

STAN52, Statistics: Advanced Machine Learning, 7.5 credits

Statistik: Avancerad maskininlärning, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by The Board of the Department of Statistics on 2020-12-10 (U 2020/1079) and was last revised on 2025-03-04 (U 2025/198). The revised syllabus comes into effect 2025-03-10 and is valid from the autumn semester 2025.

General information

Second cycle level course in Statistics. The course may be included in a Master's degree in Statistics. The course can also be taken as a single subject course or within other Master's programmes at Lund University.

Language of instruction: English

(Teaching may be in Swedish if all registered students have a good knowledge of Swedish.)

Main field of study

Specialisation

Statistics

A1F, Second cycle, has second-cycle course/s as entry requirements

Learning outcomes

Knowledge and understanding

Students shall have an understanding of:

- bootstrap methods,
- classification and regression trees,
- ensemble methods,
- unsupervised learning methods,
- applications of machine learning to problems that are relevant in business and economics.

Competence and skills

Students shall have the ability to independently:

- apply the methods covered,
- appropriately choose between a set of methods for a given empirical problem,
- evaluate the suitability of the chosen method,
- generalise their knowledge to empirical problems that have not been treated during the course, draw conclusions from empirical results and provide advice.

Judgement and approach

Students shall have developed the ability to pursue further studies in the subject and should be able to search for and evaluate subject related information with a high degree of independence. Students shall also have developed the ability to write an empirical report where machine learning is an essential element.

Course content

This course covers advanced machine learning methods that are relevant for applications in business and economics, and is intended as a continuation of Machine Learning from a Regression Perspective. Some of the topics covered include bootstrapping, ensemble methods such as boosting and random forests, unsupervised machine learning methods such as principal components analysis and clustering algorithms as well as applications of machine learning methods to problems that are relevant for business and economics. Theoretical studies are interwoven with empirical applications to problems in business and economics.

Course design

Teaching: Teaching consists of lectures and exercises.

Assessment

1. Examination: The examination consists of home assignments presented in writing and orally, and a written examination.
2. Limitations on the number of examination opportunities: –

The University views plagiarism and other academic dishonesty very seriously, and will take disciplinary action against students for any kind of attempted malpractice in connection with examinations and assessments. Plagiarism is considered to be a very serious academic offence. The penalty that may be imposed for this, and other unfair practices in examinations or assessments, includes suspension from the University for a specified period.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Grades

Grading scale includes the grades: U=Fail, E=Sufficient, D=Satisfactory, C=Good, B=Very Good, A=Excellent

A (Excellent) 85-100 points/percent. A distinguished result that is excellent with regard to theoretical depth, practical relevance, analytical ability and independent thought.

B (Very good) 75-84 points/percent. A very good result with regard to theoretical depth, practical relevance, analytical ability and independent thought.

C (Good) 65-74 points/percent. The result is of a good standard with regard to theoretical depth, practical relevance, analytical ability and independent thought and lives up to expectations.

D (Satisfactory) 55-64 points/percent. The result is of a satisfactory standard with regard to theoretical depth, practical relevance, analytical ability and independent thought.

E (Sufficient) 50-54 points/percent. The result satisfies the minimum requirements with regard to theoretical depth, practical relevance, analytical ability and independent thought, but not more.

F (Fail) 0-49 points/percent. The result does not meet the minimum requirements with regard to theoretical depth, practical relevance, analytical ability and independent thought.

To pass the course, the students must have been awarded the grade of E or higher.

The grade on the course is determined by weighting the results of the assignments (60%) and the exam (40%).

Entry requirements

90 credits in Statistics with at least 7.5 credits in Regression Analysis or Econometrics and also STAN51 Statistics: Machine Learning from a Regression Perspective, or the equivalent.

Further information

This course replaces together with STAN51 the course STAN45. The course can not be combined with STAN45 in a degree.