S022 Statistical and Mathematical Tools in Process Analysis

Coordinator: Dr. G. Hörmann

Teaching Staff: Dr. G. Hörmann, Prof. Dr. I. Unkel

Section for SSE: D - Complementary Methods
Status for SSE: Elective

Section for EM: D - Complementary Methods
Status for EM: Elective

Contact time overall:	52 hours	**Credit points:**	6 ECTS	**Term (Semester):**	1 Winter
Independent study:	128 hours	**Prerequisites:**	None	**Language of tuition:**	English
Overall workload:	180 hours			**Class size:**	25

Teaching Units:

Lecture - Statistical and Mathematical Tools in Process Analysis

Teaching Staff: Dr. G. Hörmann, Prof. Dr. I. Unkel

Contact time: 13

Exercise - Statistical and Mathematical Tools in Process Analysis

Teaching Staff: Dr. G. Hörmann, Prof. Dr. I. Unkel

Contact time: 39

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Teaching Staff:

Contact time:

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Teaching Staff:

Contact time:

Competences the module has been designed to develop:

Mastery of subject matter:	medium	**Problem solving competences:**	strong
Mastery of methods:	strong	**Communication competences:**	not at all
Application of knowledge and understanding:	strong	**Learning competences:**	minor

S022 **Statistical and Mathematical Tools in Process Analysis**

Content:

Descriptive statistics: mean, standard deviation, confidence interval. Inferential statistics: regression, ANOVA. Biological methods: rarefaction, ordination methods, clustering. Time series analysis: spectral analysis, cross correlation, analysis of spatial data

Learning outcomes:

Students learn to apply statistical methods for ecological research. After an introduction into common computer tools for data management and data analysis (spreadsheets, data bases, shells for statistics modeling) the students learn to use methods for the statistical interpretation of ecological data. Exercises include the use of common computer programs for calculations, e.g. Excel and R, fundamentals of descriptive and inferential statistics, e.g. means, standard deviation, ANOVA, regressions. Furthermore, students learn specific methods of biological ecology, e.g. similarity coefficients, ordination, multivariate methods. Time series analysis is used to analyze fluctuations and interference between parameters. A special unit is devoted to the treatment of spatial data.

References:

http://davidmlane.com/hyperstat/intro.html

Jongman R.H.G., Braak C.J.F., van Tongeren O.F.R.: Data analysis in community and landscape ecology. Cambridge University Press, 1995.

Kabacoff, R.I., R in Action. Manning Publications, 2011
www.r-project.org

Logan Murray, 2010: Biostatistical Design and Analysis Using R - A practical Guide

Recommended previous knowledge:

Basic knowledge in computer applications

Teaching media:

PPT, Computer exercises

Assessment:

Written examination: 100%

Contact details of module coordinator:

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