UNIVERSITÄT DUISBURG-ESSEN
Lehrstuhl Steuerung, Regelung
und Systemdynamik
Univ.-Prof. Dr.-Ing. Dirk Söffker

Sommersemester 2025

Course	**Machine learning (1V, 3S)**
Zielgruppe	Master Program: Mechanical Engineering – all programs Automation and Safety - Safe Systems and all programs Maschinenbau, Wirtschaftsingenieurwesen **NOTE: Check if this course is really listed in your actual/updated program description.**
URL of the course	https://lehre.moodle.uni-due.de/course/view.php?id=1838
Lecturer	Univ.-Prof. Dr.-Ing. Dirk Söffker
Assistant	Jonathan Liebeton, M.Sc.
About course	In SoSe 2025, the course will be realized in presence at the university. The realization is carried out via: - Lecture and exercise material (pdf) - Lecture video material - Exercise video material The commented material is published online 3 days before the lecture/exercise date in the Moodle course and can be downloaded. Downloading the commented versions after the lecture/exercise date is not possible. **In principal learning exclusively with the video material is not recommended, in this case this is different. The main focus is with the seminar part, the lecture serves more as introduction. So … feel free to take the introduction using the online material.** The core part of the course is based on Mathworks' webinars as well as structured manuscripts for online learning. The main part of your work is appointment independent, the student can solve the learning and training part when s/he according to his/her schedule. The given appointments are serving ONLY as Q/A and discussion meeting point. The students will also earn Mathworks certificates. If the course is finalized the grading will be automatically realized by Mathworks. **NO additional examination.** **The grading depends on the written final report. The enrollment for this course requires two finished parts: training part (mathworks) + homework part (in this sequence). The non existing written final report will automatically lead to a non successful examination.** **This course is based on the introduction into data-driven diagnosis and prognosis LU 4 and LU5 parts (which serves as introduction).**

	This allows interested students to attend both courses in parallel and earn deep insights into Fault Detection and Diagnosis and Prognosis methods using Machine Learning.
Material	Moodle: Machine learning– ML https://lehre.moodle.uni-due.de/course/view.php?id=1838 The password can be requested via the e-mail address srs-pw@uni-due.de. The subject must contain the word **ML**.
Day	Tuesday
Time	3.00 – 7.00 pm
Room	MB 242
First course	April 29
Last course	End of the summer semester, 2025
Literature	Literature is announced in the DAP-related text description
Additional Reading	To be announced during lecture
Content	The main contents of the course are: - Fundamentals of optimization strategies Application of machine learning models for clustering, classification, and regression - Basic design of intelligent controllers using reinforcement learning - Application of deep learning and implementation of network architectures The data sets used are standard Mathwork data sets, public known data sets (with respect to fault detection and diagnosis tasks), SRS data sets
Exam	The course grade will be realized by evaluation of the written final report. The grade will be forwarded to the examination office in case of exam enrollment. **For participation and assistance, we accept only students with exam enrollment.** **Due to the nature of this interactive course this exam is offered only once a year.**