

## Online course with on-demand video and live Zoom meetings

# Introduction to Linear Mixed Effects Models and GLMM with R-INLA

Provided by: Highland Statistics Ltd

This online course consists of 5 modules representing a total of approximately 40 hours of work. Each module consists of video files with short theory presentations, followed by exercises using real data sets, and video files discussing the solutions. All video files are on-demand and can be watched online, as often as you want, at any time of the day, within a 6 month period.

A discussion board allows for daily interaction between instructors and participants. The course also contains 5 2-hour live web meetings in which we summarise the theory and the exercises. Attending these live web meetings is optional. We will run the web meetings multiple times per day and in different time zones.

You are invited to apply the statistical techniques discussed during the course on your own data and if you encounter any problems, you can ask questions on the Discussion Board. The course fee includes a 1-hour face-to-face video chat with the instructors.

### Course content

The course begins with a brief revision of multiple linear regression, followed by an introduction to Bayesian analysis and how to execute regression models in R-INLA. We then explain linear mixed effects models to analyse nested data, followed by a series of mixed modelling exercises in R-INLA. Nested data means multiple observations from the same animal, site, area, nest, patient, hospital, vessel, lake, hive, transect, etc.

In the second part of the course GLMMs are applied on count data, binary data (e.g. absence/presence of a disease), proportional data (e.g. % coverage) and continuous data (e.g. biomass or distance) using the Poisson, negative binomial, Bernoulli, binomial, beta and gamma distributions.

In the third part of the course we show how R-INLA can be used to execute GLMs with temporal dependency for the analysis of univariate and multivariate time series..

### Date & Venue

Date: 22 June - 10 July 2020  
6 months access

Multiple live meetings in different time zones.

Price: £550 + **1 hour free face-to-face video chat about your data**

Instructors: Dr. Alain Zuur  
Dr. Elena Ieno

Authors of 11 books and providers of over 150 courses



## COURSE CONTENT

### Module 1 consists of 7 on-demand videos

- General introduction.
- Revision exercise multiple linear regression in R.
- Introduction to matrix notation.
- Brief introduction to Bayesian analysis.
- Brief theory presentation on INLA.
- Exercise how to fit a regression model in R-INLA.
- Live 2 hour Zoom meeting.

### Module 2 consists of 4 on-demand videos

- Theory presentation on linear mixed effects models
- Two exercises showing how to apply (one-way and two-way nested) linear mixed effects models in R-INLA
- Exercise on random intercept and slope models
- Live 2 hour Zoom meeting.

### Module 3 consists of 7 on-demand video files

- Using multiple variances (Generalised Least Squares) in R-INLA
- One exercise using GLS
- Brief revision generalised linear models (GLM)
- Exercise showing how to execute a Poisson GLM and negative binomial GLM in R-INLA
- Three GLMM exercises in R-INLA
  - Poisson GLMM
  - Negative binomial GLMM
  - Poisson and negative binomial GLMMs with two-way nested and crossed random effects
- Live 2 hour Zoom meeting.

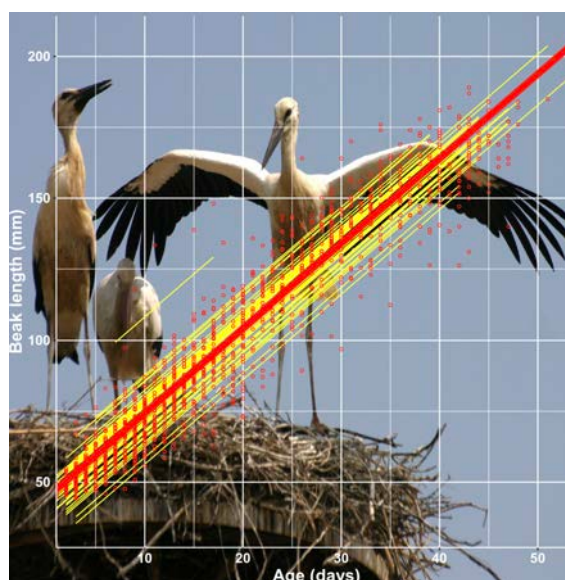
### Module 4 consists of 4 on-demand video files

- A series of exercises covering the applications of Bernoulli, binomial, gamma and beta GLMMs in R-INLA
- Live 2 hour Zoom meeting.

### Module 5 consists of 3 on-demand video files

- Theory presentation on temporal trends and residual auto-correlation
- Two exercises showing the analysis of (univariate and multivariate) time series using GLMs in R-INLA
- Live 2 hour Zoom meeting.

Some Live Zoom meeting may take slightly more than 2 hours.



**GENERAL INFORMATION**

**COURSE FEE: £550**

- Credit card payments are charged in GBP currency. UK participants are subject to 20% VAT.
- EU participants (but non-UK) are not subject to UK VAT, but need to provide their institutional VAT number. Non-EU participants (including Norway) are not subject to VAT.

**LIVE 2-HOUR ZOOM MEETINGS SUMMARISING THE MODULES**

	Module 1	Module 2	Module 3	Module 4	Module 5
09.00-11.00 BST	22 June	24 June	29 June	2 July	9 July
19.00-21.00 BST	22 June	24 June	29 June	2 July	9 July

BST = British Summer Time.

- 09.00 London (BST) = 10.00 Amsterdam.
- 19.00 London (BST) = 14.00 New York / Toronto = 15.00 Sao Paulo = 11.00 Los Angeles / Vancouver.
- Times may be adjusted to accommodate certain time zones.

[Click here for](#) recommended internet speed (see the text under 'Recommended bandwidth for Webinar Attendees'). We will record the meetings and make them available on the course website.

Course participants will be given access to the course website with all the videos, data sets, R solution code and course material on 15 June.

**FREE 1-HOUR FACE-TO-FACE MEETING**

The course fee includes a 1-hour face-to-face meeting with one or both instructors. The meeting needs to take place within 3 months after the last live zoom meeting. A mutual convenient date and time will be selected. You can discuss your own data, but we strongly recommend that the statistical topics are within the content of the course. The 1-hour needs to be consumed in one session.

**PRE-REQUIRED KNOWLEDGE:**

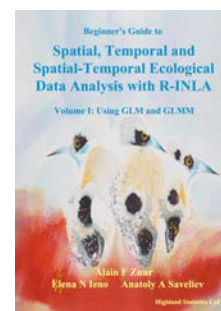
Working knowledge of R, data exploration, linear regression and GLM (Poisson, negative binomial, Bernoulli). This is a non-technical course.

**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 powerpoint files and video 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: <http://highstat.com/index.php/sign-up2>

### RECOMMEND LITERATURE:

- Zuur, Ieno, Saveliev (2017). *Beginner's Guide to Spatial, Temporal and Spatial-Temporal Ecological Data Analysis with R-INLA*.
- This book is available from [www.highstat.com](http://www.highstat.com).
- Books are not included in the course fee. The course can be followed without purchasing these books.



### GENERAL

- Please ensure that you have system administration rights to install R and R packages on your computer.
- Instructions what to install will be provided before the start of the course.

### REGISTRATION

[www.highstat.com](http://www.highstat.com)

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Payment via credit card or bank transfer

