Module description: Stochastics and Statistics

Module Code	t.BA.XXM7.STS.19HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IAMP
Module Coordinator	Monika Ulrike Reif
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 introduces the terms and concepts of probability theory and statistics that are indispensable for a deeper understanding of many areas.
Module Content	**Descriptive Statistics** • Introduction of statistical software • Representation of frequencies and distribution function • Measures of central tendency and measures of variation • Classified data • Bivariate and multivariate data • Correlation **Probability calculus** • Random events • Concept of probability • Probability models • Stochastic independence • Conditional probability **Distributions** • Random variable • Density function • Distribution function • Discrete distributions • Continuous distributions • Parameters • Limit theorems **Estimating and testing** • Point estimate (such as linear regression, maximum likelihood estimation, moment method) • Interval estimation • Hypothesis testing
Prerequisite Knowledge	

Module description: Stochastics and Statistics

	Students...	Competencies	Taxonomies
Learning Objectives (Competences)	You know the most important distributions and know how to calculate their parameters.	F, M	K2, K3
	You know general methods for estimating parameters and can apply them.	M, F	K3, K4
	You can use probability theory methods to analytically calculate probabilities and use them to evaluate dependent and independent events.	M, F	K3, K4
	You understand the concept of random variables and the properties of probability density and distribution function.	F, M	K3, K4
	You know the laws of large numbers and the central limit theorem and their significance in statistical applications.	M, F	K2, K3
	You can visualize data from a statistical point of view and calculate various statistical values. You can use statistics software to do this.	F, M	K3, K4
	You know the basics of probability theory for the analytical description of random events.	F, M	K2, K3

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

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
Weekly short tests	Grade	60	10	acc. to module agreement

Classroom Attendance Requirement	None
Learning material	- Lecture Notes - Fahrmeir, L. Statistik; Der Weg zur Datenanalyse. ISBN 978-3-662-67526-7. - Cramer, E. & Kamps, U. Grundlagen der Wahrscheinlichkeitsrechnung und Statistik; Eine Einführung für Studierende der Informatik, der Ingenieur- und Wirtschaftswissenschaften. ISBN 978-3-662-60552-3. - Teschl, G. & Teschl, S. Mathematik für Informatiker; Band 2: Analysis und Statistik. ISBN 978-3-642-54274-9. - Teschl, G. & Teschl, S. Mathematik für Informatiker; Band 1: Diskrete Mathematik und Lineare Algebra. ISBN 978-3-642-37972-7.
Comments	