



LTH

FACULTY OF
ENGINEERING

Course syllabus

Statistik Statistics

EXTA60, 7,5 credits, G1 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED I

Date of Decision: 2023-04-14

General Information

Compulsory for: BI2

Language of instruction: The course will be given in Swedish

Aim

The aim of the course is to give a basic knowledge of statistical concepts in technology, science and economics and to give training in the use of computers for statistical calculations and in the evaluation of the quality of statistical investigations.

The course will give the student knowledge in how to describe random variation and understanding of the principles behind statistical analysis. It will also give the student a tool-box with the most common models and methods and the ability to use these in different practical situations.

The aim is both to give a general knowledge in statistics and to give a foundation for further studies.

The general knowledge is required for those who in their professional activities perhaps will not need to perform statistical analyses regularly, but who will have to interpret results from various investigations, present results and perform simple statistical analyses.

The course will also give a foundation for further studies, foremost by defining and using the basic concepts within probability theory, risk-analysis, decision theory, statistical modelling etc.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to relate questions on random variation and observed data, to both applied and theoretical concepts: variables/random variables, distributions and association between variables
- be able to explain the concepts: independence, probability, conditional probability, distribution, expected value, variance, covariance and correlation,
- be able to calculate the probability of an event and expected value and variance in a theoretical distribution,
- be able to explain a statistical decision model and concepts as decision, uncertainty and values,
- be able to describe basic techniques for statistical inference and be able to use them in simple statistical models.

Competences and skills

For a passing grade the student must

- be able to describe a dataset with the aid of different descriptive techniques,
- be able to choose and use an appropriate statistical method to answer a specific statistical question,
- be able to describe a problem with the help of a decision-tree and also be able to find the optimal decision,
- be able to use a statistical computer program for data analysis and simulations,
- be able to use statistical concepts in writing.

Contents

The course presents the theoretical and practical foundations for statistical analysis of data. Concepts as event, probability (risk), independence and expected value are defined. Further, different discrete and continuous probability models are studied, e.g. binomial, poisson and normal models. The foundations of descriptive statistics: Principles of tabulation and graphs, measures of location, variation and association, standardization, and index-theory. The meaning of concepts as statistical precision and statistical significance are discussed. The course will also give an introduction to Monte Carlo simulation.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written exam and laboratory work.

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.

Parts

Code: 0117. **Name:** Written Examination.

Credits: 7,5. **Grading scale:** TH. **Assessment:** Approved written examination

Code: 0217. **Name:** Laboratory Work.

Credits: 0. **Grading scale:** UG. **Assessment:** Approved laboratory tasks. **Contents:** The compulsory laboratory work (two introductory sessions and three laboratory sessions) must be completed to qualify for a passing grade.

Admission

Assumed prior knowledge: FMAB65 Calculus in One Variable B1, FMAB70 Calculus in One Variable B2

The number of participants is limited to: No

The course overlaps following course/s: TNX071

Reading list

- Körner, S. & Wahlgren, L. : Praktisk statistik, fjärdeupplagan. Studentlitteratur, 2012, ISBN: 9789144075242. Chapters 1-5.
- Vännman, K., Jonsson, A. & Dunkels, A. : Matematisk statistik, tredje upplagan. Studentlitteratur, 2020, ISBN: 9789144133249.
- Kompendium i regressionsanalys och beslutsteori.

Contact and other information

Course coordinator: Peter Gustafsson, peter.gustafsson@stat.lu.se

Course homepage: <http://canvas.education.lu.se>

Further information: Contact course coordinator for questions regarding re-exams.