Linnæus University

Course syllabus

Faculty Board of Science and Engineering

School of Computer Science, Physics and Mathematics

1MA211 Tillämpad sannolikhetslära och statistik, 7,5 högskolepoäng
1MA211 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 School of Computer Science, Physics and Mathematics 2012-08-17
The course syllabus is valid from spring semester 2013

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 distributionand 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 Fail (U), Pass (G) or Pass with Distinction (VG).

On request, students may have their credits translated to ECTS-marks. Such a request must be sent to the examiner before the grading process starts.

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
A course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The result of the course evaluation will be filed at the department.

Required Reading and Additional Study Material
Required Reading

Dag Jonsson och Lennart Norell. Ett stycke statistik. Studentlitteratur, 2007 eller senare upplaga. Pages 199 (216).