



LUND
UNIVERSITY

Faculty of Science

MASM22, Mathematical Statistics: Linear and Logistic Regression, 7.5 credits

Matematisk statistik: Linjär och logistisk regression, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2010-12-07 to be valid from 2010-07-01, spring semester 2011.

General Information

The course is an elective course for second-cycle studies for a Master of Science in Mathematical statistics.

Language of instruction: Swedish and English

Main field of studies

Mathematical Statistics

Mathematics

Depth of study relative to the degree requirements

A1N, Second cycle, has only first-cycle course/s as entry requirements

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Learning outcomes

The aim of the course is that students on completion of the course should have acquired the following knowledge and skills:

Knowledge and understanding

On completion of the course, the students are expected to:

- Describe the differences between continuous and discrete data, and the resulting consequences for the choice of statistical model
- Give an account of the principles behind different estimation principles,

- Describe the statistical properties of such estimates as appear in regression analysis,
- Interpret regression relations in terms of conditional distributions,
- Explain the concepts odds and odds ratio, and describe their relation to probabilities and to logistic regression.

Competence and skills

On completion of the course, the students are expected to:

- formulate a multiple linear regression model for a concrete problem,
- formulate a multiple logistic regression model for a concrete problem,
- estimate the parameters in the regression model and interpret them,
- examine the validity of the model and make suitable modifications of the model,
- use the model resulting for prediction,
- use some statistical computer program for analysis of regression data, and interpret the results,
- present the analysis and conclusions of a practical problem in a written report and an oral presentation.

Judgement and approach

On completion of the course, the students are expected to:

- Always check the prerequisites before stating a regression model,
- Evaluate the plausibility of a performed study,
- Reflect over the limitations of the chosen model and estimation method, as well as alternative solutions.

Course content

Least squares and maximum-likelihood-method; odds ratios; Multiple and linear regression; Matrix formulation; Methods for model validation, residuals, outliers, influential observations, multi co-linearity, change of variables; Choice of regressors, F-test, likelihood-ratio-test; Confidence intervals and prediction. Introduction to: Correlated errors, Poisson regression as well as multinomial and ordinal logistic regression.

Course design

Teaching consists of lectures, exercises, computer exercises and projects. Participation in computer exercises, projects and thereby integrated teaching is compulsory.

Assessment

The examination is done by written and oral presentation of the the project as well as a short written opposition on another student project present and an oral exam.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

For passing grade on the entire course passing grade on the project presentation (written and oral), and participation in compulsory parts are required. The final grade is grade on the project.

Entry requirements

For admission to the course knowledge equivalent to the courses of at least 60 credits. Among these courses one of the courses MASA01, Mathematical Statistics: Basic Course, 15 credits, MASB02 Mathematical statistics for chemists, 7.5 credits, MASB03 Mathematical statistics for physicists, 9 credits or MASB11 Biostatistics – basic course, 7.5 credits, should be included. English B or equivalent.

Subcourses in MASM22, Mathematical Statistics: Linear and Logistic Regression

Applies from V17

- 1001 Examination, 3,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1002 Project 1, 1,5 hp
Grading scale: Fail, Pass
- 1003 Examination, 3,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1004 Project 1, 1,5 hp
Grading scale: Fail, Pass
- 1005 Project 2, 1,5 hp
Grading scale: Fail, Pass
- 1006 Project 3, 1,0 hp
Grading scale: Fail, Pass
- 1007 Laborations, 0,5 hp
Grading scale: Fail, Pass

Applies from V11

- 1001 Examination, 5,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 1002 Project, 2,0 hp
Grading scale: Fail, Pass