



Course syllabus

Faculty of Technology
Department of Mathematics

1MA511 Tillämpad sannolikhetslära och statistik, 7,5 högskolepoäng
Applied Probability Theory and Statistics, 7.5 credits

Main field of study

Mathematics

Subject Group

Mathematics

Level of classification

First Level

Progression

G1F

Date of Ratification

Approved by Faculty of Technology 2015-05-22

The course syllabus is valid from spring semester 2016

Prerequisites

1MA102 Calculus I 7.5 credits or equivalent.

Objectives

The students should be able to:

- solve introductory exercises in combinatorics and probability theory
- use random variables to solve probability exercises
- identify when common discrete distributions can be used, in particular the hypergeometric distribution, the binomial distribution, and the Poisson distribution
- identify when common continuous distributions can be used, in particular the normal distribution, the exponential distribution, and the uniform distribution
- compute probabilities, expectations and variances for random variables with given density functions or probability functions
- solve problems where sums of random variables are used
- apply the central limit theorem
- interpretate frequency tables, staple diagrams, histograms, Box-plot diagram and stem-leaf displays
- point estimate mean values and variances
- interval estimate expectations for normal distributed data and for large samples
- formulate, perform, and draw conclusions of hypothesis testings for expectations for one sample
- formulate, perform, and draw conclusions of hypothesis testings for the difference of expectations for pairwise samples and for two samples
- mean square estimate parameters for a simple linear regression
- estimate confidence interval for simple linear regression

- formulate, perform and draw conclusions of hypothesis testings for simple linear regression

Content

- Combinatorics: variants, permutations, combinations
- Introductory probability theory: random events, probabilities, conditional probabilities, independent events, probability functions, density functions, expectations, variances
- Discrete distributions: in particular the hypergeometric distribution, the binomial distribution, and the Poisson distribution
- Continuous distributions: in particular the normal distribution, the exponential distribution and introduction to the Weibull distribution
- Position measures and spread measures, functions of random variables
- Sums and means of random variables: the central limit theorem, normal approximations of binomial variables and Poisson variables
- Descriptive statistics: frequency tables, histograms, staple diagrams, stem-leaf diagrams
- Point estimate, interval estimate and hypothesis testing for means: for one normal distributed sample, for two normal distributed samples, for pairwise samples
- Simple linear regression: point estimates, interval estimates and hypothesis testings

Type of Instruction

Lectures and exercises. Mandatory assignments may appear.

Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

Assessment of student performance is made through written test and/or oral examinations and/or presentation of mandatory assignments. The assessment method is decided at the start of the course.

Students who do not pass the regular examination will be offered retrials close to the regular examination.

Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed at the Faculty.

Credit Overlap

This course cannot be part of a degree in combination with another course in which the content fully or partly correspond to the content of this course: 1MA211, 7,5 hp

Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material

Required Reading

Dag Jonsson och Lennart Norell. Ett stycke statistik. Studentlitteratur, 2007 eller senare

upplaga. Pages 199 (216).