Valid from 2026.HS

Module description: Data-Driven Methods for Mechanical Engineering

Module Code	t.BA.MT.DMMT.27HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IMES
Module Coordinator	Thomas Mayer
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 3b 2 lecture lessons per semester week and class+ 4 lab bi-weekly lessons per semester and half-class
Module Description	The course teaches fundamental data-driven methods and machine learning approaches with a special focus on applications in mechanical engineering. Students learn how to systematically extract information from measurement, simulation and process data, build models, and critically evaluate results.
Module Content	• Introduction to data-driven methods and their relevance for mechanical engineering • Fundamentals of data science and machine learning • Statistical foundations for data analysis and model evaluation • Data processing and feature engineering • Linear classification and regression models • Model evaluation and validation • Decision trees and ensemble methods • Optional: unsupervised Learning • Practical examples from mechanical engineering • Accompanying practical course with hands-on implementation in Python using common libraries
Prerequisite Knowledge	Basic knowledge of Python, calculus, linear algebra, and statistics / probability theory

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Learning Objectives (Competencies)

Students...	Competencies	Taxonomies
A) The students are familiar with the fundamental terms, concepts, and application areas of data-driven methods in mechanical engineering.	F	K1, K2
B) The students understand the typical workflow of data-driven analysis projects, from data collection to model development and the evaluation of results.	F, M	K2
C) The students are able to select and apply appropriate machine learning methods (e.g. regression, classification, decision trees, ensemble methods) for given mechanical engineering problems.	M, F	K3
D) The students are able to prepare datasets, construct suitable features, and implement models using common software libraries.	F, M	K3, K4
E) The students are able to analyze and compare models with respect to quality, robustness, and generalizability.	F, M	K4, K5
F) The students are able to interpret the results of data-driven analyses in a technical context and make well-founded decisions regarding model selection.	M, F, SE	K5, K6
G) The students are able to document and present their approach, results, and the limitations of the methods used in a clear and comprehensible manner.	SO, SE	K5

Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Social Form	Scenario/Format
written exam	Grade	90	60%	acc. to module agreement	

	Assessment	Length (min.)	Weighting	Social Form	Scenario/Format
report	Grade	0	20%	acc. to module agreement	
Presentation *Presentation of the practical project carried out during the semester.*	Grade		20%	acc. to module agreement	

Classroom Attendance Requirement

None

Comments

This module is still in preparation. Individual details may therefore still change.