INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

<table>
<tr><td>Course Code</td><td></td><td>Course Title</td><td colspan="4">Stochastic Process</td></tr>
<tr><td rowspan="2">Dept./Faculty proposing the course</td><td rowspan="2">SH-Mathematics / Dr Bipasha Pal</td><td rowspan="2">Structure (LTPC)</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td rowspan="2">To be offered for</td><td rowspan="2">PG/PhD</td><td>Type</td><td colspan="2">Core ☐</td><td colspan="2">Elective ▬</td></tr>
<tr><td>Status</td><td colspan="2">New ▬</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Pre-requisite</td><td>Prior exposure to basic probability theory along with a working knowledge of sequences, limits, convergence, differentiation, and integration</td><td colspan="3">Submitted for approval</td><td>Senate # 63</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">• Students will learn key concepts such as random variables, distributions, Markov chains, Poisson processes, and Brownian motion, and their applications</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">• Students will be able to analyze and model random phenomena using concepts such as random variables, Poisson processes, Markov chains, and Brownian motion, and solve problems involving transition probabilities and long-term behavior.
• Students will gain an understanding of the fundamental principles governing stochastic processes, including stationarity, independence, and limit theorems, and their applications in science and engineering contexts.</td></tr>
<tr><td>Contents of the course (With approximate break-up of hours for L/T/P)</td><td colspan="6">Random Variable and Distributions [5L+1T]

Poisson process, Interarrival and waiting time distributions, arrival times, birth-death process, non-homogeneous poisson process. [11L+4T]

Markov Chains (Discrete time, continuous time), transition probability matrices [8L+3T]

Chapman- Kolmogorov equations, gambler’s ruin problem, Kolmogorov differential equation, Branching process, Limiting probabilities [9L+3T]

Brownian Motion, Brownian motion as a Markov process, Gaussian processes, Properties of a brownian motion [9L+3T]</td></tr>
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Text Books	1. Grigorios A. Pavliotis, Stochastic Processes and Applications, Springer, 1st ed, ISBN 13: 978-1493913220, 2014. 2. Sheldon M. Ross, Stochastic Processes, Wiley, 2nd ed, ISBN 13: 978-0471120629, 1995.
Reference Books	1. Dimitri Bertsekas and John Tsitsiklis. Introduction to Probability, Athena Scientific, 2nd ed, ISBN 13: 978-1886529236, 2008. 2. Etienne Pardoux, Markov Processes and Applications, Wiley, 1st ed, ISBN 13: 978-0470772713, 2009.