

## ROBUST REGRESSION METHODS IN BIOSTATISTICS

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This course is based on the book Heritier, Cantoni, Copt and Victoria-Feser (2009) *Robust Methods in Biostatistics*, Wiley.

### Description

Linear regression, logistic models (and more generally the entire class of generalized linear models, GLM), survival analysis and repeated measurement models are nowadays part of the toolbox of any biostatistician or alike (see for example Vittinghoff, Glidden, Shiboski and McCulloch (2005) *Regression Methods in Biostatistics*, Springer). To analyse real data through these models, standard packages propose so-called classical estimation and inferential methods, such as MLE, REML, PLE, t-test, F-test, LRT, etc, which are optimal if the data exactly match the postulated model. When this hypothesis is questionable, robust statistical methods offer an alternative to classical methods that take into account that the postulated models can only be considered as an approximation to reality. Robust statistics are nowadays part of many curricula in statistics and they are also widely available for linear models. They are less known in more complex models such as the ones used by biostatisticians.

This course will provide an introduction to general robust regression methods according to the following program: Introduction to robust statistics, robust linear regression modelling, robust generalized linear modelling, robust longitudinal data analysis via generalized estimating equations (GEE). For each model, robust estimation and inference will be presented. The theory will be illustrated via the R *robust* and *robustbase* packages on a selection of biology, medical and health sciences applications. If time permits, robust methods for mixed linear models and survival analysis models will be briefly introduced.

### Training

The course will consist of a mixing of presentation by the instructor and of applied work (lab form) on a personal laptop.

### About the speakers

Eva Cantoni is Lecturer in Statistics at the University of Geneva. She has been exposed to robust statistics since her PhD and trained at the source of this field. She has proposed robust techniques for different type of models and has interacted with researchers and students from different fields, as her publication list confirms. Her research interests are currently directed towards biostatistics. She has been teaching at different levels for several years.

Maria-Pia Victoria-Feser is Professor of Statistics at the University of Geneva. She has developed robust methods (estimation and inference) for important problems in economics, psychology and social sciences, which have led to several publications in leading statistical journals. Her teaching experience varies from undergraduate courses for non specialists (psychology, business, social sciences) to master's courses for students in statistics. She has also supervised several PhD students in statistics with background education in economics, econometrics, physics, social sciences and psychology.

**Prerequisites**

The prerequisites are some basic background in statistics (undergraduate level) and some familiarity with the classical versions of the presented models. Some experience with R is useful for this course. A laptop with preinstalled R software in its latest release (see CRAN.R-project.org) and the *robust* and *robustbase* packages.

**Presentation**

The lecture and the documents will be in English. All participants will receive a printed version of the documentation for personal use only.

**Date and hour**

Friday, November 27, 2009. Course starts at 09.45 and ends at 17.15, including a lunch break from 12.45 to 14.15 and one coffee break per half-day.

**Venue**

Swiss Academy of Sciences, Schwarztorstrasse 9, Bern, Switzerland.  
Detailed room to be announced in due course.

**Course fee**

Course fee: CHF 350 for members of the Swiss Statistical Society.  
For non-members, CHF 150 will be added. A limited number of course places are reserved for students and assistants for CHF 200.  
Prices include printed documentation for personal use only, coffee breaks and lunch.  
The number of participants is limited to 20 with a minimum of 10 people.

**Registration deadline**

October 13, 2009. For registrations after this date, CHF 150 will be added.

**Registration and contact information**

For registration and further information please contact  
Sabine Probst, Swiss Statistical Society, Bergacher 8, CH-3253 Schnottwil  
sabine.probst@stat.ch.

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