



Cursusomvang (nominale waarden; effectieve waarden kunnen verschillen per opleiding)

Studiepunten 8.0 Studietijd 240 u Contacturen 97.5 u

Aanbodsessies en werkvormen in academiejaar 2017-2018

A (semester 1)	zelfstandig werk	20.0 u
	microteaching	5.0 u
	hoorcollege	40.0 u
	groepswerk	5.0 u
	werkcollege: PC-klasoefeningen	15.0 u
	werkcollege: geleide oefeningen	5.0 u
	project	7.5 u

Lesgevers in academiejaar 2017-2018

De Neve, Jan	PP01	Verantwoordelijk lesgever
Goetghebeur, Els	WE02	Medelesgever
Loeys, Tom	PP01	Medelesgever

Aangeboden in onderstaande opleidingen in 2017-2018

Master of Science in Statistical Data Analysis	stptn	aanbodsessie
	8	A

Onderwijstalen

Engels

Trefwoorden

Situering

The course assumes students come with basic statistical understanding and skills, that is, they master the material offered in the course 'Principles of statistical data analysis'. It focuses on regression models to describe, explain and predict continuous or categorical outcomes from a set of measured covariates. Several other courses in the program build in turn on this course, most directly all other courses involving more advanced regression modeling, such as 'Causality and missing data analysis', 'Experimental Design', 'Analysis of clustered and longitudinal data', 'Survival Analysis'. This course aims to provide the student with a basic insight in and skills for statistical modeling. This will primarily be developed in the context of generalized linear models, starting from linear regression and with ample attention given to the analysis of tabulated data and logistic regression.

Inhoud

- The simple and generalized linear regression model for the analysis of continuous and categorical data
- The (iteratively reweighted) least squares algorithm
- The maximum likelihood principle for statistical models
- Confidence intervals for conditional means, prediction intervals for new observations
- Graphical and formal diagnostic methods for the inspection of residuals
- Goodness-of-fit tests, checking the model assumptions, detection of influential observations
- The impact of transforming variables
- Box-Cox regression for non-linear associations
- The link between linear regression and analysis of variance

- The multiple regression model with joint predictors that can be binary, categorical and/or continuous
- Confounding and effect modification
- Procedures for stepwise building of a regression model
- Penalized regression methods
- Distribution and inference for categorical data
- Analysis of contingency tables with approximate and exact methods
- Logistic regression
- Ordinal logistic regression, Proportional odds models
- Multinomial logistic regression
- Poisson regression
- Generalized additive models

Begincompetenties

Basic knowledge of probability and statistics, such as that covered in 'Principles of Statistical Data Analysis'; and basic working knowledge of matrix algebra.

Eindcompetenties

- 1 The student can recognize practical problems which can be solved by means of the (multivariate) (generalized) linear model.
- 2 The student knows the distinction between association, prediction and causation, and understands the basic role of confounding in this context.
- 3 The student can interpret the generalized linear regression model correctly, can fit it to a data set and draw justified conclusions in the theoretical as well as the practical sense.
- 4 The student can apply diagnostic techniques to check the fit of a (multivariate) (generalized) linear model.
- 5 The student can adopt appropriate remedial measures when the current regression model does not fit.
- 6 The student knows the basic properties of the estimators and can work with the distinction between estimation and prediction.
- 7 The student can link regression analysis with analysis of variance.
- 8 The student recognizes the limitations of the (generalized) linear model, can suggest appropriate extensions and develop some methods via the maximum likelihood approach.
- 9 The student can collaborate with colleagues.
- 10 The student has theoretical knowledge about the most frequently used methods of categorical data analysis.
- 11 The student can correctly interpret and critically assess the results of a categorical data analysis.
- 12 The student can select appropriate statistical methods for categorical data analysis.
- 13 The student can adequately report results of the statistical analysis of continuous and categorical data: both orally and in writing.

Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Groepswork, hoorcollege, microteaching, project, zelfstandig werk, werkcollege: geleide oefeningen, werkcollege: PC-klasoefeningen

Leermateriaal

A syllabus is available. Cost: 20 EUR

Referenties

- M. Kutner, C. Nachtsheim, J. Neter, W. Li. 'Applied Linear Regression Models', 5th edition. McGraw-Hill Education, 2004.
- Agresti A. (2002). Categorical Data Analysis. New York: Wiley.
- McCullagh P. & Nelder J.A (1989). Generalized Linear Models. CRC press

Vakinhoudelijke studiebegeleiding

Students are coached by assistants during PC-labs and regular exercise classes which prepare students for problem solving, the final analysis project and the open book exam. Through the electronic learning environment they can exchange questions and answers outside lecture hours among themselves and with lecturers. A series of take home projects will provide the students with practical experience in data analysis. The students will receive coaching and feed back on these projects through organized

sessions and feedback on an individual oral presentation.

Evaluatiemomenten

periodegebonden en niet-periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Schriftelijk examen met open vragen, openboekexamen

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Schriftelijk examen met open vragen, openboekexamen

Evaluatievormen bij niet-periodegebonden evaluatie

Werkstuk

Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is enkel mogelijk in gewijzigde vorm

Toelichtingen bij de evaluatievormen

The end-of-term exam aims to assess if the student understands the basic theory of Statistical regression modelling of continuous and categorical outcome data. The exam consists of a critical understanding of theory and data analysis reports, with exercises that are also concerned with the design and analysis plan for a statistical study and the interpretation of given software output.

The continuous assessment takes the form of two take home problem sets for independent work and a data analytic project. Reports on these take home projects are graded.

Eindscoreberekening

Periodic evaluation (50%) + non-periodic evaluation (50%). Students must pass both parts to pass the course.