E-Masters in Communication Systems at IIT Kanpur

EE901 Probability and Random Processes

Instructor: Dr Abhishek Gupta

Objective: This course will focus on strengthening foundation of probability keeping its application in communications in mind.

First Course Video

https://www.youtube.com/watch?v=-rtxtWHyrlQ

Topics: Introduction to Probability, Probability Space, Discreet Probability space, Continuous Probability space, Conditional Probability and Independence, Random Variable, Continuous and Discreet Random Variable, Distribution: CDF and PDF/PMF, Random Variable Transformation, Functions of Random Variables, Measures of Random Variable: Expectation, Variance, Sampling of random variable and empirical statistics using computer simulations, Conditional Expectation, Characteristic functions, Laplace, MGF, Law of Large Number, CLT, Random Process, Measures of Random Process, Properties of Random Process,

Module Number	**Name**	**No of Lectures**
1	Introduction to probability theory Introduction to Probability and Probability Space, Properties of Probability Measure	L1-L3
2	Random Variables,	L4
3	Distribution of Random Variables, CDF and PDF/PMF, Continuous and Discrete Random Variables, Examples of Random Variables	L5-L7
4	Expectation and Moments, Variance, MGF	L8
5	Functions of Random Variables Transformation of discrete random variables Transformation of continuous random variables-	L9-L11
6	Multiple Random Variables Random Variable Transformation	L12-13
7	Sampling of random variable and empirical statistics using computer simulations	L19-20

8	Conditional Expectation Distribution	L14
9	Limit Theorems, Law of Large Number, Central Limit Theorem, Deviations	L15
10	Introduction to Random Processes and Examples	L16
11	Distribution of Random Processes	L17
12	Random Processes via Linear Systems	L18

References

Class notes

Books

- A. Papoulis and S. Pillai, ``Probability, Random Variables, and Stochastic Processes," McGraw-Hill, 4th Edition.
- Bruce Hajek,``An Exploration of Random Processes for Engineers." Available Online at http://www.ifp.illinois.edu/~hajek/Papers/randomprocJuly14.pdf

Grading Policy

Assignments - 4	40
Attendance and Active Participation in Discussion sessions)	20
Objective Quizzes (3~)	10
Final Examination	30
Total	100