Stockholm University

Syllabus

for course at first level

Statistical Theory with Applications
Statistisk teori med tillämpningar

15.0 Higher Education Credits
15.0 ECTS credits

Course code:	ST211G
Valid from:	Spring 2017
Date of approval:	2012-03-14
Changed:	2016-09-07
Department	Department of Statistics
Subject	Statistics

Decision

This syllabus was approved by the Board of the Department of Statistics on April 09, 2008, and revised on March 14, 2012, March 12, 2014, and September 7, 2016.

Prerequisites and special admittance requirements

Fundamentals of Statistics, basic level, 15 ECTS credits and Regressionanalysis and Survey Methods, basic level, 15 ECTS credits, or Statistics I, basic level, 30 ECTS credits, or equivalent.

Course structure

Examination code	Name	Higher Education Credits
11ST	Statistical theory with applications I, examination	6
12SI	Compulsory exercise, statistical theory with applications I	1.5
21ST	Statistical theory with applications II, examination	6
22SI	Compulsory exercise, statistical theory with applications II	1.5

Course content

The course consists of two course units and is examined in accordance with four examination codes, "Exam 1" has the examination code 11ST, "Exam 2" has the examination code 12SI, "Exam 3" has the examination code 21ST and "Exam 4" has the examination code 22SI.
The course gives extended knowledge in probability theory and statistical inference. There is an emphasis on applications within the area of social scienses. Furthermore, the course also includes use of statistical software.
The concepts that are treated more thoroughly treated are:
Introduction to mathematical analysis. Basic concepts in probability theory, stochastic variables and probability distributions. Discrete and continuous distributions, univariate as well as multivariate. The Central Limit Theorem. Order statistics. Basic concepts within inference theory. Methods for point estimation like the method of momentsand the method of maximum likelihood. Properties of estimators, such as efficiency of estimators and sufficient statistics. Confidence intervals. Tests of statistical hypotheses. The lemma of Neyman-Pearson, Likelihood ratio tests. Non-parametrical methods.

Learning outcomes

To pass the course the student shall be able to:
I. Solve and interpret problems in probability,
II. Show good knowledge of the foundations of the theory of inference,

III. Solve and interpret more advanced problems regarding distributions and tests,
IV. Formulate simple statistical models for some concrete situations,
V. Compute and interpret point- and interval-estimates and test hypotheses regarding parameters in statistical models.

Education

The teaching forms consist of lectures and exercises.
Individual written examinations and examinations of group work are compulsory. The requirements for the different examinations are specified in the section of Forms of examination. Students who receive the grade Fx or F on an examination have to re-take the examination. The schedules for the examinations are determined one month before the start of the course.
The course has an optional bounus system which gives bounus points to Exam 1 and Exam 3. Attendance to some of the seminars for practical assignments is mandatory. If a student misses a mandatory seminar, a written assignment with a hand-in date will be mandatory. The details will be specified in the course description which is available before the course starts.

Forms of examination

Examination will be done by assessing the learning outcomes. Examination will be in the form of written examination.

The grading of the course is done according to a seven-point scale related to the specified learning outcomes:
A = Excellent,
B = Very Good,
C = Good,
D = Satisfactory,
E = Adequate,
Fx = Fail, some more work is required,
F = Fail, a lot of more work is required.

Grading criteria will be distributed at the beginning of the course.

Exam 1 is a written individual examination. Exam 1 examines the learning outcomes I and IV. The grading of Exam 1 is done accordning to the above seven-point scale, where the grades F and Fx requires a re-examination. Active participation in a number of seminars for practical assignments gives bouns points to Exam 1. The details will be specified in the course description which is available before the course starts. The bonus points are valid for both exam dates within the semester, but can not be transferred to another semester.
Exam 2 is a hand-in group assignment, with a written oral presentation. Exam 2 examines the learning outcomes I and IV. The individual performance within the group have to be documented and examined. The grading of Exam 2 is done according to a two-point scale related to the learning outcomes: G = Pass, U = Fail.
Exam 3 is a written individual examination. Exam 3 examines the learning outcomes II, III and V. The grading of Exam 3 is done according to the above seven-point scale, where the grades F and Fx requires a re-

examination. Active participation in a number of seminars for practical assignments gives bouns points to Exam 3. The details will be specified in the course description which is available before the course starts. The bonus points are valid for both exam dates within the semester, but can not be transferred to another semester.
Exam 4 is a hand-in group assignment, with a written presentation. Exam 4 examines the learning outcomes IV and V. The individual performance within the group have to be documented and examined. The grading of Exam 4 is done according to a two-point scale related to the learning outcomes: G = Pass, U = Fail.

To pass the course, the grade E or higher is required on exams 1 and 3 and Pass (G) on the exams 2 and 4.

The grade on the whole course is decided by the grades on Exam 1 and Exam 3 (regardless of the order) according to:
A + A, A + B are added to the grade A,
A + C, A + D, B + B, B + C are added to the grade B,
A + E, B + D, B + E, C + C, C + D are added to the grade C,
C + E, D + D, D + E are added to the grade D,
E + E are added to the grade E.

There shall be two examination sessions for all exams within a course period. If there is only one course period within twelve months, there shall be one more examination session for each exam.
Students who receive the grade Fx or F on an examination are entitled to retake the examination as long as the
course is still given. Students who receive the grade E or higher on an examination may not retake this examination in order to attempt to achieve a higher grade. Students who receive the grade Fx or F or U on an
examination twice by the same examiner are entitled to request that a different examiner will be appointed to set the grade of the examination. Such a request must be in writing and sent to the head of the department.

Interim

Students can request examination in accordance with this syllabus once per semester during a period of three
semesters after the course is no longer given. Such a request must be in writing and sent to the head of the department.

Limitations

The course can not be included in a degree together with the course Statisticalö theory with applications (ST210G) 15 ECTS credits, or equivalent.

Required reading

The course literature is described in an appendix to the syllabus.