Probability theory

Instructor: Giovanni Pistone

Contact information

Phone: +39 011 670 5033

E-mail: giovanni.pistone@carloalberto.org

Webpage: www.giannidiorestino.it

Course description

The course offers an overview of some mathematical topics in Probability. Tools and models that are routinely used in a variety of areas including Statistics, Machine Learning, Econometrics, Mathematical Finance, Economics are rigorously discussed. The main emphasis is on the treatment of distribution theory and conditioning together with their main applications. Students are assumed to know the basics of Matrix Algebra, Multivariate Calculus, Measure Theory. The course is equally divided into lectures and exercise sessions.

Topics

- Recap of useful mathematical topics.
- Probability spaces.
- Random variables and their distribution. Expectation. Simulation.
- Independence.
- Conditional expectation and conditional distribution. Sufficiency.
- A selection of topics in special models: Exponential Family, Multivariate Gaussian, Markov Chain, Poisson Process, Martingale.

Grading

There will be a single final written exam consisting in exercises and a short essay.

Textbook

- Williams, D. (1991). Probability with Martingales. Cambridge University Press.
- Lecture notes.