Module Description 39-M-Inf-AI-adv_a Advanced Artificial Intelligence

Faculty of Technology

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This module guide reflects the current state and is subject to change. Up-to-date information and the latest version of this document can be found online via the page

https://ekvv.uni-bielefeld.de/sinfo/publ/modul/544082149

The current and valid provisions in the module guide are binding and further specify the subject-related regulations (German "FsB") published in the Official Announcements of Bielefeld University.

39-M-Inf-AI-adv_a Advanced Artificial Intelligence

Faculty

Faculty of Technology

Person responsible for module

Prof'in Dr. Barbara Hammer

Dr. rer. nat. Robert Haschke

Regular cycle (beginning)

Every semester

Credit points

5 Credit points

Competencies

Students acquire advanced theoretical-methodological knowledge in the areas of Artificial Intelligence and Machine Learning in this module, which are necessary for the implementation of intelligent, adaptive behavior and the interaction capability of technical systems. Upon completion of the module, students will be able to apply modern data- or model-based methods from a subfield of AI/machine learning (e.g. deep learning, reinforcement learning, probabilistic models, XAI).

Content of teaching

The module provides in-depth theoretical and methodological knowledge necessary for the development of intelligent interactive systems. The teaching content of the module includes e.g. courses from the areas of machine learning, artificial intelligence, deep learning, reinforcement learning, XAI, cognitive computing, models of decision-making, neural networks, auditory data science, interactive and autonomous learning. The courses chosen by the student determine the specific course content of the module. Selection from the range of courses designated for this purpose will be based on personal interest.

Recommended previous knowledge

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Necessary requirements

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Explanation regarding the elements of the module

The courses include a lecture (2 CP) with the corresponding exercise (2 CP) OR a seminar (2 CP) with the corresponding exercise (2 CP) from a related subject area.

Module structure: 1 bPr [1]

Courses

Title	Type	Regular cycle	Workload [5]	LP[2]
Advanced Artificial Intelligence: Seminar	seminar	WiSe&SoSe	60 h (30 + 30)	2 [Pr]
Advanced Artificial Intelligence: Lecture	lecture	WiSe&SoSe	60 h (30 + 30)	2 [Pr]
Advanced Artificial Intelligence: Übung *To study together with a corresponding lecture or with the associated seminar each from the area of Advanced Artificial Intelligence.*	exercise	WiSe&SoSe	60 h (30 + 30)	2
Advanced Artificial Intelligence: Übung (Alternative) *To study together with a corresponding lecture or with the associated seminar, each from the field of Advanced Artificial Intelligence.*	exercise	WiSe&SoSe	60 h (15 + 45)	2

Examinations

Allocated examiner	Type	Weighting	Workload	LP[2]
Teaching staff of the course **Advanced Artificial Intelligence: Seminar (seminar)** ***Examination upon Completion of Seminar + Exercise*** *Portfolio with final examination consisting of:* *1) Portfolio of exercises related to the content of the seminar* *Exercise tasks or programming tasks that are assigned in relation to the course (passing threshold: 50% of the achievable points). The assessment of the exercise tasks also includes direct questions regarding the solutions that must be answered by the students during the exercises. The instructor may require an individual explanation and demonstration of tasks and can replace a portion of the exercise tasks with in-person exercises. The exercise tasks within the portfolio are generally assigned weekly and serve to support the independent learning of implementations of the content presented in the seminar/in the lecture. Further specification, particularly regarding the time frame of the final examination, will be provided in the course description.*	Portfolio mit mündlicher Abschlussprüfung o. Portfolio mit schriftlicher Abschlussprüfung	1	30h	1

2) A final examination for the seminar *The final examination regarding the content of the seminar refers to the exercise or programming tasks or develops from the competencies learned in the exercises.* *Seminar: Presentation (lasting 30–40 minutes) with written report (10-15 pages)* *The students present, after coordinating the specific task with the examiner, the significance and systematic-scientific classification of a problem addressed in the seminar and explain and present their topic in writing in their report, incorporating aspects from the discussion in the seminar. The task may also include the elaboration of an application (i. e., programming/calculation, etc.) of a method to a typically practically significant individual case. The presentation with report refers to the content conveyed in the seminar and developed in the exercises.* *Both portfolio elements will be assessed by an examiner. A final overall assessment will be provided.*				
Teaching staff of the course **Advanced Artificial Intelligence: Lecture (lecture)** ***Examination upon Completion of Lecture + Exercise*** *Portfolio with final examination consisting of:* *1) Portfolio of exercises related to the content of the lecture* *Exercise tasks or programming tasks that are assigned in relation to the course (passing threshold: 50% of the achievable points). The assessment of the exercise tasks also includes direct questions regarding the solutions that must be answered by the students during the exercises. The instructor may require an individual explanation and demonstration of tasks and can replace a portion of the exercise tasks with in-person exercises. The exercise tasks within the portfolio are generally assigned weekly and serve to support the independent learning of implementations of the content presented in the seminar/in the lecture. Further specification, particularly regarding the time frame of the final examination, will be provided in the course description.* *2) A final examination for the lecture* *The final examination regarding the content of the lecture refers to the exercise or programming tasks or develops from the competencies learned in the exercises.* *Lecture: Final exam (lasting 90-120 minutes) or oral final examination (lasting 20-30 minutes) covering the content conveyed in the lecture and developed in the exercises.* *The exam can alternatively be conducted as an e-exam, open book exam, or e-open book exam. In the case of open book and e-open book exams, the duration is 120-150 minutes.* *Both portfolio elements will be assessed by an examiner. A final overall assessment will be provided.*	Portfolio mit mündlicher Abschlussprüfung o. Portfolio mit schriftlicher Abschlussprüfung	1	30h	1

Legend

1	The module structure displays the required number of study requirements and examinations.
2	LP is the short form for credit points.
3	The figures in this column are the specialist semesters in which it is recommended to start the module. Depending on the individual study schedule, entirely different courses of study are possible and advisable.
4	Explanations on mandatory option: "Obligation" means: This module is mandatory for the course of the studies; "Optional obligation" means: This module belongs to a number of modules available for selection under certain circumstances. This is more precisely regulated by the "Subject-related regulations" (see navigation).
5	Workload (contact time + self-study)
SoSe	Summer semester
WiSe	Winter semester
SL	study requirement
Pr	Examination
bPr	Number of examinations with grades
uPr	Number of examinations without grades