



STATS 761 Mixed Models (15 points)

Taught: Semester 2, City Campus

Prerequisites: STATS 340.

Corequisites:

Assessment: Final exam 60%, mid-term test 20%, assignments 20%.

Textbooks: No prescribed text, the following books are useful

Nick Galwey, *Introduction to mixed modelling : beyond regression and analysis of variance*, Chichester, England ; Hoboken, NJ : Wiley c2006. Available as an e-book from the library.

S. J. Welham *Statistical methods in biology: design and analysis of experiments and regression* Boca Raton : CRC Press, Taylor & Francis Group. 2015

Charles E. McCulloch S. R Searle (Shayle R.), *Generalized, linear, and mixed models*, Wiley 2006

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Mixed models are an essential part of a statistician's toolbox and are invaluable for anyone wanting to conduct research across a broad range of disciplines, e.g. biosciences, medicine, engineering, agriculture, etc. In a mixed model we not only analyse the expected values of our data (as in previous courses) but also the variances of and covariances between our observations.

STATS 761 will involve a combination of theory and practice and is designed to address questions such as "What are the effects of ocean acidification (global warming's evil twin) on gene expression in sea urchins?" and "Are there molecular biomarkers of acute diseases such as sepsis or pancreatitis in lymph?" The common feature across all of the datasets in this course is the contribution of multiple sources of random variation contributing to the values of the observed data.

Topics studied include:

Statistical modelling of experimental structure; Fixed and random effects;

Maximum likelihood and residual maximum likelihood;

Estimation versus prediction; Variance models;

Analysis of repeated measurements: ANOVA-type approaches versus random coefficient regression;

Methods for the analysis of spatial data

Disclaimer:

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