Aalto University

Stochastics and Statistics Courses 2018–2019

MSc course

BSc course

Prequisite course

Recommended order

How to lie with statistics
MS-E1992, Period II, 5 cr
Lecturer: Pauliina Ilmonen

The goal is to learn to spot if there is something fishy in a statistical analysis and to tell the truth, not lies, with statistics. You will work with various problematic data sets. The findings and ideas for improving data analyses are discussed during the lectures. You will also learn to defend your ideas and discoveries by participating in a debate.

Large random systems
MS-E1602, Period IV, 5 cr
Lecturer: Kalle Kytölä

Many important random systems are composed of a large number of simple interacting constituents. In this course you learn to work with such systems using generic mathematical techniques, tightness and weak convergence of probability measures. You also get introduced to probabilistic models including random walks, Brownian motion, percolation, and Ising model.

Multivariate statistical analysis
MS-E2112, Periods III–IV, 5 cr
Lecturer: Pauliina Ilmonen

You get introduced to common multivariate data analysis techniques. You learn to apply these methods in practice using R programming. Course topics include multivariate location and scatter, principal component analysis, multivariate correspondence analysis, canonical correlation analysis, discriminant analysis, classification, and clustering.

Random graphs and network statistics
MS-E1603, Period I, 5 cr
Lecturer: Lasse Leskelä

You get introduced to the theory of statistical models (uniform random graphs, stochastic block models, graphons) used in predicting and learning structural properties of networks based on incomplete and noisy observations. The course is targeted to students in mathematics, operations research, and computer science.

Probability theory
MS-E1600, Period III, 5 cr
Lecturer: Kalle Kytölä

This course introduces you to the mathematical theory of randomness. You learn to work with probabilistic concepts such as stochastic independence, convergence of random sequences, information contained in a sigma-algebra, characteristic and generating functions of probability measures, laws of large numbers, and central limit theorems.

Prediction and time series analysis
MS-C2128, Period II, 5 cr
Lecturer: Pauliina Ilmonen

This course introduces you to methods and concepts used in analyzing and predicting statistical time series. Course topics include linear models and regression diagnostics, stationary random processes, various ARIMA models, Kalman filters, and an introduction to dynamic regression models. R programming is used in the exercises.

Euklidiset avaruudet
MS-C1540, 5 op

Stochastic processes
MS-C2111, Period II, 5 cr
Lecturer: Lasse Leskelä

This course will get you introduced to stochastic processes, the theory of time-dependent random phenomena. You learn to mathematically model and analyze particle and population flows using Markov processes, unpredictable time instants using Poisson processes, and gambling and investment strategies using martingales.

Statistical inference
MS-C1620, Periods III–IV, 5 cr
Lecturer: Joni Virta

This course is an introduction to statistical analysis and statistical inference, with emphasis on statistical hypothesis testing and prediction methods. Course topics include estimation, simple parametric and nonparametric tests, statistical dependence and correlation, linear regression analysis, and analysis of variance. R programming is used in the exercises.

Todennäköisyyslaskennan ja tilastotieteen peruskurssi
MS-A050X, Periodit I, II, III, IV, 5 op
Luennoitsijat: Georg Metsalo, Joni Virta, Ragnar Freij, Lasse Leskelä

Kurssilla opitaan laskemaan todennäköisyyksiä ja odotusarvoja joukkojen, summien ja integraalien avulla. Lisäksi tutustutaan tilastollisiin menetelmiin, joiden avulla voi laatia estimaatteja ja ennusteita sekä analysoida tilastollista merkitsevyyttä havaitun datan ja prioritiedon valossa.

Introduction to R programming
MS-E1994, One-weekend intensive course, 1 cr
Lecturers: Sami Helander, Paavo Raittinen, Niko Lietzén

This course gets you started with R programming. No prior programming experience is required.

Matriisilaskenta
MS-A000X, 5 op

Differentiaali- ja integraalilaskenta 1
MS-A010X, 5 op

Interested in writing a BSc, MSc, or PhD thesis in stochastics and statistics?
Contact Pauliina Ilmonen, Kalle Kytölä, or Lasse Leskelä

Obtain credits by participating in the MS-E1609 Stochastics and statistics seminar?
Join stochastics@list.aalto.fi to stay updated