

## **Two-day statistics intensive course III for soil scientists from April 1<sup>st</sup> until April 2<sup>nd</sup> 2019 (in English)**

### **III. Analyses of variance using R for soil scientists**

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) a lack of understanding of important special topics such as Box-Cox transformations and logistic regressions; (II) a lack of knowledge of the great importance of statistical independence of data as condition for the analyses of variance (dealing with spatially and/or temporally dependent data); (III) a lack of understanding of residual inspections and how to deal with missing normality or with variance heterogeneity; (IV) research without hypotheses with a focus on mechanically carried out post-hoc tests; (V) a lack of knowledge how to handle unbalanced designs; (VI) a lack of understanding how to handle more complicated designs (split plot); and (VII) inaccuracies in factor formulations.

The intensive course III aims to improve soil scientists' statistical knowledge. A main objective is to reduce the occurrence of the above-mentioned problems in soil science research and publications.

**Date:** Intensive course III: April, 1<sup>st</sup> 2019 10:00 a.m. until April 2<sup>nd</sup> 6:00 p.m

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

**Costs:** The costs for the intensive course III including catering during coffee breaks (excluding accommodation and meals) are 140.00€. The price stated here is a final price and must be transferred before the start of the course.

**Number of participants:** The number of participants is restricted to 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 100 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 course:****Monday, 01.04.2019**

Time	Contents
10:00 - 13:30	Welcome, Box-Cox transformation, logistic regression & exercises using R, one-way anovas (analyses of variance), structure of anova tables & residual inspections
13:30 - 14:30	Lunch break
14:30 - 16:00	Post-hoc tests for one-way studies & multi-way anovas (blocking, interactions)
16:00 - 16:10	Coffee break
15:10 - 18:00	Exercises on one-way & multi-way anovas using R

**Tuesday, 02.04.2019**

Time	Contents
10:00 - 13:30	Model simplification and exercises using R, multiple mean comparisons & contrasts, factor formulations & unbalanced models
13:30 - 14:30	Lunch break
14:30 - 16:00	Combined anova & regression analysis, split plots & exercises using R
16:00 - 16:10	Coffee break
16:10 - 18:00	Introduction to mixed effects models

**Registration is open until March 20<sup>th</sup> 2019. Registration and general queries: Prof. Bernard Ludwig, Kassel University, [bludwig@uni-kassel.de](mailto:bludwig@uni-kassel.de)**

Please note that the intensive course 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 (140.00€).

**Additional information on statistical training courses: see**

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