

Advanced Mathematics – Statistics and Probability Theory

Token / Number:	GM-Stats
English title:	Vertiefungskurs Mathematik – Statistik und Wahrscheinlichkeitsrechnung
Credits:	3 ECTS
Language:	German and English
Turn / Duration:	every Semester / 1 Semester
Module authority:	Prof. Dr. Karsten Urban
Training staff:	Tobias Born
Integration of module into courses of studies:	Suitable as an introductory course for the following master's programs Aktuarwissenschaften, M.Sc., Artificial Intelligence for Connected Industries Business Analytics, M.Sc., Biopharmazeutisch-Medizintechnische Wissenschaften, M.Sc.
Requirements (contentual):	Fundamentals of Mathematics
Learning objectives:	The introductory microcredential "Advanced Mathematics – Statistics and Probability Theory" provides students with in-depth knowledge of statistics and probability and helps them transition into part-time academic studies or from a university of applied sciences to a university. After completing the course, students will have an overview of integral calculus and the basics of elementary probability and statistics. In addition, they will be trained in working with random samples, parameter estimation, and hypothesis testing. This foundational module enables participants to attend advanced mathematics-related courses.
Content:	- Integral Calculus - Fundamentals of Probability - Fundamentals of Statistics
Literature:	- Meyberg, Vachenauer (2003). <i>Höhere Mathematik I und II</i>, Springer-Verlag - Modler, Kreh (2013). <i>Tutorium Analysis 1 und Lineare Algebra 1: Mathematik von Studenten für Studenten erklärt und dokumentiert</i>, Springer-Verlag - Heuser (2003), <i>Lehrbuch der Analysis</i>, Vieweg+Teubner - Mosler, K., Schmid, F. (2006). <i>Wahrscheinlichkeitsrechnung und schließende Statistik</i> (2. Aufl.) Berlin, Heidelberg: Springer - Krengel, U. (2005). <i>Einführung in die Wahrscheinlichkeitstheorie und Statistik: Für Studium, Berufspraxis und Lehramt</i> (8. Aufl.), Vieweg + Teubner - Cramer, E., Kamps, U. (2020). <i>Grundlagen der Wahrscheinlichkeitsrechnung und Statistik. Eine Einführung für Studierende der Informatik, der Ingenieur- und Wirtschaftswissenschaften</i> (5. Aufl.), Springer Spektrum
Modes of learning and teaching:	On-campus meetings: - Deepening exercises/case studies: 2 h - Exam: 1 h E-Learning: - Online seminar: 4 h - Self-Study based on the script: 39 h - Self-study (review of the contents of the lecture notes and the completion of exercise sheets): 30 h - Self-Study for exam preparation: 14 h

Estimation of effort:

Active Time: 2 h
Self-Study: 53 h
Exercises: 30 h
Miscellaneous: 4 h
Exam: 1 h
Sum: 90 h

Course assessment and exams:

The following requirements need to be met to take the (written/oral) module exam:

- Regular participation at attendance days or online seminars offered
- Completion of an ungraded preliminary assignment

The format, content, and scope of the preliminary work, as well as the type of examination, will be announced at the beginning of the course.

In case of hardship, the candidate can write an informal request to the coordinator in order to be given admission to the exam. In case of sickness a doctor's certificate has to be submitted to the coordinator.

Requirements (formal):

none

Grading:

The grade of the module will be the grade of the exam.