Estimation and Testing Hypotheses in Multivariate Models, 8.0 credits

Skattning och hypotesprövning för multivariata modeller, 8.0 hp

Third-cycle education course

MAI0142

Department of Mathematics

Valid from: First half-year 2023

Approved by
Head of Department

Approved

Registration number

Entry requirements

Basic courses in probability theory, statistical inference and linear algebra.

Learning outcomes

The course is intended to give extended knowledge of the theory and methods in analysing linear and bilinear models and to introduce recent developments in the field. By the end of the course, the student should:

- be able to use appropriate linear and bilinear models to describe and analyse observed data and draw conclusions concerning interesting parameters;
- understand the need and use of structured covariance matrices in statistical inference;
- be familiar with the concepts of high dimensional analyses;
- be able to critically evaluate linear and bilinear models in some real-world applications based on the above context;
- be able to use suitable software (e.g., R or similar) for certain types of statistical analyses.

Contents

- Multivariate distributions
  - Normal distribution
  - Wishart distribution
- Linear models (MANOVA)
- Bilinear models
- Profile analysis
- Inference, i.e., estimation and testing hypotheses
  - residual analyses
  - structured covariance matrices
  - high dimensions analyses
- Analysis of data by using appropriate statistical software, e.g., R or similar.

Educational methods

Lectures and individual presentations.

Examination

Hand-in assignments and individual presentations.

Grading

One-grade scale

Course literature

The main literature for the course will be two books

1. *Advanced Multivariate Statistics with Matrices* by Tonu Kollo and Dietrich von Rosen,
2. *Bilinear Regression Analysis - An Introduction* by Dietrich von Rosen.

Also, some scientific papers will be considered to cover for the most recent findings in the field.