Joint Faculties of Humanities and Theology

# ÄMAB02, Mathematical Statistics for Subject Teachers, 7.5 credits

*Matematisk statistik för ämneslärare, 7,5 högskolepoäng*

**First Cycle / Grundnivå**

## Details of approval

The syllabus was approved by The Education Board of Faculty of Science on 2025-06-12. The syllabus comes into effect 2025-06-12 and is valid from the spring semester 2026.

## General information

The course is a component of the teacher education programme at Lund University.

*Language of instruction:* Swedish

| *Main field of study* | *Specialisation* |
|---|---|
| Mathematical Statistics | G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements |

## Learning outcomes

The overall aim of the course is for students to acquire a theoretical foundation in mathematical modeling of random variation and an understanding of the principles behind statistical analysis. Furthermore, the goal is for students to gain a toolbox of the most common models and methods, as well as the ability to apply these in various practical situations, in preparation for their upcoming degree projekt and future teaching profession. The course is also intended to provide a foundation for further studies, both in probability and inference theory, and in applied subjects.

### Knowledge and understanding

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

- 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
- describe the similarities and differences concerning statistical relationship between two variables and a cause-effect relationship between two variables.

### Competence and skills

On completion of the course, the students 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.

### Judgement and approach

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

- relate questions regarding observed random variation in measured data for different applications, to the concepts of random variables, distributions, and relationships between variables
- assess a statistical model and its ability to describe reality
- assess a simple measurement situation and judge whether data is collected in a way that allows further analysis
- discuss didactic and pedagogical questions with application to probability and statistics.

## Course content

The course treats:

- Bayes theorem.
- Expectation and variance.
- Normal distribution
- Binomial distribution, and other important distributions for measurements and frequencies.
- Data analysis.
- Statistical inference: Point estimates, Interval estimates and hypothesis testing.
- Methods for normally distributed observations.
- Approximative methods based on the normal distribution.
- Comparisons between expectations.
- Variability, and distributions.
- Estimates of proportions.
- Regression analysis and calibration.

- Covariance och correlation.
- Correlation between two explanatory variables.

## Course design

Teaching consists of lectures, exercise classes, computer exercises and a didactic project. Participation in computer exercises and project is compulsory.

## Assessment

Examination consists of a written exam at the end of the course, and computer exercises, project report as wells as a computational ability test 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
To obtain the grade Pass on the entire course a passed written exam, passed project reports, computer exercises and computer based test as well as participation in all compulsory course parts are required.
The grades awarded for the computer exercises, project reports and computer based test are Fail and Pass.

The grade on the written exam is Fail, Pass, Pass with distinction.

The final grade is the grade on the written exam.

## Entry requirements

To be eligible for the course, students must have knowledge equivalent to at least 26.5 credits with a passing grade from the following courses:

- ÄMAA01 – Mathematics 1 for Subject Teachers: Analysis in One Variable (13 credits)
- ÄMAA02 – Mathematics 1 for Subject Teachers: Algebra and Vector Geometry (7.5 credits)
- ÄMAA03 – Mathematics 1 for SubjectTeachers: Computational Programming with Python (6 credits)
- ÄMAB01 – Mathematics 2 for Subject Teachers: Analysis in Several Variables, Linear Algebra and Subject Didactics (15 credits)

## Further information

The course is given jointly with the courses MASB13 Mathematical Statistics for Physicists (7.5 credits) and FMSF50 Mathematical Statistics, Basic Course (7.5 credits) given at the Faculty of Engineering (LTH) and may not be credited in a higher education qualification with any of these courses. The course may not be credited in a higher education qualification together with MASL01 Mathematical Statistics for Teacher Students (7.5 credits) nor with MASA03 Mathematical Statistics, basic course (15 credits).

The course is assessed according to the LTH examination schedule.

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

This is a translation of the syllabus
which was established in Swedish.