Valid from 2024.HS

Module description: Probability Calculations

Module Code	t.BA.XX.WAHR.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 2a 4 consecutive lecture lessons per semester week and class
Module Description	The Probability module introduces the basics of probability theory. Students learn to describe random events using probability models, to quantitatively model the results of random experiments with random variables, to determine and interpret their properties such as expected value and variance, and to carry out calculations and simulations using the statistical software R.
Module Content	**The lessons are divided into the following blocks:** • Random experiment and the concept of probability • Basics of combinatorics • Conditional probability • Bayes' theorem • Independence of events • Random variables • Probability function and density • Distribution function • Specific discrete and continuous univariate distributions • Bivariate normal distribution • Law of large numbers • Central limit theorem
Prerequisite Knowledge	ExpD

Learning Objectives (Competences)

Students...	Competencies	Taxonomies
Students develop an understanding of quantifying the uncertainty of events by probability.	F, M	K3, K4
Students are able to calculate probabilities, expected values and variances of random events of special discrete and continuous distributions.	F, M	K1, K2
Students are able to determine the probability distribution of complex random events approximatively with simulation experiments.	M, F	K2, K3
Students are able to identify random components of everyday processes and formulate them with adequate probability models.	F, M	K1, K2
Students understand the law of large numbers and the central limit theorem.	M, F	K3, K4, K5

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Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	85	acc. to module agreement

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
report	Grade		15	acc. to module agreement
Quiz *Bonus of 0.1 on the final module grade.*	predicate			acc. to module agreement
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Classroom Attendance Requirement

None

In consultation with the lecturer. The presentation takes place on site.

Learning material

- Fahrmeir, L., Künstler, R., Pigeot, I., Tutz, G. (1997). Statistik. Der Weg zur Datenanalyse, Springer.
- Meier, L. (2020). Wahrscheinlichtsrechnug und Statistik: Eine Einführung für Verständnis, Intuition und Überblick, Springer

Comments

The exact requirements for the semester tasks are communicated in writing by the lecturers at the beginning of the lecture.