

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

# Introduction to Linear Mixed Effects Models and GLMM with R

Provided by: Highland Statistics Ltd

This online course consists of 4 modules representing a total of approximately 32 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 4 2-hour live web meetings in which we summarise some of 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 starts with a short revision of multiple linear regression and generalised linear models, followed by an introduction to linear mixed-effects models and generalised linear mixed-effects models (GLMM) to analyse hierarchical or clustered data, e.g. 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 continuous (e.g. biomass), binary (e.g. absence/presence of a disease), proportional (e.g. % coverage) and count data using the Gaussian, Poisson, negative binomial, Bernoulli, binomial, beta, and gamma distributions.

This is a non-technical, and easy-to-follow course.

**Dates:** 6 - 16 February 2023

- Multiple live meetings in different time zones.
- Self-study is optional

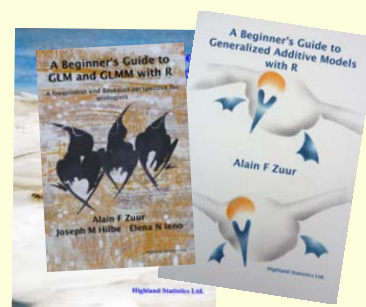
**Price:** £500

**Included: 1 hour 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 5 on-demand videos

- General introduction.
- One exercise revising data exploration and multiple linear regression in R.
- Introduction to matrix notation.
- Theory presentation for linear mixed-effects models for nested data.
- Two exercises on linear mixed-effects models with random intercepts.
- Comparing lme4/nlme/glmmTMB results.
- Live 2 hour Zoom meeting summarising module 1.

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

- One exercises showing how to apply a two-way nested linear mixed-effects model.
- One exercise on linear mixed-effects models with random intercepts and slopes.
- Using multiple variances (Generalised Least Squares) to deal with heterogeneity.
- One exercise using GLS.
- Live 2 hour Zoom meeting.

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

- Brief revision generalised linear models (GLM)
- Exercise showing how to execute a Poisson GLM and negative binomial GLM
- Three GLMM exercises
  - Poisson GLMM
  - Negative binomial GLMM
  - Poisson and negative binomial GLMMs with two-way nested and crossed random effects
- Live 2 hour Zoom meeting.

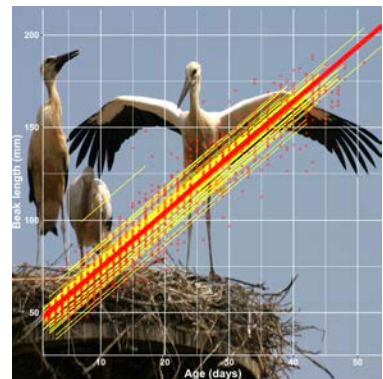
### Module 4 consists of 4 on-demand video files

- Exercise showing how to apply a Bernoulli GLMM for the analysis of absence-presence data.
- Exercise showing how to apply a binomial GLMM for the analysis of proportional data.
- Exercise showing how to apply a beta GLMM for the analysis of coverage data.
- Exercise showing how to apply a gamma GLMM for the analysis of continuous positive data.

Some Zoom meetings may be slightly longer than 2 hours. We will use the packages lme4, nlme and glmmTMB in R.

### Course material is partly based on:

- Zuur, Hilbe, Ieno (2013). Beginner's Guide to GLM and GLMM with R.



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**GENERAL INFORMATION**
**COURSE FEE: £500**

- Credit card payments are charged in GBP currency.
- VAT charge:
  - UK participants are charged 20% VAT.
  - Non-EU participants (including Norway) are not subject to VAT.
  - We do not have to charge VAT to EU participants who provide their [institutional VAT number](#).
  - EU participants who do not provide a VAT number will be charged VAT at their national rate.

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

	Module 1	Module 2	Module 3	Module 4
09.30-11.30	6 February	9 February	13 February	16 February
19.00-21.00	6 February	9 February	13 February	16 February

- These are UK (winter-) times.
- You can use this link for a time zone converter: <https://www.timeanddate.com/>

Course participants will be given access to the course website with all the videos, data sets, R solution code and course material as soon as they sign up. If you want, you can start this course at an earlier (or later) date. Some participants do everything with self-study. Others like to join the Zoom sessions. Zoom sessions from a previous course are available to view.

**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. You can discuss your own data, but we strongly advise that the statistical topics are within the content of the course. The 1-hour needs to be consumed in one session, and will take place at a mutual convenient time.

**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 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: <http://highstat.com/index.php/sign-up2>

## COURSE FLYER

### RECOMMEND LITERATURE:

- Zuur, Hilbe, Ieno (2013). *A Beginner's Guide to GLM and GLMM with R*.
- This book is available from [www.highstat.com](http://www.highstat.com)
- The course can be followed without purchasing this book.

### 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.

### REGISTRATION

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

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Payment via credit card or bank transfer

