Live online course with on-demand video

Introduction to Data exploration, regression, GLM and linear mixed-effects models

Provided by: Highland Statistics Ltd
Organised by: SEA-EU at Kiel University in collaboration with the Graduate Center at Kiel University

Course content

We begin with an introduction to R and provide a protocol for data exploration to avoid common statistical problems. We will discuss how to detect outliers, deal with collinearity and transformations.

An important statistical tool is multiple linear regression. Various basic linear regression topics will be explained from a biological point of view. We will discuss potential problems and show how generalised linear models (GLM) can be used to analyse count data.

In the second part of the course linear mixed-effects models are introduced to deal with pseudoreplication. These models can be used to analyse hierarchical or clustered data, e.g. multiple observations from the same animal, site, area, nest, patient, hospital, vessel, lake, hive, transect, etc. We will also discuss generalised linear mixed-effects models (GLMM) to analyse count data.

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

Course format

The course will be delivered via live online teaching using Zoom. It represents a total of approximately 40 hours.

To improve the quality of our online courses, every exercise and every theory presentation is also available as an on-demand video file that 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. 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 includes a 1-hour face-to-face video chat with the instructors (to be used within 6 months after the course).

Dates: 7, 10, 14, 17 and 21 December 2021

Format:

- Live teaching (09.00 - 16.00) using Zoom.
- All exercises and theory presentations are also available as on-demand video.
- 6 months access.

Bonus:

- **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 (Tuesday 7 December 2021) consists of 5 on-demand videos

- General introduction.
- Introduction to R.
- Theory presentation on data exploration.
- Two exercises on data exploration.

Module 2 (Friday 10 December 2021) consists of 4 on-demand videos

- Theory presentation bivariate linear regression.
- Exercise on bivariate linear regression.
- Theory presentation multiple linear regression.
- One exercise.

Module 3 (Tuesday 14 December 2021) consists of 7 on-demand video files

- Theory presentation on interactions in multiple linear regression models.
- One exercise.
- Theory presentation on Poisson and negative binomial distributions.
- Theory presentation on Poisson GLM.
- Exercise Poisson GLM.
- Theory presentation on negative binomial GLM.
- Exercise negative binomial GLM.

Module 4 (Friday 17 December 2021) consists of 4 on-demand videos

- Catching up.
- 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.

Module 5 ((Tuesday 21 December 2021)) consists of 3 on-demand videos

- Catching up
- Exercise on Poisson GLMM
- Exercise on Negative binomial GLMM
- Exercise on Negative binomial GLMM (time allowing)

GENERAL INFORMATION

COURSE TIMES:

- **All days:** 09.00am to 16.00pm (German time) including a 1 hour lunch break and a 20 minutes break both morning and afternoon

Course participants will be given access to the course website with all the videos, data sets, R solution code and course material about a week before the start of the course.

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 6 months after the last live zoom meeting. You can discuss your own data, but we strongly advice 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.

RECOMMEND LITERATURE:

- Zuur, Ieno and Smith (2007). Analysis Ecological Data. Springer.
- Zuur, Ieno, Elphick. (2010). A protocol for data exploration to avoiding common statistical problems. Methods in Ecology and Evolution, 1: 3-14.
- Zuur, Hilbe, Ieno (2013). Beginner's Guide to GLM and GLMM with R.
- 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 is on the course website.

INFORMATION ON COURSE CONTENT

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