Two-day statistics intensive courses I & II for soil scientists
from March 28ᵗʰ until March 29ᵗʰ 2019 (in English)

I. **Fundamentals of statistics, experimental designs & introduction to R for soil scientists (March 28ᵗʰ)**

II. **Statistical modelling and regressions using R for soil scientists (March 29ᵗʰ)**

The media and scientific journals of different disciplines repeatedly address the topic of erroneous research due to insufficient statistical knowledge (see e.g., Ainsworth (2007, Nature 448, 849)). To some extent there may be similar problems in soil science.

Examples of such problems could be (I) research without hypotheses; (II) inappropriate experimental design; (III) a lack of understanding of pseudoreplication; (IV) an inappropriate handling of outliers; (V) missing inspections of conditions for hypothesis testing; (VI) an insufficient description of statistical analyses in publications; (VII) a lack of knowledge of the importance of residual inspections; (VIII) a lack of understanding of the differences between a minimal adequate model and a maximal model; (IX) a lack of knowledge of the differences between a calibration, a cross-validation and a validation of a model; and (X) a lack of understanding of important special topics such as polynomial regressions and model comparisons.

The intensive courses I & II aim to improve soil scientists' statistical knowledge and include an introduction to R. A main objective is to reduce the occurrence of the above-mentioned problems in soil science research and publications.

Date: Intensive course I: March 28ᵗʰ 2019, 10:00 a.m. until 6:00 p.m.
    Intensive course II: March 29ᵗʰ 2019, 10:00 a.m. until 6:00 p.m.

Location: Kassel University, 37213 Witzenhausen, Nordbahnhofstr. 1a.

Costs: The costs for the intensive courses including catering during coffee breaks (excluding accommodation and meals) are 70.00€ for each of the courses I and II; thus 140.00€ for the two days (courses I & II). The prices stated here are final prices and must be transferred before the start of the course.

Number of participants: The number of participants is restricted to a maximal 30.

Laptops: Course participants should bring laptops with R and RStudio software already loaded onto them. If necessary, laptops can be borrowed by prior arrangement.

Materials: Lecture notes (more than 200 pages), exercises and model solutions will be provided.

Recommended literature: Crawley (2012). The R Book. 2nd Ed., Wiley. Welham et al. (2015). Statistical Methods in Biology. Design and Analysis of Experiments and Regression, CRC.

Lecturer: Prof. Dr. Bernard Ludwig

Schedule of the intensive courses:
Thursday, 28.03.2019

Time	Contents
10:00 - 13:30	Welcome, introduction to R (data types, vectors & data frames, reading of data), tests of normality and of variance homogeneity, parametric (various t-tests) & non-parametric tests (Wilcoxon rank sum tests)
13:30 - 14:30	Lunch break
14:30 - 16:00	Introduction to descriptive statistics, important distributions, experimental designs & replication, pseudo-replication & hypothesis testing, exercises using R with practical examples: parametric & nonparametric tests
16:00 - 16:10	Coffee break
16:10 - 18:00	Spearman & Pearson correlation methods, chi-square tests & exercises using R with practical examples: Correlations

Friday, 29.03.2019

Time	Contents
10:00 - 13:30	Welcome, regressions, lack of fit test, residual inspections & statistical modelling: model types & model simplification
13:30 - 14:30	Lunch break
14:30 - 16:00	Steps of model simplification & exercises using R
16:00 - 16:10	Coffee break
16:10 - 18:00	Transformations (square-root & logarithmic), dealing with variability & predictions (confidence & prediction bands; validation & cross-validation), polynomial & non-linear regressions including exercises in R

Registration is open until March 20th 2019. Registration and general queries: Prof. Bernard Ludwig, Kassel University, bludwig@uni-kassel.de

Please note that the intensive courses may be cancelled if not enough registrations have been received. In this case or in the event of cancellation due to illness of the lecturer or any other events beyond the control of the lecturer, there will be no claims possible, except for the reimbursement of participation costs (70.00€ for each of the courses, 140.00€ for both).

Additional information on statistical training courses: see

http://www.uni-kassel.de/fb11agrar/en/sections/environmental-chemistry/statistics-courses.html