



## DEPARTMENT OF ECONOMICS

### **STK250 Intermediate Statistics 2, 15 credits**

Statistik: Föreläsningkurs 2, 15 högskolepoäng

*First Cycle*

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#### **Confirmation**

This course syllabus was confirmed by Department of Economics on 2019-08-07 and was last revised on 2022-01-15 to be valid from 2022-01-17, spring semester of 2022.

*Field of education:* Social Sciences 100%

*Department:* Department of Economics

#### **Position in the educational system**

This is a 15.0 credits intermediate course in statistics at first-cycle level.

#### *Main field of studies*

Statistics

#### *Specialization*

G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

#### **Entry requirements**

Admission to the course requires previous knowledge of Statistics, 30 credits, as well as Statistics: Intermediate course 1, 15 credits, of which at least 30 credits must be completed.

#### **Learning outcomes**

On successful completion of the course the student will be able to:

1. solve and analyze problems within probability theory.
2. explain, apply and analyze inferential theory concepts.
3. use discrete and continuous stochastic variables to solve and analyze problems of in-depth character within probability theory and statistical theory.
4. calculate and analyze Point- and interval estimates and perform hypothesis tests of parameters in statistical models.

5. apply simpler programming to implement, analyze and simulate probability theory models and for calculating parameter estimates in these models.

How overall learning goals och the bachelor's degree are related to the learning outcomes of the course:

Overall learning goals	Learning outcomes
Knowledge and understanding	1+2+3+4+5
Skills and abilities	1+2+3+4+5
Judgement and approach	1+2+3+4+5

### Course content

The course provides in-depth and broad knowledge of probability theory and statistical inference theory. Great emphasis is put on the use of probability theoretical- and statistical models to analyze practical problems, and to draw accurate conclusions from the results.

Since the course requires more advanced mathematics than previous courses, the course begins with a brief introduction to mathematical analysis. Concepts that are dealt with in this mathematical introduction are functions, derivatives, integrals, double integrals, and optimization.

Apart from the introduction of mathematics, the following concepts are discussed in the course:

- Basic probability theoretical concepts, stochastic variables, various discrete and continuous distributions, multivariate distributions and conditional distributions.
- Moment-generating functions, the law of large numbers and the central limit theorem.
- Point estimation such as the method of moments, method of maximum likelihood and the least squares method and its properties.
- Confidence intervalls..
- Hypothesis testing and the Neymann-Pearson's lemma.
- Likelihood ratio test, non-parametric methods and Bayesian inference.

The course consists of two parts (part I and part II), each of which is examined separately.

The course gives two compulsory assignments where the student uses simpler programming to implement and simulate probability theory models in the solution of applied questions and estimation of model parameters.

**Form of teaching**

The teaching consists of lectures, exercises, question hours and computer labs.

*Language of instruction:* Swedish

Teaching activities in English may occur.

**Assessment**

Learning Outcomes 1-4 are examined through a written examination of part I and part II. Learning Outcome 5 is examined through two compulsory assignments.

To be approved on the course, approved results are required on both parts (Part I and Part II). In order to be approved for part I, an approved examination of part I is required and the result is passed on the compulsory assignment in part I. In order to be approved in part II, an approved examination of part II is required and an approved result on the compulsory assignment in part II.

If a student, who has failed the same examined element on two occasions, wishes to change examiner before the next examination session, such a request is to be submitted to the department in writing and granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In the event that a course has ceased or undergone major changes, students are to be guaranteed at least three examination sessions (including the ordinary examination session) over a period of at least one year, though at most two years after the course has ceased/been changed.

**Grades**

The grading scale comprises: Excellent (A), Very good (B), Good (C), Satisfactory (D), Sufficient (E) and Fail (F).

**Course evaluation**

Course evaluation is done digitally and anonymously at the end of the course.

The survey material is compiled and the results from the course evaluation and proposals for possible improvement measures are discussed at the course committee meeting. After the course evaluation is completed, the result will be published at the course homepage.

If a change of course is done based on the course evaluation, this will be communicated at the course introduction for the upcoming student group.

**Additional information**

1. Transitional rules: the course replaces the course "Intermediate statistics 2", STG250.
2. Limitations: the course cannot be used in a degree together with "Intermediate statistics 2", STG250.