

Module title	4.2 Scientific methods II
Workload (ECTS)	3 ECTS
Module coordinator	Prof. Dr. Stefan Grösser
Contributing lecturers	
Entry requirements	None
Description	<p>The module offers a hands-on application-oriented approach to gathering, structuring, clearing, visualizing, and analyzing of quantitative data. In addition to lectures, hands-on sessions are provided during which students apply the defined methods themselves to their methods-oriented projects.</p> <p>First, it will be addressed why quantitative methods became more important in recent years and decades and where they can be applied. Second, primary data gathering by means of an online survey (questionnaire) will be addressed. Third, then data cleaning and structuring occurs on the data gathered. Fourth, essential elements of descriptive statistics are reviewed (distribution, central tendency, dispersion, correlation). Also, visualization techniques will be used. Fifth, methods for hypothesis testing and group comparisons will be introduced. And finally, different approaches for inferential statistics are introduced (correlation analysis, multiple linear regression analysis, logistic regression, instrumental variables).</p> <p>In case time and interest allows for it: more advanced data analysis methods will be addressed such as cluster analysis and further machine learning methods.</p> <p>For the module the open-source software R-Studio is used. Students are expected to build a basic understanding programming in such a way that the software can be used. The module covers the usage of R for this module at the beginning of the module. Each student needs to have an own laptop for this module.</p>
Learning outcomes and competences	<p>Competences:</p> <p>Students</p> <ul style="list-style-type: none"> • understand the importance of quantitative data analysis. • can design an online survey to enable data gathering. • can clean and structure the data. • can perform descriptive statistical analysis with respect to the topic of their concentration. • know the elementary methods of quantitative data analysis. • understand the utility of multiple linear regression analysis compared to descriptive statistics. • will independently identify which method is most appropriate in which situation and be able to apply it concretely. <p>Outcome:</p> <p>Students</p>

	<ul style="list-style-type: none"> • will be able to reflect on issues/problems when applying data analysis methods. • have a basic competence of primary data generation and statistical analysis.
Assessment of learning outcomes	Two exam components: 66% weight for an application project which will be provided as two deadline-based deliverables. At the end, an oral examination about the own project takes place, weight 34%.
Didactic approach	<ul style="list-style-type: none"> • Contact teaching • individual and group exercises • learning videos • guest lecture
Project-based learning	The module content will be applied to a particular topic that will be followed throughout the social science modules I-III applying qualitative, quantitative as well as transdisciplinary methods.
Links to other modules	<ul style="list-style-type: none"> • 0.1 Introduction circular economy • 4.2 Social sciences I • 4.3 Social sciences III • 4.4 Impact analysis
Bibliography	Literature will be provided before the start of the module.
Language	English
Location	TBD