

Probability

A.A. 2012/2013

Graduate School of Economics and Management
Universities of Ca' Foscari Venezia, Padova and Verona

TEACHER RESPONSABLE: Prof. Marco Minozzo
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OFFICE HOURS: Tuesday 12:00 – 13:00

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Teaching

The course will take place over 9 weeks (from the 2nd of October 2012 to the 28th of November 2012) for a total amount of 30 hours (20 hours lessons; 10 hours exercises). The lessons will take place according to the following calendar:

Tuesday, 2nd October 2012, 14.00-17.00 (3 hours), Classroom DSE;
Wednesday, 10th October 2012, 14.00-17.00 (3 hours), Classroom DSE;
Monday, 15th October 2012, 14.00-17.00 (3 hours), Classroom DSE;
Wednesday, 17th October 2012, 14.00-17.00 (3 hours), Classroom DSE;
Wednesday, 24th October 2012, 14.00-17.00 (3 hours), Classroom DSE;
Wednesday, 31st October 2012, 14.00-17.00 (3 hours), Classroom DSE;
Wednesday, 7th November 2012, 14.00-17.00 (3 hours), Classroom DSE;
Wednesday, 14th November 2012, 14.00-17.00 (3 hours), Classroom DSE;
Wednesday, 21st November 2012, 14.00-17.00 (3 hours), Classroom DSE;
Wednesday, 28th November 2012, 14.00-17.00 (3 hours), Classroom DSE.

Availability

The course is intended for 1st year students on PhD in Economics and Management.

Pre-requisites

Introduction to mathematics, elementary statistical theory and elementary set theory (textbook, Sections 1.1 and 1.2). 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). Attendance at more advanced courses such as real analysis, probability, distribution theory and statistical inference would be desirable.

Objectives of the course

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; (iii) to give an introduction to some concepts of the theory of stochastic processes. The topics will be illustrated and explained through many examples.

Assessment

A two-hour written paper at the end of the course.

COURSE CONTENT

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 parametric families of random variables.
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

G. Grimmett, D. Stirzaker (2001). *Probability and Random Processes*. Oxford University Press.

Further readings

G. Casella, R. L. Berger (2002). *Statistical Inference*, Second edition. Duxbury Thompson Learning.

R. Durrett (2009). *Elementary Probability for Applications*. Cambridge University Press.

M. J. Evans, J. S. Rosenthal (2003). *Probability and Statistics - The Science of Uncertainty*. W. H. Freeman.

A. M. Mood, F. A. Graybill, D. C. Boes (1974). *Introduction to the Theory of Statistics*. McGraw-Hill.

P. Newbold, W. Carlson, B. Thorne (2012). *Statistics for Business and Economics*. Pearson Higher Education.

D. Stirzaker (2003) *Elementary Probability*, Cambridge University Press.

L. Wasserman (2004). *All of Statistics*, Springer.

Advanced readings

R. B. Ash, C. A. Doléans-Dade (2000). *Probability and Measure Theory*, Harcourt/Academic Press.

M. J. Schervish (1995). *Theory of Statistics*, Springer.