Faculty of Science

MASB21, Mathematical Statistics: Statistics - Basic Course for Applied Computational Science, 7.5 credits

Matematisk statistik: Statistisk grundkurs för tillämpad beräkningsvetenskap, 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 a compulsory course for a degree of Master of Science in Applied Computational Science with specialization in Chemistry, Geology, Environmental Science and Physical Geography.

Language of instruction: English

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

Learning outcomes

The course's purpose is that the student after a finished course will have acquired the basics in mathematical modelling of random variation and an understanding of the principles behind statistical analysis. It shall also give the students a toolbox containing the most commonly used models and methods, as well as the ability to use these in practical situations. The emphasis lies on models and methods for analysis of experimental data and measurement errors.

Knowledge and understanding

On completion of the course, the student shall be able to:

- relate questions about random variation and observed data to the concepts random variables, distributions and relationships between variables
- explain the concepts of independence, probability, distribution, expectation, and variance
- calculate the probability of an event, and the expectation and variance from a given distribution
- describe fundamental techniques for statistical inference and be able to use them on basic statistical models.

Competence and skills

On completion of the course, the student shall be able to:

- construct a simple statistical model describing a problem based on a real life situation or on a collected data material
- use a computational program for simulation and interpretation of statistical models, as well as for data analysis
- choose, modify, perform, and interpret a statistical procedure that answers a given statistical problem
- use statistical terms within the field in writing
- give account of an statistical analysis in a technical report.

Judgement and approach

On completion of the course, the student shall be able to:

- examine a statistical model and its ability to describe reality.

Course content

The course treats:

- Descriptive statistics,
- Basic probability theory for discrete and continuous distributions,
- Standard distributions such as binomial, Poisson and Gaussian distributions,
- Elementary statistics such as estimation, confidence intervals and tests etc,
- Comparisons between averages, variabilty and proportions,
- Statistical methods such as regression analysis and analysis of variance,
- Correlation,
- Non parametric tests such as Chi square tests.

Course design

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

Assessment

Examination consists of a written exam at the end of the course, and computer exercise reports during the course.

Students who did not pass the ordinary exam are offered a re-examination shortly after.

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
For a grade of Pass on the whole course a passed written exam and passed computer exercise reports as well as participation in all compulsory course parts are required. The grades awarded for the computer exercise reports are Fail and Pass. The grade on the written exam is Fail, Pass, Pass with distinction. The final grade is determined by the grade on the exam.

Entry requirements

English course 6/B (advanced proficiency) and 90 ECTS credits in Science, Technology, Engineering and/or Mathematics.

Further information

The course may not be included in a higher education qualification together with any course code starting with MASB or with MASA03 Mathematical Statistics: Basic Course, 15 credits or Mathematical Statistics for Subject Teachers 7.5 credits.

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