



INTRODUCTION TO PROBABILITY THEORY AND STATISTICS

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PRE-REQUISITES : A basic course on Linear Algebra and Calculus

INDUSTRY SUPPORT : Goldman Sachs, Morgan Stanley, RBS, Quant, Futures First, Towers and other finance companies

COURSE OUTLINE :

This course provides axiomatic definition of probability, random variable, distributions, moments, modes of convergences, descriptive statistics, sampling distribution, point and interval estimations, hypothesis testing and analysis of correlation and regression. It explains the concepts of probability theory and statistics which are needed for handling various real-world problems.

ABOUT INSTRUCTOR :

Prof. Dharmaraja earned his M.Sc. degree in Applied Mathematics from Anna University, Madras, India, in 1994 and Ph.D. degree in Mathematics from the Indian Institute of Technology Madras, in 1999. From 1999 to 2002, he was a post-doctoral fellow at the Department of Electrical and Computer Engineering, Duke University, USA. From 2002 to 2003, he was a research associate at the TRILabs, Winnipeg, Canada. He has been with the Department of Mathematics, IIT Delhi, since 2003, where he is currently Head, Department of Mathematics from Sept. 2020 and he is a Professor, Department of Mathematics and joint faculty of Bharti School of Telecommunication Technology and Management from June 2013. Currently, he appointed as 'Institute Chair Professor' from July 2019. During July 2014 and August 2017, he served as Head, Department of Mathematics. He appointed as 'Jaswinder & Tarvinder Chadha Chair Professor' for teaching and research in the area of Operations Research from May 2010 to July 2015. He has held visiting positions at the Duke University, USA, Emory University, USA, University of Calgary, Canada, University of Los Andes, Bogota, Colombia, National University of Colombia, Bogota, Colombia, University of Verona, Verona, Italy, Sungkyunkwan University, Suwon, Korea and Università degli Studi di Salerno, Fisciano, Italy. His research interests include applied probability, queueing theory, stochastic modeling, performance analysis of computer and communication systems and financial mathematics. He has published over 45 papers in refereed international journals and over 25 papers in refereed international conferences in these areas. He is an Associate Editor of International Journal of Communication Systems and an Associate Editor of Opsearch. He is co-author of a text book entitled "Introduction to Probability and Stochastic Processes with Applications" in John Wiley (US Edition, New Jersey, June 2012) and (Asian Edition, New Delhi, Jan. 2016), co-author of a text book entitled "Financial Mathematics: An Introduction" in Narosa, Nov. 2012 and co-author of a text book entitled "Introduction to Statistical Methods, Design of Experiments and Statistical Quality Control" in Springer (Asian Edition, Sept. 2018).

COURSE PLAN :

Week 1: Basics of Probability

Week 2: Random Variable

Week 3: Moments and Inequalities

Week 4: Standard Distributions

Week 5: Higher Dimensional Distributions

Week 6: Functions of Several Random Variables

Week 7: Cross Moments

Week 8: Limiting Distributions

Week 9: Descriptive Statistics and Sampling Distributions

Week 10: Point and Interval Estimations

Week 11: Testing of Hypothesis

Week 12: Analysis of Correlation and Regression