Modul 46: Preparatory Course in Research Methods

Studiengang / course:	M. Eng. Energie- und Umweltmanagement
Modulbezeichnung / module name:	Preparatory Course in Research Methods
ggf. Kürzel / abbreveation	Research Methods
ggf. Untertitel / subtitle	
ggf. Lehrveranstaltungen / seminar:	
Semester / semester:	Pre-semester
Modulverantwortliche(r) / person in charge of module:	Prof. Dr. Bernd Möller
Dozent(in) / person teaching the seminar:	M.Eng. Tabitha Karanja
Sprache / language:	English
Zuordnung zum Curriculum / attribution to courses:	EEM developing countries: Preparatory course for students without knowledge in statistics
Lehrform / SWS / form of seminar / teaching hours per week:	Seminar
Arbeitsaufwand / student workload:	4 SWS
Kreditpunkte / credit points:	5 ECTS
Voraussetzungen nach Prüfungsordnung/ preconditions according to examination regulations:	none
Modulziele / angestrebte Lernergebnisse / aims of the module / aspired learning outcome:	The students - acquire knowledge to decide appropriate statistics techniques to be applied depending on the type of problem that needs to be solved - are able to, given a sample, describe all relevant aspects of said sample related with the problem at hand - are able to, given a sample, infer information about the population from where the sample came from - are able to solve statistics problems with the use of computers, using open-source software such as R and utility software like Excel. - are able to write small syntax programs to automatize repetitive work - are able to manipulate existent information in order to create new relevant (to an analysis) information - are able to communicate their data and present information in the suitable ways
Inhalt / subjects covered:	Descriptive Statistics - Important concepts: Population, Sample, Variable, Scales, Interviews, Distribution forms, Standardized values, Outliers - Distribution Tables: Absolute, relative and cumulative distributions

	- Central tendency measures: Mode, Median and mean - Dispersion measures: Range, Variance, Standard deviation, Quartiles - Graphical representation: Bar diagrams, Histograms, Stem and leaf Diagrams, Box plots, Scatter plots, etc. Inference Statistics: - Important concepts: Confidence Intervals, Tests, significance, Distribution: Normal distribution, Chi-Square, T, Independent and dependent samples. - Tests: T-Test, Independent Test, Anova Relational Statistics: - Important concepts: Correlation coefficient, Magnitude and direction of correlation, Effect size - Pearson's and Spearman's correlation coefficient Explanatory statistics: - Important concepts: Regression line, Direction of causality, Error term, Ordinary Least Squares, Slope coefficient, Coefficient of determination, F-test, Confidence Intervals, Prediction Intervals. - Relationships between two or more variables: Cross tables, regression analysis Data visualization: - Important concepts: Tables, Heat maps, Graphical displays, Data-to-ink ratio - Decluttering of visuals R: - Introduction to R - Data manipulation: Sorting, Recoding, Conversion Computing, Restructuring, Visualization.
Studien- Prüfungsleistungen / form of examination:	Written test
Medienformen / media used:	Power point presentations, Computer
Literatur / literature:	- Furlong, Nancy et al (2000): Research Methods and Statistics: an integrated approach, 1st edition, Wadsworth/Thompson Learning - Field, Andy et al (2012): Discovering Statistics with R, 1st edition, SAGE Publications Ltd - Cole Nussbaumer Knafic (2015): Storytelling with Data: a data visualization guide for business professionals, 1st edition, Wiley - Andy Kirk (2016): Data visualisation: a handbook for data driven design, 1st edition, SAGE Publications Ltd - Paul Teetor (2011): R Cookbook: proven recipes for data analysis, statistics, and graphics, 1st edition, O'Reilly Media - Winston Chang (2013): R Graphics Cookbook: practical recipes for visualizing data, 1st edition, O'Reilly Media