PROFORMA FOR MODIFIED COURSE

1.	Title of the course	Stochastic Decision Processes
2.	Course number	CS5225
3.	Status of the course	Elective
4.	Structure of credits	3-0-0-3
5.	Offered to	PG
6.	New course/modification to	Modification to CS3910
7.	To be offered by	Department of Computer Science and Engineering
8.	To take effect from	July 2020
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	**Course Objective(s):** To enable the modeling of sequential decision making problems from different engineering applications. To provide the principles and algorithms for deriving optimal solutions for sequential problems.	
12.	**Course Content:** Basics: probability space, conditional probability, random variables, expectation and linearity of expectation, law of large numbers, central limit theorem, discrete and continuous time Markov chains, absorbing Markov chains; Finite horizon problems: Markov Decision Process (MDP) model formulation, optimality criteria, policy evaluation, Bellman optimality equations, optimality of deterministic Markov policies, backward induction; Infinite horizon MDP problems: expected total-reward criterion, expected discounted-reward criterion, Markov policies, policy evaluation, value iteration, policy iteration, linear programming; Optimal stopping problems; Introduction to partially observable MDP.	
13.	**Textbook(s):** 1. Bertsekas D P, *Dynamic Programming and Optimal Control, Volume-I*, 4th Edition, Athena Scientific (2017). 2. Puterman M L, *Markov Decision Processes: Discrete Stochastic Dynamic Programming*, 1st Edition, John Wiley and Sons (1994).	
14.	**Reference(s):** 1. Bertsekas D P, *Dynamic Programming and Optimal Control, Volume-II*, 4th Edition, Athena Scientific (2017). 2. Bertsekas D P, *Abstract Dynamic Programming*, 2nd Edition, Athena Scientific (2018). 3. Filar J and Vrieze K, *Competitive Markov Decision Processes*, Springer-Verlag (1996). 4. Sutton R S and Barto A G, *Reinforcement Learning - An Introduction* , 2nd Edition, MIT Press (2018).	