

MSA250, EXPERIMENTAL DESIGN, 7.5 credit points

Level: advanced

1. Authorisation

The course plan has been authorised by the vice-dean of the Department of Mathematical Sciences on November 9, 2006, to be valid from July 1, 2007.

Educational field: Mathematical Sciences

2. Educational context.

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.

3. Prerequisites

Basic courses in linear algebra, calculus and mathematical statistics.

4. Goals and learning outcomes

Working with statistics in practice means studying data with associated errors. After finishing the course, the students should be able to

- judge which assumptions are needed in order to draw conclusions from data using statistical methods
- apply these methods to analyse data
- know how the experiments should be planned in order to fulfil these assumptions
- plan and analyse experiments in certain typical situations
- appreciate and explain importance of experimental planning.

5. Course description

The basic philosophy behind statistical inference is discussed. An important case is comparative studies for two treatments where nuisance factors can either be randomised or blocked. How this is done in practice is of importance for the analysis. More than two treatments are introduced and treated using analysis of variance.

We also study regression analysis. In the study of the methods of analysis extra emphasis is put on the assumptions, which are essential to secure during the planning stage of the experiment.

Key concepts and techniques are

- independence and dependence, correlation
- randomisation and blocking
- tests and confidence intervals in comparing two treatments
- one-way analysis of variance with and without blocking
- two-way analysis of variance
- regression analysis
- factorial designs at two levels
- fractional factorial designs
- Split-Plot designs
- response surface methods.

The course consists of lectures, exercises and projects.

6. Literature

See separate list.

7. Assessment

Evaluation of the projects and a written examination.

8. Grades

The grade levels are Fail (U), Pass (G), and High Pass (VG). A wish for an ECTS grade should be reported to the examiner at the beginning of the course.

9. Course evaluation

In the middle of the course the teacher arranges a feedback discussion with the students and at the end of the course the students will be asked to answer a questionnaire. The results of the questionnaire will be processed by the teacher together with student representatives.

10. Additional information