THEORY OF PROBABILITY AND INFORMATION
(300 LEVEL : JAN-APR 2013: CREDITS: 3:1)

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DESCRIPTION OF THE COURSE

Most engineering students do not get formal exposure to measure theoretic probability even after the first course in probability. This course not only fill this gap but also introduce them to relevant mathematical theory of information. This course also emphasizes rigorous reasoning which is essential for graduate studies.

OUTLINE OF THE COURSE

Probability spaces and measure theory, Borel Sigma-Algebras and Random Variables, Lebesgue theory of integration, expectation, Radon Nikodym theorem, Shannon entropy and I-divergence, GYP-theorem for I-divergence, Pinsker inequality, stochastic process and entropy rate, product spaces and Fubini's Theorem, probability on metric spaces, conditional expectation, martingales, introduction to stochastic calculus.

Prerequisites: Any basic course in Probability

REFERENCES

Billingsley, P. Convergence of Probability Measures, Wiley-interscience, 1999.

Borkar, V. S. Probability Theory : An Advanced Course, Springer-Verlag, 1995.

Pinsker, M. S. Information and Information Stability of Random Variables and Process. Holden-Day, San Francisco, CA. 1960 (English ed., 1964, translated and edited by Amiel Feinstein).

Parthasarathy, K. R. Coding Theorems of Classical and Quantum Information theory TRIM publication, 2007.

Karatzas, I. and Shreve, S. E. Brownian Motion and Stochastic Calculus, Springer; 2nd edition 1991.