

## Modern statistics in natural sciences (5hp)

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**Course aim:** To give an introduction to the most commonly applied statistical techniques and tools used to analyse experimental data in natural sciences. In addition to providing you with an overview of the statistical "tool- box", the course aims at giving an understanding of the philosophy and reasoning behind statistical design and inference as well as some practical experience of running various different statistical models.

**Target group:** PhD students in all natural sciences, as well as Master students in biology. The course assumes that participants have a basic understanding probability theory, statistical distributions, estimation of means and standard errors, confidence intervals and simple hypothesis testing.

**Course content:** Experimental designs leading to ANOVA or ANCOVA, including block experiments, repeated measurement designs, nested and factorial designs. Multiple regression, including techniques for selecting variables and evaluating models. Generalized linear models (GLIM), including logistic and Poisson regressions. Introduction to power analysis, analyses of frequencies, multivariate analysis, Bayesian analysis, MCMC estimation and resampling and permutation techniques. Throughout the course, participants conduct a series of practical exercises. Some support for students using the software platform R is provided.

**Course organisation:** The course runs as a part time course (Tuesdays and Thursdays 1PM-3PM) every year, approximately from late January to mid-March. Practicals are an integral part of the course but the course is not built on any particular piece of statistical software (students are free to use their software of choice).

**Course literature:** Quinn, G, & Keough, M. 2002. Experimental Design and Data Analysis for Biologists, Cambridge University Press (available as a PDF).