Faculty of Science

MASC15, Mathematical Statistics: Design of Experiments, 7.5 credits

Matematisk statistik: Försöksplanering, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by The Education Board of Faculty of Science on 2025-05-30. The syllabus comes into effect 2025-05-30 and is valid from the spring semester 2026.

General information

The course is an elective course for first-cycle studies for a Bachelor of Science in Mathematics / Master of Science in Mathematical Statistics.

Language of instruction: English

Main field of study	*Specialisation*
Mathematics	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements
Mathematical Statistics	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

This is a basic course in designing experiments and analyzing the resulting data. It is intended for engineers, physical/chemical scientists and scientists from other fields such as biotechnology and biology. The course deals with the types of experiments that are frequently conducted in industrial settings. Its objective is to learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions.

Knowledge and Understanding

On completion of the course, the students are expected to be able to

- explain and use basic methods in factorial experiments,

- explain and use basic methods in analysis of variance with fixed and random effects, regression and analysis of covariance.

Competence and skills

On completion of the course, the students are expected to be able to:

- plan a factorial experiment,
- suggest an experimental plan suitable for a given problem,
- structure and analyse sets of data using a computer package and critically examine the result,
- account for the solutions of statistical problems in written reports.

Course content

The course treats:

- Simple design with fixed and random effects.
- Simultaneous confidence intervals.
- Requirements for analysis of variance:transformations, model validation, residual analysis.
- Factorial design with fixed, random, and mixed effects.
- Additivity and interaction. Complete and incomplete designs.
- Randomised block designs, Latin squares and confounding.
- Regression and analysis of covariance.

Course design

Teaching consists of lectures, exercises and computer exercises. Participation in computer exercises is compulsory.

Assessment

The examination consists of oral exam and computer exercises with written reports and a project.

Students who did not pass an assessment in the regular session will be offered another opportunity for assessment during the scheduled period for resits.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction
The final grade is determined by the grade on the oral exam.

The grade on the computer exercises with written report is Fail, Pass while the oral exam is graded as Fail,Pass and Passed with distinction.

For a passing grade on the entire course a passing grade on the computer exercise reports and on the oral exam is required.

Entry requirements

For admission to the course 60 ECTS credits in Science, Technology, Engineering and/or Mathematics including knowledge equivalen to the course MASA03, Mathematical Statistics: Basic Course, 15 credits. English 6/B.

Further information

The course replaces MASC05 Design of experiments, 7,5 credits and credits from that course cannot count towards a degree together with this course.

The course is given by Centre for Mathematical Sciences, Lund University.

The course is read together FMSF65, Design of experiments, 7,5 hp which is a course given by Lund's engineering school LTH.

The examination of the course is scheduled according to LTH:s exam schedule.