

WiSe 2026/27

A Toolkit of Machine Learning and Operations Research: From Prediction to Decision [Current Topic]

Lecture and Exercise (4 SWS) – 5 CP – Language of instruction: English

Lecturer: Dr. Christina Liepold-Viehweger

1. Content and Objective of the Module

The module focuses on the notion of a shared toolkit of machine learning (ML) and operations research (OR): supervised learning (regression, decision trees, naive Bayes and Bayesian networks, neural networks), unsupervised learning (clustering, principal component analysis) and reinforcement learning (Q-learning/deep Q-network, policy gradient/actor-critic). These methods are applied to core areas of operations management practice, such as demand forecasting, inventory management, scheduling and capacity planning, pricing and revenue management, routing and logistics, and are contrasted in each case with the classical OR/OM baseline (e.g. economic order quantity, newsvendor, mixed-integer programming, vehicle routing, ARIMA, Markov decision processes). The course concludes with the integration of prediction and decision-making (predict-then-optimize).

Upon successful completion, students will have gained a foundational understanding of state-of-the-art ML methods, can distinguish ML from classical OR/OM methods, select the appropriate tool for a given problem, evaluate results with suitable metrics, and justify their method selection.

2. Target Group and Prerequisites

- Target group: Master BWL (CDS, SC, ORM), Master WiWi (CDS, SC, ORM, GM), Master Wirt.-Ing (CDS, SC, ORM)
- Max. number of participants: 80
- Language of instruction: English
- Basic knowledge of statistics and Python is helpful

3. Organizational Structure and Schedule

The module is taught as a weekly lecture (2 SWS) and a weekly exercise (2 SWS) in the second half of the lecture period of the winter semester 2026/27. The exercise applies the methods discussed in the lecture to operations management case studies.

- Kick-off: **Tuesday, 08.12.2026, 16:30, E1 (1090|301)** – together with the first lecture

- Lecture: Tuesdays, 16:30–20:00, E1 (1090|301) – 08.12., 15.12., 22.12.2026, 12.01., 19.01., 26.01., 02.02.2027
- Exercise: Wednesdays, 10:30–12:00, H 201 (1401|201) – 09.12., 16.12.2026, 06.01., 13.01., 20.01., 27.01., 03.02.2027

Attendance at the kick-off meeting is mandatory. Unexcused absence from the first session generally leads to the loss of the assigned place; which is then passed on to interested students from the waiting list. Please inform the lecturers immediately if you do not wish to accept an assigned place.

4. Examination Requirements

The examination consists of a written exam of 60 minutes (100% of the final grade). The module is not a module with a special didactic format pursuant to § 8 SPO and contains no course-accompanying assessments.

Date and time of PT1 and PT2: to be published in RWTHonline and in the course's Moodle.

5. Registration for the Course

The module is subject to a limited number of participants; places are allocated centrally. Registration takes place in ORsign from 16.09.2026 to 25.09.2026; the allocation will be announced between 28.09.2026 and 01.10.2026 by e-mail and on the website of the Faculty of Business Administration (Teilnehmerbeschränkte Module).

6. Registration for the Exam

Exam registration is carried out separately in RWTHonline within the registration period of the Faculty of Business Administration. Deregistration is possible via RWTHonline within the withdrawal period.

7. Contact Person for Questions

Module Content Dr. Christina Liepold-Viehweiger Kackertstraße 7, Room 150 52072 Aachen christina.liepold@om.rwth-aachen.de Yu Li Kackertstraße 7, Room 160 52072 Aachen yu.li@om.rwth-aachen.de	Course Registration Daniel Dirkes Templergraben 64, Room 622 zuteilung@wiwi.rwth-aachen.de Exam Registration Dr. Sandra Silvertant Examination Coordinator Templergraben 64, Room 622 pruefungen@wiwi.rwth-aachen.de
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