



PROBABILITY AND RANDOM PROCESSES (प्रायिकता एवं यादृच्छिक प्रक्रियाएँ)

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PRE-REQUISITES : Only basic calculus is required

INTENDED AUDIENCE : BTech students with a background from Hindi medium to introduce them to the technical aspects of probability theory in Hindi. PG (Mathematics and Commerce) students of the Hindi medium distance education programs such as IGNOU and MDU Rohtak.

COURSE OUTLINE :

This course aims to introduce students from a Hindi medium background to the basics of probability and random processes and is a beginner level course. Our aim is to give the students a simple, yet thorough introduction to the course in Hindi, making it easier for them to understand the basics of this course, and its applications to Electronics and Communication Engineering. During this course, we will also build a formal vocabulary and introduce the students to the English equivalents of those terms, making it easy for them to take other courses in the language of their choice.

ABOUT INSTRUCTOR :

Prof. Rohit Sinha received the B.E. degree in electronics engineering from the University of Gorakhpur, Gorakhpur, India, in 1990, and the M.Tech. and Ph.D. degrees in electrical engineering from IIT Kanpur, Kanpur, India, in 1999 and 2005, respectively. In 1994, he began his career as a Lecturer with the Department of Electronics and Communication Engineering, Madan Mohan Malaviya Engineering College (currently MMM Technical University), Gorakhpur. From 2004 to 2006, he was a Postdoctoral Researcher with the Machine Intelligence Laboratory, Cambridge University, Cambridge, U.K. Since 2006, he has been with IIT Guwahati, India, where he is currently a Full Professor with the Department of Electronics and Electrical Engineering. Since November 2017, he has also been chairing the Head of the Department position. He has published more than 100 research articles in reputed journals and conferences. He has supervised several research students and involved with some sponsored research projects. His research interests include machine learning, pattern recognition, automatic speech recognition, and language modeling, speaker and language identification, and noise-robust speech and image processing. Prof. Ribhu is currently working as an assistant professor in the department of Electronics and Electrical Engineering at IIT Guwahati. He received his B.E. degree in Electronics and Communication Engineering from Panjab University, Chandigarh, India in 2009, and M. Tech and PhD degrees from the Department of Electronics and Communication Engineering, IIT Roorkee. After submitting his PhD thesis in July 2015, he joined the Signal Processing for Communication (SPC) lab at IISc, Bengaluru as a project associate. Following his thesis defense in May 2016, he continued at the SPC lab as an IISc Institute research associate till March 2017. He is holding the current position since April 2017. His research interests include physical layer design for wireless sensor networks, statistical and adaptive signal processing, massive MIMO systems, and detection theory.

COURSE PLAN :

Week 1: यादृच्छिक परीक्षण, घटनाएं, घटनाओं का बीजगणित (Random Experiments, Events and Algebra of Events); घटना समष्टि (Event Spaces); उदाहरण (Examples)

Week 2: सप्रतिबंध प्रायिकता (Conditional probability); सप्रतिबंध प्रायिकता के कुछ उदाहरण (Some Examples); बेज़ का प्रमेय (Bayes Theorem)

Week 3: असंतत यादृच्छिक चर (Discrete Random Variables); असंतत यादृच्छिक चर के कुछ उदाहरण (Examples); प्रायिकता बंटन फलन एवं संचयी बंटन फलन (Probability Mass Functions and Cumulative Distribution Functions)

Week 4: कुछ विशिष्ट असंतत प्रायिकता बंटन (Some important probability distributions); संतत यादृच्छिक चर (Continuous Random Variables); प्रायिकता घनत्व फलन (Probability Density Function)

Week 5: कुछ विशिष्ट संतत यादृच्छिक चर (Some important continuous random variables); उदाहरण (Examples); यादृच्छिक चरों के फलन (Functions of random variables)

Week 6: दो यादृच्छिक चर (Two Random Variables); संयुक्त बंटन फलन (Joint distribution functions); कुछ उदाहरण (Examples)

Week 7: सप्रतिबंध बंटन (Conditional Distributions); सप्रतिबंध बंटन के उदाहरण (Examples); अनेक यादृच्छिक चरों के फलन (Functions of more than one random variables)

Week 8: सहसंबंध एवं सहप्रसरण (Correlation and Covariance); सप्रतिबंध प्रत्याशा (Conditional Expectation); पूर्वानुमान में सप्रतिबंध प्रत्याशा का प्रयोग (Application of Conditional Expectation in Prediction)

Week 9: यादृच्छिक चरों के अनुक्रम (Sequences of Random Variables); उदाहरण (Examples); अभिसरण (Convergence)

Week 10: केन्द्रीय सीमा प्रमेय (The Central Limit Theorem); सबल वृहद संख्या नियम (The Strong Law of Large Numbers); केन्द्रीय सीमा प्रमेय के अनुप्रयोग (Applications)

Week 11: यादृच्छिक प्रक्रियाओं की परिकल्पना (Description of Random Processes); कुछ असंतत उदाहरण (Discrete Examples); कुछ संतत उदाहरण (Continuous Examples)

Week 12: यादृच्छिक प्रक्रियाओं के गुणधर्म (Properties of Random Processes); स्थावरता (Stationarity); उदाहरण (Examples)