UCL Institut de statistique

STAT

STAT2412	Linear models

[22.5h+7.5h exercises] 5 credits

This course is taught in the 2nd semester

Teacher(s): Ingrid Van Keilegom
Language: french
Level: 2nd cycle course

Aims

By the end of this course the student will be familiar with the main linear models that are often encountered in statistics, and, by making use of computer packages, the student will be able to solve real data problems. The course stresses more the methodology, the interpretation, and the mechanisms behind linear models, and less the theoretical and mathematical aspects.

Main themes

- Introduction to the general linear model
- Multiple univariate regression (selection of variables, model validation, multicollinearity, outlier detection, inference concerning regression coefficients, error variance,...)
- Univariate analysis of variance (one or more factors, balanced or non-balanced design, fixed, mixed or random effects model, inference concerning main effects, interactions, error variance,...)
- Multivariate regression and multivariate analysis of variance

Content and teaching methods

The course considers different aspects of general linear models (regression models and analysis of variance) :
- selection of covariates
- multicollinearity
- Ridge regression
- model validation
- inference concerning the parameters in the model (confidence intervals/hypothesis tests for regression coefficients, error variance,... prediction intervals,...)
- balanced or non-balanced designs
- fixed, mixed and random effects models
- multivariate linear models
Teaching methods
The course consists of lectures, exercise sessions on computer, and an individual project on computer.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisites
- The student should have followed basis courses in probability, statistics and matrix algebra.
- Basic knowledge of SAS is required.
Evaluation
The evaluation consists of :
- an oral exam, which consists mainly of questions related to methodology, comprehension and interpretation of the course
- a project on computer, which consists of the analysis of real data
Teaching materials
The course notes will be distributed during the first lecture.
Others
Professor : Ingrid Van Keilegom, phone : 010/47 43 30, e-mail : vankeilegom@stat.ucl.ac.be
References
Arnold, S.F. (1981). The theory of linear models and multivariate analysis, Wiley, New York.
Neter, J., Kutner, M.H., Nachtsheim, C.J. and Wasserman, W. (1996). Applied linear statistical models. McGraw-Hill, Boston.
For more information:
http://www.stat.ucl.ac.be/cours/stat2410/index.html http://www.stat.ucl.ac.be/cours/stat2412/index.html

Other credits in programs

IAG21M	Première année de Maîtrise en sciences de gestion (orientation "méthodes quantitatives de gestion")	(5 credits)	Mandatory
MATH21/S	Première licence en sciences mathématiques (Statistique)	(3.5 credits)	Mandatory
MATH22/G	Deuxième licence en sciences mathématiques	(3.5 credits)	
MD3DA/MO	Diplôme d'études approfondies en sciences de la santé (sciences de la motricité)	(5 credits)	Mandatory
STAT2MS	Master en statistique, orientation générale, à finalité spécialisée	(5 credits)	
STAT3DA	Diplôme d'études approfondies en statistique		
STAT3DA/B	diplôme d'études approfondies en statistique (biostatistique et épidémiologie)	(5 credits)	Mandatory
STAT3DA/M	Diplôme d'études approfondies en statistique (méthodologie de la statistique)		
STAT3DA/P	diplôme d'études approfondies en statistique (pratique de la statistique)		