

Probability theory – Syllabus 2013-2014

Objectives of the course

The course is intended for the 1st year students of the PhD programme in Economics and Management. The purposes of this course are: (i) to explain, at an intermediate level, the basis of probability theory and some of its more relevant theoretical features; (ii) to explore those aspects of the theory most used in advanced analytical models in economics and finance.

Pre-requisites

Basic Calculus.

Basic knowledge of probability theory, as in: *P. Newbold, W. Carlson, B. Thorne (2012), Statistics for Business and Economics, Pearson Higher Education, chapters 3-5* (previous editions would be fine as well).

Contents

1. Axiomatic definition of probability. Properties of probability measure. Conditional probability, stochastic independence.
2. Random variables, distribution functions and density functions. Expectation and moments of random variables.
3. Some probability distributions.
4. Multivariate random variables. Joint and conditional distributions. Stochastic independence. Expectation. Covariance and correlation. Independence and expectation. Cauchy-Schwartz inequality.
5. Bivariate normal distribution. Density function, moments, marginal and conditional densities.
6. Distributions of transformations of random variables.
7. Convergence of sequences of random variables. Laws of large numbers. Central limit theorems.

8. Introduction to stochastic processes.

Textbook

- S. Ross (2010). A first course in probability. Pearson Prentice Hall, 8th edition.

Further readings

- R.Durrett (2009). Elementary probability for applications. Cambridge University Press.
- D. Stirzaker (2003) Elementary Probability, Cambridge University Press.
- G. Grimmett, D. Stirzaker (2001). Probability and random processes. Oxford University Press.

Advanced readings

- R.B. Ash and C.A. Doléans-Dade (2000). Probability and measure theory, Harcourt/Academic Press

Assessment

Written examination.