Module description: Explorative Data Analysis

Module Code	t.BA.XX.EXPD.20HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IDP
Module Coordinator	Martin Frey
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 3a 2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class
Module Description	The module Exploratory Data Analysis introduces the basics of descriptive statistics to visualize data and describe them with key figures. Students learn how to carry out descriptive data analyses using the statistical software R. This includes preparing, visualizing, and describing the data with key figures.
Module Content	**The lessons are divided into the following blocks:** • Basic concepts of data collection • Data types • Statistical key figures and graphical representation for univariate data (e.g. location and dispersion parameters, bar chart, histogram, empirical cumulative distribution function, boxplot, ...). • Statistical key figures and graphical representation for bivariate and multivariate data (crosstabs, scatter plots, correlation, comparative boxplots or bar charts for grouped data, ...). • Interpretation of multivariate data. • Linear and monotonic data transformations. • Principal component analysis. **The lab is divided into the following blocks:** • Introduction to the statistical software R and the development environment RStudio. • Data structures in R. • Import and export of data. • Introduction to R Graphics. • Functions in R. • Data preparation in R. • Alternatives to classic R graphics. • Reproducible and dynamically customizable descriptive data analysis.
Prerequisite Knowledge	Mathematics at BMS level Basic Computer skills

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Learning Objectives (Competences)	Students...	Competencies	Taxonomies
	Students develop an understanding of the purpose of a statistical investigation.	M, F	K3, K4
	Students are able to determine meaningful key figures from a given data set and create appropriate, univariate, bivariate, and multivarite desired graphs with the help of the statistic software R.	F, M	K2, K3, K4
	Students are able to independently conduct a descriptive analysis of a given dataset.	F, M	K1, K2
	Students can read, understand and evaluate descriptive data analyses carried out by third parties.	F, M	K2, K3

Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	65	acc. to module agreement

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
written exam	Grade	45	10	acc. to module agreement
Presentation *Chapter from a book*	Grade		5	acc. to module agreement
report	Grade		20	acc. to module agreement

Classroom Attendance Requirement	None In consultation with the lecturer. Presentation takes place on site.
Learning material	• Meier, L. (2020). Wahrscheinlichtsrechnug und Statistik: Eine Einführung für Verständnis, Intuition und Überblick, Springer • Fahrmeir, L., Künstler, R., Pigeot, I., Tutz, G. (1997). Statistik. Der Weg zur Datenanalyse, Springer.
Comments	The exact requirements for the semester tasks are communicated in writing by the lecturers at the beginning of the lecture.