

LTCC Proposed Course

- Title: REML estimation and linear mixed models
- Basic Details:
 - Core Audience: statistics
 - Course Format: advanced (10 h)
- Course Description:
 - Keywords: linear mixed models, REML estimation, longitudinal data, spatial data, geo-statistics, penalized splines
 - Syllabus: This course will introduce the method of residual (aka restricted) maximum likelihood (REML) for estimation of variance parameters in the linear mixed model, with an emphasis on use of the method to analyse real data. The following elements will be covered:
 - review of linear mixed models and REML estimation, relationship to ANOVA and linear regression models, determination of fixed and random terms, modelling strategies, prediction
 - simple variance components models, interpretation and use of variance models in design
 - models for longitudinal data: modelling covariances directly, random coefficient regression models, model selection and diagnostics
 - models for spatial data on a regular grid or irregular samples, links to geo-statistics and kriging
 - penalized splines for efficient modelling of non-linear trend, development within mixed model framework, interpretation, comparison of different penalized spline models
 - Recommended reading: Searle SR, Casella G & McCulloch CE. *Variance Components*, Wiley.
 - Additional Optional reading: Verbeke G & Molenberghs G. *Linear Mixed Models for Longitudinal Data*, Springer. Ruppert D, Wand MP & Carroll RJ. *Semiparametric regression*, Cambridge.
 - Prerequisites: basic knowledge of the linear model, linear regression and ANOVA.
- Format:
 - No of discussion/problem sheets : 4 (with solutions)
 - Electronic lecture notes: copies of lecture slides will be provided
 - Necessary support facilities: PC projector, computer room for practical sessions
 - necessary software requirements for computing facilities: GenStat
 - Proposed timing: to be decided
 - Lecture/computer session/tutorial/discussion h split: approximately 6/4/0/0
- Lecturer Details:
 - Lecturer: Robin Thompson, Sue Welham
 - Lecturer home institution: QMUL, Rothamsted Research
 - Lecturer e-mail: robin.thompson@bbsrc.ac.uk; sue.welham@bbsrc.ac.uk
 - Lecturer telephone number: