Module description: Basics of Statistics

Module Code	t.BA.MIM.GSTAT.23HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IAMP
Module Coordinator	Adela Weil
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	This module is an introduction to statistics. Students learn the basic principles and concepts of probability theory and statistics. They learn to statistically present and discuss data, analyse relationships between variables and to draw conclusions for the whole population from samples.
Module Content	• Descriptive Statistics: Plotting and Calculating Frequencies / Distribution Functions, Central Tendency and Dispersion, Correlation, Linear Models • Introduction to Probability theory: experiments in probability theory, probability measures, random variables, density function, distribution function, Bernoulli, Binomial and normal distributions, expected values and variances, conditional probabilities • Limit theorems: central limit theorem and law of large numbers • Linear regression and least squares method • Statistical inference: parameter estimation, confidence intervals, hypothesis testing
Prerequisite Knowledge	Basic knowledge of analysis and linear algebra; basic programming skills

Learning Objectives (Competences)	Students...	Competencies	Taxonomies
	Students acquire techniques to describe and graphically represent frequencies. They are familiar with measures of central tendency and dispersion and can calculate them. They understand techniques of multivariate data analysis and can use statistical software for this purpose.	F, M	K3
	Students are familiar with the fundamentals of probability theory. They know methods to calculate simple probabilities. They understand the concept of random variables, the properties of density and distribution functions, and can calculate the expected value and variance of random variables. Students can calculate conditional probabilities. They are familiar with the Bernoulli, Binomial, and normal distributions.	M, F	K3
	Students are familiar with the central limit theorem and the laws of large numbers, as well as their significance in applications. They can apply these limit theorems to examples.	M, F	K2, K3
	Students understand the principle of the least squares method and can calculate the parameters of a regression.	F, M	K3
	Students are familiar with the basic concepts of estimation (point and interval estimation, unbiased and consistent estimation). They can determine confidence intervals, formulate hypothesis tests, and draw the correct conclusions from samples.	F, M	K2, K3, K4

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Performance Assessment	End-of-module exam	Assessment	Length (min.)	Weighting	Form
	written exam	Grade	90	80	acc. to module agreement

	Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
		Grade		20	acc. to module agreement

Classroom Attendance Requirement	None
Learning material	• Course material dependent on lecturer
Comments	