Introduction to Probability Theory - Web course

COURSE OUTLINE

We will cover the following concepts from probability. Probability space, random variables, distribution functions, expectation, conditional expectation, Characteristic function, Limit theorems.

COURSE DETAIL

Module No.	Topic/s	Lectures
1	**Probability space:** Sample space, events, sigma fields, sigma field generated by finite number of events, probability measures and its properties, conditional probability, independent events, independent sigma fields.	6
2	**Random variables:**Definition and examples, random vectors, distribution function, discrete and continuous random variables, pmf and pdf of random variables.	6
3	**Random Vectors :** Definition and examples, joint distribution function.	3
4	**Expectation:**Expectation of discrete random variables, expectation of nonnegative random variables, expectation of general random variables,Statements of monotone and dominated convergence theorems for random variables,illustration of expectation of continuous random variables with pdf.	6
5	**Conditional Expectation:**Independent random variables, Conditional pmf and pdf, conditional expectation using conditional pmf and pdf, computing probabilities of events using conditioning technique.	6
6	**Characteristic function :** Definition and properties, inversion formulas, continuity theorem.	4
7	**Law of large numbers:**Weak and strong law of large numbers, applications.	5
8	**Central limit theorem:** central limit theorem, applications.	4

References:

NP-TEL

NPTEL

http://nptel.iitm.ac.in

Mathematics

Pre-requisites:

Basic real analysis

Additional Reading:

Chung, K. L., A Course in Probability Theory, Academic Press, San Diego, USA, 2001.

Coordinators:

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Hoel, P. G., Port, S. C. and Stone, C. J, Introduction to Probability Theory, Universal Book Stall, New Delhi, Reprint 2003.