15MAMC302 Probability and Stochastic Processes (3-1-0)

Course Objectives:

1. To provide the students with knowledge about the random variable, random process and how to model the random processes in the communication system such as receiver performance, interference, thermal noise, and multipath phenomenon.
2. To introduce the idea of a stochastic process, and to show how simple probability and matrix theory can be used to build this notion into a beautiful and useful piece of applied mathematics.
3. To understand the notion of a Markov chain, and how simple ideas of conditional probability and matrices can be used to give a thorough and effective account of discrete-time Markov chains;
4. To be able to apply these ideas to answer basic questions in several applied situations including genetics, branching processes and random walks.

Prerequisites: Probability Distribution and Expectation of single random variable.

Syllabus:

Module-I:(15Hrs)

Multiple random variables, Functions of several random variables, Covariance, Correlation and Moments, Conditional expectation. Modes of convergence of a sequence of random variables, Weak law of large numbers, Strong law of large numbers, Central limit theorem.

Module-II:(15Hrs)

Introduction to Stochastic process, Specification of stochastic process, Markov chain, Transition probability, Classification of states and chains, Determination of higher transition probability, , Markov chain with discrete and continuous space.

Module-III: (10Hrs)

Poisson process with related distribution, Generalization of Poisson process: Pure birth process, Birth and death process.

Text book

1. An Introduction of Probability and Statistics by V. K. Rohatgi and A. K. Md.E. Saleh,2nd Edition, Wiley Publication. (Chapter 4 and Chapter 6)
2. Stochastic Process by J. Medhi, New Age International Publication (2nd edition}
3. A first course in Stochastic process, S.Karlin& H. Taylor,2nd Edition, Academic Press.

Reference book

1. Fundamentals of Mathematical Statistics by S.C.Gupta&V.K.Kapoor, S Chand & Sons.
2. Stochastic Process by Sheldon M. Ross, Wiley & sons, (2nd edition)
3. Stochastic Process by D N Shanbhag, C R Rao, Gulf Publishing.
4. Stochastic Methods by Crispin Gardiner, Springer.
5. Probability, Random Variables and Stochastic Processes, 4thEdn., A. Papoulis and S. U. Pillai, TMH Publication.

Course outcomes: After the successful completion of this course the students will be able to

1. Have a general overview of discrete and continuous random variables and their statistical properties
2. Understand how random variables and stochastic processes can be described and analyzed
3. Know the law of large numbers and their application
4. Overview of Markov process and applications;
5.