

Bayesian Learning

Single subject and programme course

6 credits

Bayesianska metoder

732A91

Valid from: 2017 Spring semester

Determined by
Course and Programme Syllabus Board
at the Faculty of Arts and Sciences

Date determined
2016-04-13

Main field of study

Statistics

Course level

Second cycle

Advancement level

A1N

Course offered for

- Master's Programme in Statistics and Machine Learning

Entry requirements

A bachelor's degree in one of the following subjects: statistics, mathematics, applied mathematics, computer science, engineering, or equivalent. Completed courses in calculus, linear algebra, statistics and programming are required.

The student should also have passed:

- an intermediate course in probability and statistical inference;
- a course including multiple linear regression.

Documented knowledge of English equivalent to Engelska B/Engelska 6.

Intended learning outcomes

After completion of the course the student should at an advanced level be able to:

- account for the main differences between Bayesian and frequentist inference,
- analyze basic statistical models using a Bayesian approach and correctly interpret the results,
- use Bayesian models for prediction and decision making,
- implement more advanced statistical models using modern simulation methods,
- perform Bayesian model inference

Course content

The course covers the following topics:

Likelihood, Subjective probability, Bayes theorem, Prior and posterior distribution, Bayesian analysis of the following models: Bernoulli, Normal, Multinomial, Multivariate normal; Linear and nonlinear regression, Binary regression, Mixture models; Regularization priors, Classification, Naïve Bayes, Marginalization, Posterior approximation, Prediction, Decision theory, Markov Chain Monte Carlo, Gibbs sampling, Bayesian variable selection, Model selection, Model averaging.

Teaching and working methods

The teaching comprises lectures, exercise sessions, and computer labs. The lectures are devoted to presentations of concepts and methods. Mathematically oriented problems are solved in the exercise sessions. The computer labs are used for practical applications of Bayesian inference. Homework and independent study are a necessary complement to the course.

Language of instruction: English.

Examination

Written reports on computer lab assignments, and a computer exam. Detailed information about the examination can be found in the course's study guide.

If the LiU coordinator for students with disabilities has granted a student the right to an adapted examination for a written examination in an examination hall, the student has the right to it. If the coordinator has instead recommended for the student an adapted examination or alternative form of examination, the examiner may grant this if the examiner assesses that it is possible, based on consideration of the course objectives.

Students failing an exam covering either the entire course or part of the course twice are entitled to have a new examiner appointed for the reexamination.

Students who have passed an examination may not retake it in order to improve their grades.

Grades

ECTS, EC

Other information

Planning and implementation of a course must take its starting point in the wording of the syllabus. The course evaluation included in each course must therefore take up the question how well the course agrees with the syllabus.

The course is carried out in such a way that both men's and women's experience and knowledge is made visible and developed.

Department

Institutionen för datavetenskap