

**Lehrform** (*teaching format*) / **SWS** (*hours per week*): 4K

**Kreditpunkte** (*credit points*): 6

**Turnus** (*frequency*): each summer term

**Inhaltliche Voraussetzungen** (*content-related prior knowledge/skills*):

Fundamental knowledge of machine learning models and algorithms, as taught in e.g. the Fundamentals of Machine Learning course. Although not required, the advanced machine learning course (F-AML) is recommended for a deeper understanding of some discussed phenomena.

**Sprache** (*language*): English

**Lehrende** (*teaching staff*): AG OWL-ML (Prof. Dr. Martin Mundt)

Studiengang ( <i>degree program</i> )	Module	Semester
Informatik (Master)	IMAP, IMA-AI	ab 1.Sem.
AI and Intelligent Systems (Master)	AI-M-MLCS	from 2nd sem.
Informatik (Bachelor)	(nur <i>Freie Wahl</i> )	

**Lernergebnisse** / *Learning Outcome*:

Machine learning studies the design of models and training algorithms in order to learn how to solve tasks from data. Whereas historically machine learning has concentrated primarily on static predefined training datasets and respective test scenarios, recent advances also take into account the fact that the world is constantly evolving. Upon successful completion of the course, students will have learned to

- understand the breath of factors relevant to lifelong machine learning and their biological inspiration
- design methods to transfer machine knowledge and mitigate interference in continual training
- go beyond rigid train-validate-test methodology towards assessment of lifecycles
- deal with unknown future inputs and adapt machines to diverse contexts

**Inhalte** / *Contents*:

The course traverses the fundamentals of lifelong machine learning, spanning methodology of how to effectively learn in the present, remember the past, and anticipate an unknown future:

- Effective learning of present information: curriculum learning and assessing task difficulty, domain adaptation and knowledge transfer
- Remembering past information: the sequential learning problem, algorithms and methods to mitigate catastrophic interference and forgetting
- Handling an unknown future: active learning, closed and open world learning, dynamic and modular neural architectures
- Biological and cognitive underpinnings of lifelong machine learning
- Benchmarks and evaluation methodologies for lifelong machine learning
- Software foundations for lifelong machine learning
- Lifelong machine learning applications

**Hinweise** (*remarks*): The table lists only the primary / most specific modules to which this course is assigned.