

Applied Multivariate Techniques

Monica Chiogna, Jordan Stoyanov

PhD School, XXV cycle

Course Description

This course provides a quick overview of basic multivariate techniques. A module on multivariate distributions will be developed by Prof Jordan Stoyanov. The main goal of this module is to extend the previous student's knowledge on multivariate distributions. Lectures will present old and new classes of continuous and discrete multivariate distributions, focussing on properties which are important for the theory and needed for applications. Traditional and new concepts will be discussed. Starting from normal distributions (1-dimensional, bivariate, multivariate), the course will move smoothly to distributions, not normal, which either 'imitate' properties of the normal, or are quite different. Some of the new classes have been developed very recently in order to address new demands coming from applications. Among them are distributions with skewing and generalized inverse distributions. There will be a reasonable theory, illustrations and indications of areas for possible applications. The illustrations will involve distributions such as normal, exponential, gamma, beta, Student, Poisson, Dirichlet, IG, etc., all important in statistical theory and practice. It is expected the students to extend their previous knowledge and be better prepared to deal with any kind of complex problems arising in statistical modelling.

Objectives

The objectives of this course are:

- to learn some of the traditional tools for analysing multidimensional data;
- to extend knowledge on multivariate distributions.

Schedule

31	May	15.00-17.00	Introduction, course organization, etc. (Monica Chiogna)
21	June	10.00-13.00	Multivariate distributions (Jordan Stoyanov)
22	June	10.00-13.00	Multivariate distributions (Jordan Stoyanov)
23	June	10.00-13.00	Multivariate distributions (Jordan Stoyanov)
24	June	10.00-13.00	Multivariate distributions (Jordan Stoyanov)
25	June	10.00-13.00	Multivariate distributions (Jordan Stoyanov)
1	July	10.00-12.00	Basic techniques (Monica Chiogna)
2	July	10.00-12.00	Basic techniques (Monica Chiogna)

Recommended texts

- Arnold, B., E. Castillo, J.-M. Sarabia (1999). *Conditional Specification of Statistical Models*. Springer.
- Balakrishnan, N. and C.-D. Lai (2009). *Continuous Bivariate Distributions*. 2nd edn. Springer.
- Mardia, K.V., Kent, J.T., and Bibby, J.M. (1979). *Multivariate Analysis*, Academic Press.
- Stoyanov, J. (1997). *Counterexamples in Probability*. 2nd edn. Wiley.
- Stuart, A. and K. Ord (1994). *Kendall's Advanced Theory of Statistics. Volume 1: Distribution Theory*. 6th edn. Arnold.

Final Exam

July, 19 h.16.00