



DEPARTMENT OF MATHEMATICAL SCIENCES

MSA650 Linear Mixed Models for Longitudinal Data, 7.5 credits

Linjära mixade modeller för longitudinella data, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Mathematical Sciences on 2019-02-22 to be valid from 2021-01-18, spring semester of 2021.

Field of education: Science 100%

Department: Department of Mathematical Sciences

Position in the educational system

The course is part of the Master Program in Mathematical Sciences. It is also open for students outside the program who meet the course prerequisites.

The course can be part of the following programme: 1) Mathematical Sciences, Master's Programme (N2MAT)

Entry requirements

For entrance to the course, a student is required to have knowledge corresponding to the courses MSG110 Probability Theory, MSG200 Statistical Inference, MSG500 Linear Statistical Models and MMG300 Multivariable Calculus.

Learning outcomes

After passing the course, the student should be able to

- use the mixed model framework
- recognize common study designs and models with longitudinal data or otherwise correlated observations
- conduct an appropriate statistical analysis of models covered in the course using standard software

Course content

This course is an introduction to the area of mixed models which has become a necessary tool for treating real life situations with e.g. random effects, correlated observations and missing data. The emphasis is on longitudinal data and on how to use SAS and R to analyse mixed models.

Main topics:

- Exploratory Data Analysis,
- Estimation of the Marginal Model,
- Inference for the Marginal Model,
- Inference for the Random Effects,
- Fitting Linear Mixed Models with SAS,
- General Guidelines for Model Building,
- Exploring Serial Correlation,
- Local Influence for the Linear Mixed Model ,
- The Heterogeneity Model,
- Conditional Linear Mixed Models,
- Exploring Incomplete Data,
- Joint Modeling of Measurements and Missingness,
- Simple Missing Data Methods,
- Selection Models,
- Pattern-Mixture Models,
- Sensitivity Analysis for Selection Models,
- Sensitivity Analysis for Models,
- How Ignorable is Missing at Random?,
- The Expectation-Maximization Algorithm,
- Design Considerations,
- Case Studies

Form of teaching

Lectures and computer exercise classes.

Language of instruction: English

Assessment

Home assignments and written final examination

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

The grades are Fail (U), Pass (G), and High Pass (VG). Students who are contractually entitled to ECTS grades should inform the examiner about this no later than one week

after the start of the course. Students without such entitlement will not be awarded ECTS grades. Grades will be converted into ECTS terminology according to a standard model approved by the University President.

Course evaluation

Oral and/or written course evaluation will be performed. The results of the evaluation will be communicated to the students and will serve as a guide for the development of the course.