

# INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI

## PROFORMA FOR NEW COURSE

1.	Title of the Course	Stochastic Decision Processes
2.	Course Number	CS3910
3.	Status of the Course	Elective
4.	Structure of Credits	3-0-0-3
5.	Offered to	UG
6.	New Course/ Modification to	New course
7.	To be offered by	Dr. V. Mahendran & Dr. K. P. Naveen
8.	To take effect from	January 2018
9.	Prerequisite	CoT
10.	Whether approved by the Program	Yes
11.	<p>Course Objective (Max 70 words):                      This course will introduce students with techniques to model sequentially decision-making scenarios that frequently arise in engineering applications, for instance, e.g., while packet forwarding in wireless networks, robotic motion-control, aircraft navigation, etc. The application domain also includes problems from the vast area of operations research (e.g., portfolio allocations, asset selling, etc). Principles and algorithms for deriving the optimal solution for such sequential problems will be discussed.</p>	
12.	<p>Course Content (Max 100 words):                      Basics of Probability: Probability space, conditional probability, independence, random variables, law of large numbers, central limit theorem.</p> <p>Finite Horizon Problems: Model formulation, optimality criteria, policy evaluation, optimality equations (Bellman equation) and principle of optimality, optimality of deterministic Markov policies, Backward induction.</p> <p>Infinite Horizon Problems: Value of a policy, expected total-reward criterion, expected discounted-reward criterion, optimality criterion, Markov policies, policy evaluation, optimality equation, value iteration, policy iteration, linear programming.</p>	
13.	<p>Text Book(s):</p> <ol style="list-style-type: none"> <li>Puterman M. L., <i>Markov Decision Processes: Discrete Stochastic Dynamic Programming</i>, 1<sup>st</sup> ed, John Wiley and Sons, Inc, NY USA, 1994.</li> </ol>	
14.	<p>Reference(s):</p> <ol style="list-style-type: none"> <li>Bertsekas D. P., <i>Dynamic Programming and Optimal Control (Vol-I and II)</i>, 4<sup>th</sup> ed, Athena Scientific, 2017.</li> <li>Bertsekas D. P. and Tsitsiklis J. N., <i>Introduction to Probability</i>, 2<sup>nd</sup> ed, Athena Scientific, 2008.</li> <li>Filar J. and Vrieze K., <i>Competitive Markov Decision Processes</i>, Springer-Verlag NY, USA, 1996.</li> </ol>	