

## Master Thesis in Statistics

Masteruppsats i statistik  
30 credits

Single subject and programme course

732A64

Valid from: 2017 Autumn semester

<b>Determined by</b>	<b>Main field of study</b>	
The Quality Board at the Faculty of Arts and Sciences	Statistics	
<b>Date determined</b>	<b>Course level</b>	<b>Progressive specialisation</b>
2017-01-15	Second cycle	A1X
<b>Revised by</b>	<b>Disciplinary domain</b>	
	Technology	
<b>Revision date</b>	<b>Subject group</b>	
	Statistics	
<b>Offered first time</b>	<b>Offered for the last time</b>	
<b>Department</b>	<b>Replaced by</b>	
Institutionen för datavetenskap		

## Course offered for

- Master's Programme in Statistics and Machine Learning

## Entry requirements

Students entering the course shall have passed 65 ECTS of the programme courses including all obligatory courses in the programme.

## Intended learning outcomes

After completion of the course, the student should be able to:

- obtain and use relevant knowledge to solve the problem formulated in the thesis
- put the master thesis work in a relevant scientific context
- independently and creatively identify, formulate and solve statistical problems using relevant methods for analysis and evaluation
- study mathematical models underlying the selected analysis methods and adapt these models to the given problem if necessary
- efficiently implement statistical machine learning methods in a programming language, and apply the implemented technological solution to the problem identified in the thesis
- plan and to use adequate methods to carry through the master thesis work within the given time frame
- critically and systematically use knowledge obtained in programme courses and during the thesis work
- identify relevant sources of information, conduct information searches, critically assess the obtained information, and to use correct referencing to prior work
- clearly communicate the master thesis work, its problems and solutions, and relevant surrounding information, both orally and in written form
- critically assess and evaluate own work and the work of others with respect to relevant scientific, societal and ethical dimensions

## Course content

The society is overwhelmed by the large volumes of information generated by large and complex technological systems. Analytical methods from machine learning, data mining, statistics and related fields are known instruments that are able to process these information volumes and improve analysis, quality of predictions, efficiency and autonomy of the large and complex technological systems.

In this course, the students are assumed to apply these analytical tools in order to solve a given industrial problem or a task provided by a research group at LiU.

This includes:

- Studies of the given problem and posing it as research questions,
- Review of the relevant research papers,
- Selection of suitable models from machine learning, data mining, statistics and related fields,
- Studies of the underlying mathematical models, their adaptation/modification to the given research context,
- Implementation of the models in a computer language, code verification and simulations,
- Analysis of the simulation results, model and code adjustments,
- Interpretation of the obtained output, comparison of the selected models and their output with the results published by the research society,
- Compilation of a thesis report based on the studies performed by the student,
- Oral presentation of the thesis work.

## Teaching and working methods

The course is based on individual work with regular access to supervision. Regular contacts with external organizations or research teams provide additional feedback. Language of instruction: English.

## Examination

Oral and written presentations of the thesis. Oral presentations are made during the course. The first oral presentation shall be focused on problem formulations, work plan and scientific approaches. The intermediate presentations show the study progress. The final oral presentation comprises a public defense of the thesis and opposition on another master's thesis.

If special circumstances prevail, and if it is possible with consideration of the nature of the compulsory component, the examiner may decide to replace the compulsory component with another equivalent component.

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 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.

An examiner may also decide that an adapted examination or alternative form of examination if the examiner assessed that special circumstances prevail, and the examiner assesses that it is possible while maintaining the objectives of the course.

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.

If special circumstances prevail, the vice-chancellor may in a special decision specify the preconditions for temporary deviations from this course syllabus, and delegate the right to take such decisions.