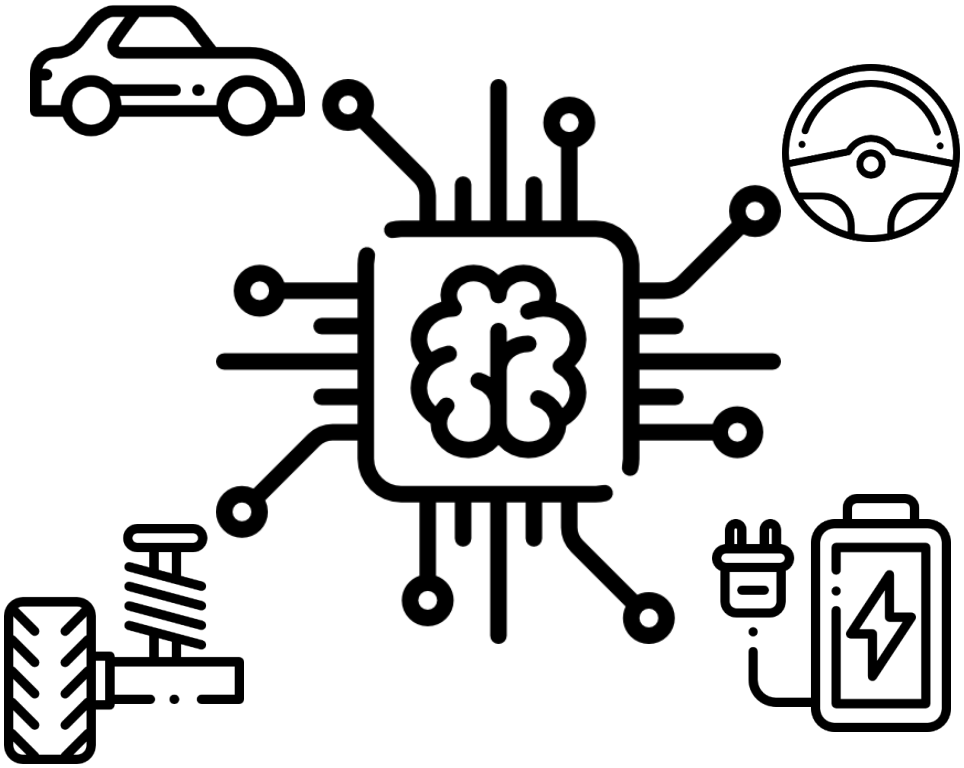
Institute of Automotive Technology
Faculty for Mechanical Engineering
Technical University of Munich

Artificial Intelligence in Automotive Technology

Prof. Dr.-Ing. Markus Lienkamp



New this year: English lecture

- For the first time, this lecture will be held in **English**
- There are **German videos available** from last year that cover the same content
- Questions can be in **German or English**
- Exam will be in **German and English** and we accept German or English answers

Institute of Automotive Technology – FTM

- Where is the Institute of Automotive Technology?
  - Building 5 / 3rd floor → "Guide" to the employees
  - www.ftm-tum.de
- Course guidance module “Automotive Engineering”
  Dr.-Ing. Frank Diermeyer, MW 3528, by arrangement

- Lecturers responsible for this semester:
  - Maximilian Geißlinger
  - Fabian Netzler

- For general information and questions please write in our moodle forum or an email to: vl.ki.ftm@ed.tum.de

General Course Information

Exam

- 5 ECTS
- Exam on 08.03.2022 at 2.15 pm
- Duration: 90 minutes
- A further explanation what we are asking in the exam will be done in the last lecture
- No oral / no foreign examinations

Lecture Overview

Lecture 16:15-17:45 | Practice 17:45-18:30	
1 Introduction: Artificial Intelligence	20.10.2022 – Maximilian Geißlinger
2 Perception	27.10.2022 – Sebastian Huber
3 Supervised Learning: Regression	03.11.2022 – Fabian Netzler
4 Supervised Learning: Classification	10.11.2022 – Andreas Schimpe
5 Unsupervised Learning: Clustering	17.11.2022 – Andreas Schimpe
6 Introduction: Artificial Neural Networks	24.11.2022 – Lennart Adenaw
7 Deep Neural Networks	08.12.2022 – Domagoj Majstorovic
8 Convolutional Neural Networks	15.12.2022 – Domagoj Majstorovic
9 Knowledge Graphs	12.01.2023 – Fabian Netzler
10 Recurrent Neural Networks	19.01.2023 – Matthias Rowold
11 Reinforcement Learning	26.01.2023 – Levent Ögretmen
12 AI-Development	02.02.2023 – Maximilian Geißlinger
13 Guest Lecture	09.02.2023 – to be announced

