

## THIRTY-THIRD GREGYNOG STATISTICAL CONFERENCE PROGRAMME

*All talks will take place in Seminar Room 1 (Floor 2, far end)*

**Friday**

**11 April**

- 16.00 *Tea*  
 17.00 Professor Murray Aitkin (University of Newcastle)  
*Random effect extensions of generalized linear models, I*  
 19.00 *Dinner*  
 20.00 Professor Steve Buckland (University of St Andrews)  
*Wildlife population assessment: some research issues*

**Saturday**

**12 April**

- 08.30 *Breakfast*  
 09.30 Mr John Hinde (University of Exeter)  
*Modelling with overdispersion*  
 11.00 *Coffee*  
 11.30 Professor Murray Aitkin (University of Newcastle)  
*Random effect extensions of generalized linear models, II*  
  
 13.00 *Lunch*  
  
*Afternoon free (walks, etc.)*  
  
 16.00 *Tea*  
 17.00 Dr Neil Shephard (University of Oxford)  
*Some developments in the analysis of non-Gaussian time series using  
 MCMC methods*

**Sunday**

**13 April**

- 08.30 *Breakfast*  
 09.30 Dr Michael Cain (University of Salford)  
*Property valuation under asymmetric loss*  
 11.00 *Coffee*  
 11.30 Professor Angela Dean (Ohio, visiting University of Southampton)  
*Factorial cross-over designs involving few subjects*  
 13.00 *Lunch*  
 14.00 Professor Murray Aitkin (University of Newcastle)  
*Random effect extensions of generalized linear models, III*  
 15.30 ~~Finish~~ *Tea & Finish*

**Professor Murray Aitkin (University of Newcastle)**  
*Random effect extensions of generalized linear models*

**I: A general maximum likelihood analysis of kernel density estimation**

This talk gives a reformulation of kernel density estimation by expressing it as a deconvolution problem of a general kernel mixture. The nonparametric maximum likelihood (NPML) analysis of the mixture yields a finite mixture of kernel densities. Several examples are given.

**II: A general maximum likelihood analysis of variance components in generalized linear models**

This talk describes an EM algorithm for maximum likelihood estimation in generalized linear models with variance component structure. The algorithm, first given by Hinde and Wood (1987), is a generalization of that for random effect models for overdispersion in generalized linear models, described in Aitkin (1996). The algorithm is initially derived as a form of Gaussian quadrature assuming a normal mixing distribution, but with only slight variation it can be used for a completely unknown mixing distribution, giving a straightforward method for the fully nonparametric ML estimation of this distribution. This is of value because the ML estimates of the GLM parameters may be sensitive to the specification of a parametric form for the mixing distribution.

The nonparametric analysis can be extended straightforwardly to general random parameter models, with full NPML estimation of the joint distribution of the random parameters. This can produce substantial computational saving compared with full numerical integration over a specified parametric distribution for the random parameters.

**III: A general maximum likelihood analysis of measurement error in normal linear models**

This talk describes an EM algorithm for maximum likelihood estimation in normal linear models with continuous measurement error in the explanatory variables. The algorithm is an adaptation of that for nonparametric maximum likelihood (NPML) estimation in overdispersed GLMs described in Aitkin (1996). The measurement error distribution can be of any specified form, though the implementation described assumes normal measurement error. Neither the reliability nor the distribution of the true score of the variables with measurement error has to be known, nor are instrumental variables required.

Several examples are given.

Reference:

Aitkin, M (1996) A general maximum likelihood analysis of overdispersion in generalized linear models. *Statistics and Computing* 6, 251-262.

**Professor Stephen Buckland (St Andrews)**  
*Wildlife population assessment: some research issues*

Wildlife management is becoming increasingly sophisticated as public awareness of conservation and natural resource utilisation improves. A key component of wildlife management is population assessment. We review the main methods of assessment, and describe some current research issues. The talk will touch upon several topics, including automated survey design, adaptive sampling, simulated inference, Horvitz-Thompson estimators, generalized additive models, spatial models and spatio-temporal models.

**Mr John Hinde (Exeter)**  
*Modelling with overdispersion*

The allowance for overdispersion in binomial and Poisson regression models has received considerable attention over the last 20 years. This talk will review some of the models and the general approaches to estimation including maximum likelihood, moment methods, extended quasi-likelihood, pseudo-likelihood and non-parametric maximum likelihood. These will be illustrated by a number of examples and aspects of modelling strategy and diagnostics will be discussed.

Extensions to multinomial data, with particular application to toxicological time to response data, will be considered.

GREGYNOG STATISTICS CONFERENCE 1997  
PARTICIPANTS

SPEAKERS

Professor Murray Aitkin (University of Newcastle)  
Professor Steve Buckland (University of St Andrews)  
Professor Angela Dean (Ohio, visiting University of Southampton)  
Mr John Hinde (University of Exeter)  
Dr Neil Shephard (University of Oxford)  
Dr Michael Cain (University of Salford)

STAFF

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Dr Roger Owen  
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Mr R L Holder

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Dr A B J Nix

Jenny Griffiths  
Karen Williams

Swansea

Professor Alan Hawkes  
Professor T Stroud  
~~Dr A Sykes~~

~~Mrs M C Sykes~~  
Dr Mark Kelbert  
Dr Alan Watkins

Helen Beer  
Paul Heatley  
Mary Oldham

~~University of Wales College of Medicine~~

~~Caryl Stokes~~  
~~Rebecca Playle~~

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Richard Goodman  
Dave Briggs  
~~Karla Hemmings~~

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Axel Krebs  
Roberto Puch-Solis