Module Name	Module Code
Statistical & Mathematical Tools	AEF-EM030
Module Coordinator	
Dr. agr. Georg Hörmann	
Organizer	
Institute for Natural Resource Conservation - Hydrology and Water Resources Management	
Faculty	
Faculty of Agricultural and Nutritional Sciences	
Examination Office	
Faculty of Agricultural and Nutritional Sciences - Examination Office	

ECTS Credits	6
Evaluation	Graded
Duration	one semester
Frequency	Only takes place during winter semesters
Workload per ECTS Credit	30 credits
Total Workload	180 hours
Contact Time	60 hours
Independent Study	120 hours
Teaching Language	English

Further Information on the Teaching Language			
english			
Recommended Requirements			
General computer knowledge, course in basic statistics			
Module Courses			
Course Type	**Course Name**	**Compul-sory/Optional**	**SWS**
Lecture	Statistical and Mathematical Tools	Compulsory	1
Exercise	Statistical & Mathematical Tools	Compulsory	3

Examination(s)				
Examination Name	**Type of Examination**	**Evaluation**	**Compulsory / Optional**	**Weighting**
Written Examination: Statistical & Mathematical Tools	Written Examination	Graded	Compulsory	100

Further Information on the Examination(s)

1.+2. period in wintersemester
1. period in summersemester

examiner: Dr. Hörmann/Prof. Dr. Unkel
QIS: 71501 with number of Examination 71520

Course Content

Data management: organisation of data bases, format conversions, data base functions
Descriptive statistics: mean, standard deviation, confidence interval. Inferential statistics: regression, ANOVA. Biological methods: ordination methods, clustering. Time series analysis: spectral analysis, cross correlation, analysis and display of spatial data, use of R as a GIS

Learning Outcome

Students learn to apply statistical methods with the R system for statistical analysis for ecological research. After an introduction to data management and data analysis the students learn to use methods for the statistical interpretation of ecological data. Exercises include the use of common procedures for exploratory data analysis, 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.

Reading List

R-Website: www.r-project.org
David M. Lane, 2016: Hyperstat Online Textbook, http://www.davidmlane.com/hyperstat/

Kabacoff, R., 2015: R in Action: Data Analysis and Graphics with R, 2nd.
Edition, Manning Publications.
Logan, M., 2010: Biostatistical Design and Analysis Using R: A Practical Guide, Wiley-Blackwell Publ.
Hedderich, J., Sach, L., 2015: Angewandte Statistik: Methodensammlung mit R, 15. Auflage, Springer Verlag

Additional Information

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Use	Compulsory / Optional	Semester
Master, 1-Subject, Agricultural Sciences, Specialisation Agricultural Economics, (Version 2017)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Agricultural Economics, (Version 2013)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Agribusiness, (Version 2017)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Agribusiness, (Version 2013)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Crop Sciences, (Version 2017)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Crop Sciences, (Version 2013)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Animal Sciences, (Version 2017)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Animal Sciences, (Version 2013)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Environmental Sciences, (Version 2017)	Optional	1.
Master, 1-Subject, Agricultural Sciences, Specialisation Environmental Sciences, (Version 2013)	Optional	1.
Master, 1-Subject, Biology, (Version 2011)	Optional	1.
Master, 1-Subject, Biology, (Version 2007)	Optional	1.
Master, 1-Subject, Dairy Science, (Version 2017)	Optional	1.
Master, 1-Subject, Environmental Management, (Version 2017)	Optional	1.
Master, 1-Subject, Environmental Management, (Version 2013)	Optional	1.
Master, 1-Subject, Nutritional and Food Science, (Version 2013)	Optional	1.
Master, 1-Subject, Nutritional and Consumer Economics, (Version 2017)	Optional	1.
Master, 1-Subject, Nutritional and Consumer Economics, (Version 2013)	Optional	1.
Master, 1-Subject, Sustainability, Society and the Environment, (Version 2013)	Optional	1.
Master, 1-Subject, Environmental Geography and Management, (Version 2015)	Optional	1.
Master, 1-Subject, Environmental Geography and Management, (Version 2013)	Optional	1.