General Course Information

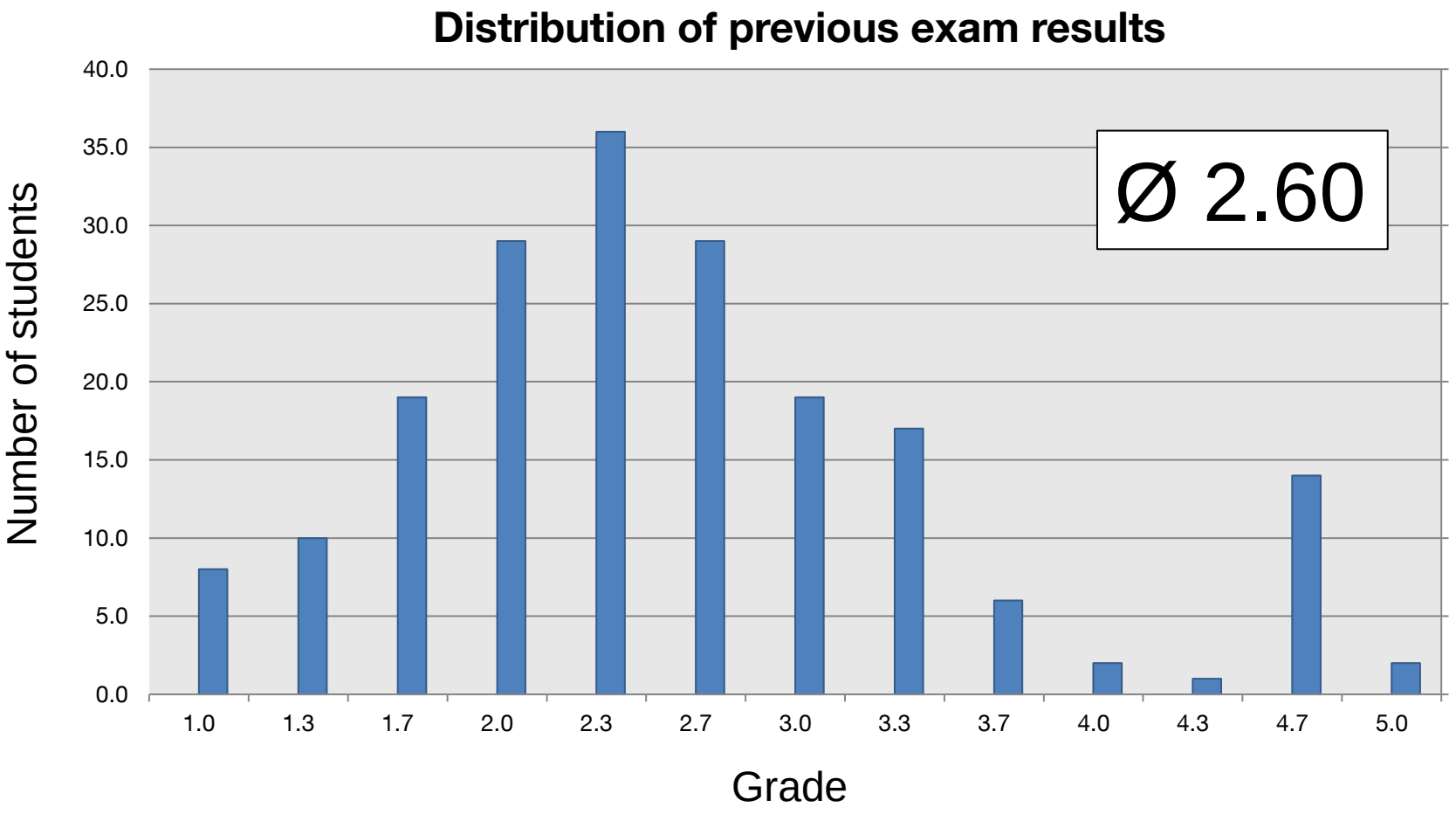
Registration:

