

### Stochastic Processes

Course Type	Course Code	Name of the Course	L	T	P	Credit
DC	NMSC_524	Stochastic Processes	3	0	0	3
<b>Course Objective</b>						
The objective of the course will be to give idea to the students about various stochastic processes, the theory and applications of stochastic processes.						
<b>Learning Outcome</b>						
This course will be useful to understand and apply stochastic models in business and industry.						
Unit No	Topics to be covered	Lecture hours	Learning Outcomes			
1	<b>Introduction to Stochastic Processes:</b> Definition, Difference between Deterministic and Stochastic Processes. Decision-making under uncertainty, Stochastic Models, Examples and Applications.	9	This unit will help students to understand the difference between deterministic and stochastic processes, and basics of stochastic models.			
2	<b>Markov Chains:</b> Definition, Classification of States of a Markov Chain, Transition Probability Matrices, Long-Run Properties of Markov Chains, Absorbing States. Discrete-time Markov chains, Continuous-time Markov Chains, Hidden Markov chains. Problems and Cases.	11	This unit will help students to understand discrete-time and continuous-time Markov chains and its applications along with basics of hidden Markov chains.			
3	<b>Markov Decision Process:</b> Definition, Markov decision process modelling and solution approaches. Backward Induction method. Partially observable Markov decision process. Problems and Applications.	11	This unit will help students to get the concept on Markov decision processes, modelling and solution approaches along with business applications.			
4	<b>Stochastic Programming with recourse:</b> Overview. Two-stage problems. Stochastic programming with recourse modelling and solution approach. Problems and Applications.	11	This unit will help students to get the concept of two-stage stochastic programming along with its applications.			
<b>TOTAL</b>		<b>42</b>				

#### Textbooks

1. Stochastic Processes by J. Medhi, New Age International Publication, 5<sup>th</sup> Edition, 2022.
2. Introduction to Operations Research by Hiller and Liberman, McGraw Hill Education, 11<sup>th</sup> Edition, 2024.

#### Reference books

1. Elements of Applied Stochastic Processes by U.N. Bhat, John Wiley and Sons, 3<sup>rd</sup> Edition, 2002.