Format: Online live using Zoom

Data Exploration, Regression, GLM & GAM with introduction to R

Provided by: Highland Statistics Ltd

We will begin with a brief intro to R and provide a step-by-step guide for data exploration, helping you avoid common statistical mistakes. You'll learn how to identify outliers, manage collinearity, visualise relationships, and understand dependency structures. We will also explain why checking for normality at this stage is unnecessary.

We will then move on to multiple linear regression, a key statistical tool. We'll cover the basics of linear regression using examples from biology, discuss potential challenges, and introduce the concept of interactions.

We will demonstrate how generalised linear models (GLMs) can be used to analyse count data, presence-absence data, proportional data, and continuous data. Some key distributions will be explored in detail, along with a clear overview of all GLMs.

We will also discuss and apply generalised additive models (GAMs) to handle non-linear relationships. We will cover smoother-factor interactions and explore model selection within GAMs.

Throughout the course, there will be around 15 exercises to help you apply what you've learned.

Dates:
- 16 - 20 June 2025.
- 08.30 - 15.30 UK time.

Format: Online live.

Price: £500

**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.

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1 hour face-to-face

The course includes a 1-hour face-to-face video chat with the instructors (to be used after the course). A discussion board (access for 12 months) allows for interaction on course content between instructors and participants. 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 during the 1-hour face-to-face video chat.

KEY WORDS

Introduction to R, Outliers, Transformations, Collinearity (correlation between covariates), Multiple linear regression, Model selection, Visualising results, Poisson and negative binomial GLMs, Overdispersion, Binary and proportional data, ggplot2, DHARMa, Generalised Additive Models (GAMs)
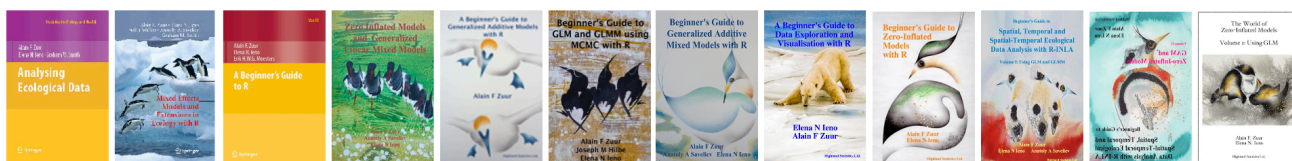
COURSE CONTENT

Monday:
- General introduction.
- Introduction to R.
- Theory presentation on data exploration (outliers, collinearity, transformations, relationships, interactions), based on Zuur et al. (2010) and Ieno and Zuur (2015).
- Two exercises.

Tuesday & Wednesday morning:
- Theory presentation on linear regression.
- Different strategies for model selection.
- Interactions.
- Dealing with categorical covariates.
- Sketching model fit.
- Two exercises.

Wednesday afternoon and Thursday:
- Theory presentation on Poisson, negative binomial, Bernoulli, and binomial distributions.
- Theory presentation on GLM.
- Poisson GLM: How to deal with overdispersion.
- Negative binomial GLM.
- DHARMa for model validation.
- Two exercises on Poisson and negative binomial GLM.
- A general overview discussing Bernoulli, binomial, Tweedie, Gamma, and beta GLM.
- One or two GLM exercises (time permitting).

Friday:
- Theory presentation on GAM.
- Two or three exercises using Gaussian GAM, and Poisson and negative binomial GAMs.

The course material consists of relevant PDF files of presentations, data sets, and clearly documented R code. Course participants will be given access to the course website, which will contain all data sets, R solution code, and course material, one week before the start of the course. Access to the course website will be available for 12 months.

COURSE MATERIAL:
- Pdf files of all powerpoint presentations are provided
- The powerpoint files are based on various chapters from:
  - Chapters 4 - 5 from Zuur, Ieno, Smith (2007). *Analysing Ecological Data*
  - *A Beginner's Guide to GLM and GLMM using MCMC with R.* (2013).
  - A *Beginner's Guide to Zero Inflated Models with R.* (2016)
  - Chapter 3 in *Beginner's Guide to GAM with R.* Zuur (2013).
  - Books are not included in the course fee. The course can be followed without purchasing these books.
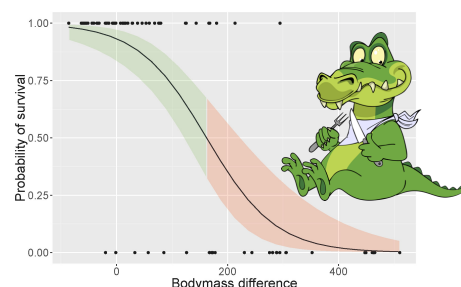
GENERAL INFORMATION

FEE: 500 GBP
Credit card payments are charged in GBP currency.
VAT Charge:
- UK participants are charged a 20% VAT.
- Non-EU participants (including Norway and Switzerland) are not subject to VAT.
- We do not 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.
- Canadian participants are subject to GST/HST tax.
- Access to the course website is 12 months.

TIMES:
- Monday - Friday: 08.30am to 15.30pm (UK time) including a 1 hour lunch break and a 20 minutes break both morning and afternoon.

PRE-REQUIRED KNOWLEDGE:
Basic statistics (e.g. mean, variance, normality). No R knowledge is required. You will learn R 'on the fly'. 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 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.

RECOMMEND LITERATURE:
- Zuur, Hilbe, Ieno (2013). *A Beginner's Guide to GLM and GLMM with R*.
- Ieno, Zuur (2015) A *Beginner's Guide to Data Exploration and Visualisation with R.*
- Zuur (2013). *A Beginner's Guide to GAM with R*.
- These books are available from www.highstat.com

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.
- You will be given access to a course website with around 15 fully worked out R exercises. These are all based on published papers and real data sets.
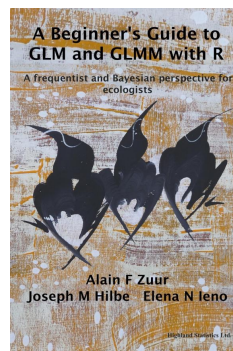
REGISTRATION

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