Module title			Abbreviation
Mathematical Foundations of Data Science			10-M-MFD-222-m01

Module coordinator	Module offered by
Dean of Studies Mathematik (Mathematics)	Institute of Mathematics

ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--

Duration	Module level	Other prerequisites
2 semester	undergraduate	--

Contents

Mathematical data analysis: histogram, band width selection, boxplot, kernel estimation, stochastic models and calibration, correlation, linear model and generalized linear models, nonparametric tests; Applied linear algebra for data science: orthogonality, matrix calculus, matrix factorisation, tensors, least squares, singular value decomposition, classification, approximation and dimension reduction; Applied analysis for data science: convexity, basic optimization, linear and quadratic programs, gradient descent, step size tuning

Intended learning outcomes

The student is acquainted with the fundamental methods and concepts of data science and can apply them to practical problems.

Courses (type, number of weekly contact hours, language — if other than German)

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Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 to 180 minutes, usually chosen) or
b) oral examination of one candidate each (15 to 30 minutes) or
c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor's degree (1 major) Mathematical Data Science (2022)
Exchange Program Mathematics (2023)