probability*, 1st Edition, Academic Press (1972). 2. Borkar V S, *Stochastic Approximation: A Dynamical Systems Viewpoint*, 1st Edition, Hindustan Book Agency (2008). 3. Szepesvari C, *Algorithms for Reinforcement Learning*, 1st Edition, Morgan & Claypool (2010).	