Module title			Abbreviation
Reinforcement Learning and Computational Decision Making			10-I=RLCDM-252-m01
Module coordinator		**Module offered by**	
Dean of Studies Informatik (Computer Science)		Institute of Computer Science	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

This course will provide the essential notions about reinforcement learning and further related approaches for computational decision-making (e.g., multi-armed bandits, recommender systems). The topics will be covered under a both theoretical and empirical lens, providing the rigorous mathematical foundations of reinforcement learning and decision-making, complementing them with concrete examples of real-world applications.

Intended learning outcomes

The students will gain fundamental knowledge of Reinforcement Learning spanning from classical methods to modern algorithms based on deep learning techniques, and Decision-Making approaches such as multi-armed bandits and recommender systems. Students will know about the theoretical treatment of the methods explained in the course, and will have a deep understanding of the importance of Reinforcement Learning and Decision-Making in solving real-world problems. They will be able to design, implement, and conduct Reinforcement Learning experiments for solving problems from simulated basic tasks to advanced real-world applications, e.g., games, autonomous driving, finance, robotics.

Courses (type, number of weekly contact hours, language — if other than German)

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Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN

Workload

150 h

Teaching cycle

Teaching cycle: every year, summer semester

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2025)
Master's degree (1 major) Mathematical Data Science (2025)
First state examination for the teaching degree Gymnasium Computer Science (2025)
Teaching degree Gymnasium Erweiterung Computer Science (2025)

Exchange Program Computer Science (2025)

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