

Format: Hybrid (onsite and online)

Introduction GLMs with spatial correlation and GLMM A Bayesian's perspective using R-INLA

Provided by: Highland Statistics Ltd

Hosted by: Université Grenoble Alpes – INRAE

This course introduces spatial generalised linear models (GLMs) and generalised linear mixed-effects models (GLMMs) using R-INLA, with a strong focus on Bayesian approaches tailored for biological and ecological research.

We begin by adding spatial dependency to regression models with frequentist tools, exploring their limitations before moving to Bayesian techniques that better capture complex natural processes.

In the second part, we address hierarchical data, enabling analysis of multiple observations from the same animal, site, or ecosystem unit.

With hands-on examples in R-INLA, participants will gain practical skills to model ecological and biological data, including spatial patterns and dependencies vital to environmental and field research.

This is an onsite course, but you can also participate online via a Zoom connection.

Dates:

- 12 - 16 May 2024
- 09.00 - 16.00

Location: Université Grenoble Alpes - INRAE, Grenoble, France

Price: 500 GBP

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

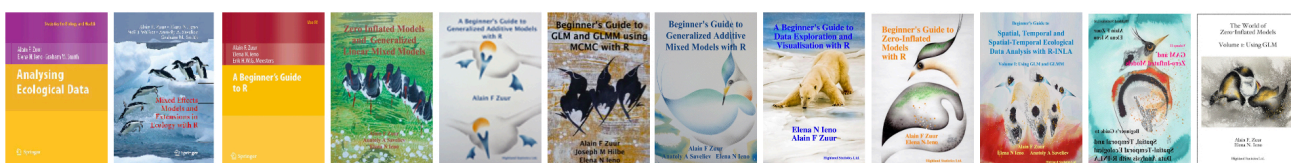
Instructors:

- Dr. Alain Zuur
- Dr. Elena Ieno

Authors of 12 books and

Interaction between participants and instructors after the course:

- The course fee includes a 1-hour face-to-face video chat with the instructors. You can ask questions related to your own data or to the course.
- A Discussion Board allows for interaction between instructors and participants. You can ask detailed questions related to the course material.



COURSE CONTENT

Module 1: Foundations of Bayesian Analysis and R-INLA

- General introduction and overview.
- Brief introduction to Bayesian analysis.
- Conjugate priors: diffuse vs. informative priors.
- Theory and fundamentals of INLA (Integrated Nested Laplace Approximation).
- Exercise: Implementing a linear regression model in R-INLA.

Module 2: Spatial Dependencies in Regression Models

- Theory: Adding spatial dependencies using frequentist techniques.
- Exercise: Adding spatial dependency to a regression model with frequentist tools.
- Theory: Adding spatial correlation in R-INLA.
- Exercise: Adding spatial correlation to a linear regression model in R-INLA.

Module 3: Spatially Correlated Poisson and Negative Binomial Models

- Exercise: Implementing a Poisson GLM in R-INLA.
- Exercise: Adding spatial correlation to a Poisson GLM in R-INLA.
- Exercise: Adding spatial correlation to a negative binomial GLM in R-INLA.
- Time allowing: Exercise: Bernoulli GLM with spatial correlation

Module 4: Linear Mixed-Effects Models for Hierarchical Data

- Theory: Linear mixed-effects models for nested data structures.
- Two exercises: Linear mixed-effects models with random intercepts in R-INLA.

Module 5: Generalised Linear Mixed Models (GLMMs)

- Exercise: Poisson GLMM for count data analysis.
- Exercise: Negative binomial GLMM for count data analysis.
- Exercise: Negative binomial GLMM with nested and crossed random effects.
- Time allowing: Exercise: Bernoulli GLMM

We reserve the right to change the exercises. Pdf files of all theory material will be provided. All exercises consists of data sets and annotated R scripts. Access to the course website is for 12 months. The Monday-Friday material does not contain on-demand video.

PRE-REQUIRED KNOWLEDGE:

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

The course website provides preparatory materials, including on-demand videos and R scripts covering multiple linear regression, basic matrix notation, generalised linear models, model validation using DHARMA, and the explanation of variograms. If you are not familiar with these methods, please review them before the course begins.

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.
- Access to the course website is 12 months.

GENERAL INFORMATION

COURSE FEE: £500

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.
- The course fee does not contain coffee, tea, lunch or accommodation.
- Access to the course website is 12 months.

COURSE TIMES (French time):

- Monday - Thursday: 09.00-16.00
- Friday: 09.00-15.00
 - Including a 60-minutes lunch break and two short 20 minutes tea/coffee breaks.
- You can use this link for a time zone converter: <https://www.timeanddate.com/>

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 the footer at: www.highstat.com

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.

COURSE LOCATION

Université Grenoble Alpes – INRAE
Salle Théodore Rosset,
Batiment Stendhal,
Maison des Langues et de la Culture,
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INFORMATION ON COURSE CONTENT

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Payment via credit card or bank transfer