- Website www.moodle.tum.de
- Registration in Moodle is automatic when you register for a course in TUM-Online
- Moodle cannot be used without a TUM online account (LRZ code)
- Exam registration is done separately via TUM-Online

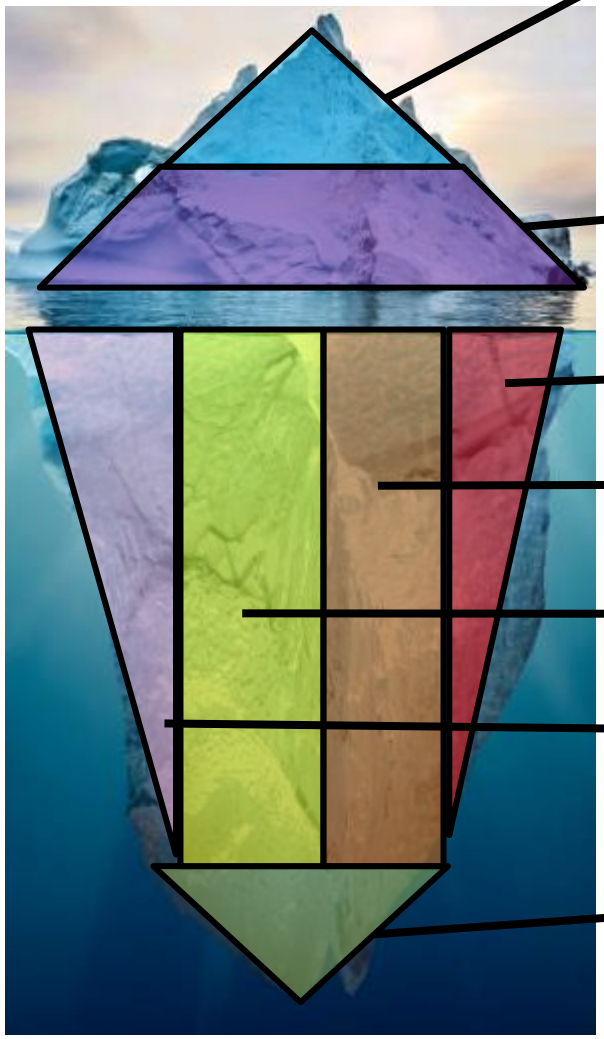
You will find everything on Moodle:

- Video recordings
- Lecture materials
- Practice materials
- Homeworks

General Course Information



Objectives of the Lecture



Theoretical lecture

Practical lecture

Software frameworks

Software examples

Online courses

Books/online reports

Scientific papers

Moodle

Recommended Books and Papers

Artificial Intelligence & Machine Learning
Russell, S. J., Norvig, P., & Davis, E. Artificial intelligence: a modern approach, 2020
Tom M. Mitchell, Machine Learning, 1997
Christopher M. Bishop, Pattern Recognition and Machine Learning, 2007
David Barber, Bayesian Reasoning and Machine Learning, 2012

Deep Learning and Neural Networks
Christopher M. Bishop, Neural Networks for Pattern Recognition, 1995
Michael Nielsen, Neural Networks and Deep Learning, 2014
Goodfellow et al., Deep Learning, 2016 → Free Download
http://www.deeplearningbook.org

Autonomous Driving
Pendelten et. al, Perception, Planning, Control, and Coordination for Autonomous Vehicles, Machines 2017, 5(1), 6; https://doi.org/10.3390/machines5010006

+ Additional papers in each lecture

Additional Courses

NVIDIA Deep Learning Institute offers self-paced training and instructor-led workshops
https://www.nvidia.com/en-us/deep-learning-ai/education/

CS229: Machine Learning by Andrew Ng (Baidu)
https://www.youtube.com/watch?v=UzxYlbK2c7E&list=PLA89DCFA6ADACE599

Deep Learning at Oxford by Nando de Freitas (University of Oxford)
https://www.youtube.com/playlist?list=PLE6Wd9FR--EfW8dtjAuPoTuPcqmOV53Fu

Neural Networks for Machine Learning by Geoffrey Hinton (Google, University of Toronto) https://www.coursera.org/learn/neural-networks

Deep Learning for Computer Vision by Rob Fergus (Facebook, NYU)
https://www.youtube.com/watch?v=qgx57X0fBdA

Learning from Data by Yasser Abu-Mostafa (Caltech)
https://work.caltech.edu/lectures.html#lectures