Introduction to the Course

Measure Theoretic Probability 1

Welcome to the Course Measure Theoretic Probability 1. The course duration is 8 weeks and we shall learn about the mathematical foundations of Probability Theory. We need the language/tools from Measure Theory and hence follows the title of this course.

In the first three weeks of the course, the necessary tools from Measure Theory shall be developed. Then, we shall revisit our familiar notions of random variables/vectors and Probability distributions. Basic familiarity with the notions such as random experiments, events, random variables, etc. shall be assumed. In
addition, regarding the results of Measure Theory, familiarity with Real Analysis is also an important pre-requisite.

The lecture notes have been prepared using the following references.

(i) "Probability and Measure Theory" (Second Edition) by Robert B. Ash, with contributions from Catherine A. Doléans-Dade.


(iii) "Probability: Theory and Examples" (Fourth Edition) by Rick Durrett.

(iv) "Probability and Measure" (Third Edition) by Patrick Billingsley.

Please note the following points. These may help you in your understanding of the lecture materials.
(i) The lecture notes are made up of numbered entries involving definitions, notes, propositions etc. At the start of each week, the numbering/enumeration is reset to 1.

(ii) Please join the Google group of the discussion forum and actively participate in the discussions.

(iii) Some live sessions may be organized later on for discussions.

(iv) Exercises are included in the lecture notes. However, they need not be submitted. Please feel free to discuss the exercises in the discussion forum.

(v) Weekly assignments will be available to check your progress.

(vi) If you require additional practice problems, then try the problems from the reference books.
(vii) All communications of this course will be through announcements and discussions forum (Google groups). There shall be no response to emails sent to personal email account.

The starting point in this course is the notion of a random experiment. Recall that such experiments can be repeated under identically conditions and that all possible outcomes are known in advance. However, we do not know the specific outcome of a trial, before conducting the trial. The set of all outcomes is referred to as the sample space and we look at events that appear out of the experiments. In the next lecture, we look at some structures of the collection of events.

I hope you enjoy the course.