Online live course

Bayesian Time Series Analysis

- GAMs, random walks, and hierarchical time series in inlabru -

Provided by: Highland Statistics Ltd

Instructors: Dr. Alain F. Zuur and Dr. Elena Ieno

This is an online live course (14.00 - 20.00 UK)

Course Overview

This course provides an applied introduction to Bayesian time series analysis using generalised additive models (GAMs) and latent temporal structures implemented in inlabru.

The course focuses on modelling temporal dependence through smooth functions and random walk processes, with particular emphasis on RW2 models. We begin by revisiting regression and mixed-effects models and then introduce GAM-based approaches for analysing univariate time series. From there, the course progresses to hierarchical and multivariate time series models, allowing for shared and group-specific temporal trends across multiple animals, tagged individuals, sites, species, or monitoring devices.

A wide range of data types is covered, including continuous data, count data, presence–absence data, proportional data, and zero- and one-inflated (ordered) Beta data, using appropriate likelihoods such as Gaussian, Poisson, negative binomial, Bernoulli, Gamma, Tweedie, and Beta. Participants will learn how to incorporate covariates, seasonal and cyclic effects, long-term trends, random effects, and common latent temporal drivers.

Online live statistics course

Dates and times:
- 7 - 11 September 2026
- 14.00 - 20.00 (UK time)

Price: £700

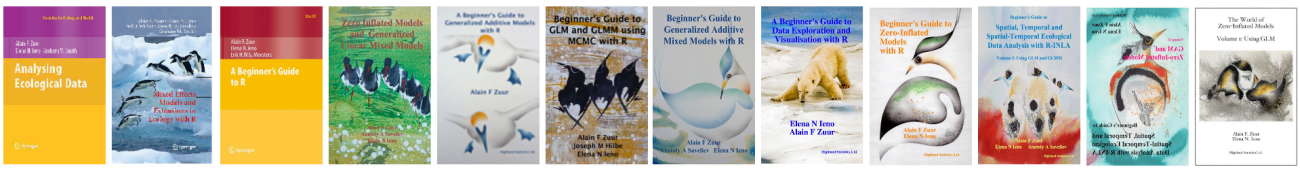
Included: 1 hour face-to-face video chat about your data.

Instructors:
Dr. Elena Ieno.
Dr. Alain Zuur.

Authors of 12 books and providers of over 250 courses.

Throughout the course, emphasis is placed on practical implementation in R, model interpretation, and model validation, including the use of posterior simulation and diagnostic tools such as DHARMa. All concepts are illustrated using real ecological and environmental case studies, including data from tagged animals, camera traps, and long-term monitoring programmes.

This is an applied but advanced course, focusing on hands-on modelling rather than mathematical derivations.



COURSE CONTENT

Module 1
- General introduction
- Revision exercise: linear regression.
- Revision exercise: linear mixed-effects models.
- Theory presentation on Bayesian statistics and INLA.
- Exercise showing how to fit a linear regression model in inlabru.
- Exercise showing how to fit a linear mixed-effects model in inlabru.

Module 2
- Theory presentation on time series analysis, generalised additive models, and how to fit these models in inlabru.
- Exercise showing how to fit a simple GAM in inlabru.
- Exercise showing how to fit a GAM with multiple covariates in inlabru.
- Exercise showing how to fit a univariate time series in inlabru.
- Exercise showing how to fit a univariate time series with multiple covariates in inlabru.

Module 3
- Exercise showing how to analyse time series of count data.
- Exercise showing how to analyse time series of absence/presence data.
- Theory presentation on hierarchical time series analysis (first encounter with multiple time series).
- Two exercises showing how to analyse multivariate time series.

Module 4
- Theory presentation on using multiple likelihoods in inlabru.
- Three exercises showing how to analyse multivariate time series.

Module 5
- A series of case studies in which we analyse multivariate time series (e.g. data from tagged animals, or data from multiple cameras, sites, or species).
- Keywords in these case studies: count data; proportional data (e.g. time budgeting); presence–absence; seasonality; long-term trends; covariate effects; common latent drivers; random effects; irregularly spaced time series; model validation; posterior simulation; DHARMa; cyclic patterns; prior specification.

We reserve the right to change the exercises. PDF files of all theory material will be provided. All exercises consist of data sets and annotated R scripts. Access to the course website is provided for 12 months. The course website also includes selected on-demand video materials that complement the live course content.

PRE-REQUIRED KNOWLEDGE:
Participants are expected to have a solid working knowledge of R, data exploration, linear regression, linear mixed-effects models, and generalised linear models (Poisson, negative binomial, and Bernoulli).

This is an applied but advanced course, with a strong emphasis on practical implementation and interpretation of models in R. It assumes prior training in regression modelling and mixed-effects models and is not suitable for beginners. Participants who are not already comfortable with these techniques are strongly advised to attend an introductory regression or mixed-effects/GLM course before enrolling.

GENERAL
- Please ensure that you have system administration rights to install R, and R packages on your computer.
- Instructions what to install is on the course website.

GENERAL INFORMATION

COURSE FEE: £700

- Credit card payments are processed in GBP.
- Australian participants: Not subject to VAT.
- UK participants: Subject to 20% VAT.
- EU participants (non-UK): Not subject to UK VAT but must provide their institutional VAT number.
- Non-EU participants: Not subject to VAT. Canadian participants are subject to GST/HST tax.

COURSE TIMES:

- Monday-Friday: 14.00 to 20.00pm (UK time) including a 1 hour lunch break and a 20 minutes break both morning and afternoon.

FREE 1-HOUR FACE-TO-FACE MEETING

The course fee includes a 1-hour face-to-face meeting with one or both instructors. You can discuss your own data, but we strongly advice that the statistical topics are within the content of the course. The 1-hour consultancy needs to be consumed in one sessions, and will take place at a mutual convenient time. It is not transferable. The meetings needs to take place within 12 months after the last live zoom module.

CANCELLATION POLICY:

What if you are not able to participate? Once participants are given access to course exercises with R solution codes, pdf files of certain book chapters, pdf files of presentations and video solution files, all course fees are non-refundable. However, we will offer you the option to attend a future course or you can authorise a colleague to attend this course. Terms and conditions see the footer at: https://www.highstat.com.

REGISTRATION

https://www.highstat.com/index.php/joine-an-onsite-course

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Payment via credit card or bank transfer