Module title			Abbreviation
Quantum Communications			10-I=QC-252-m01
Module coordinator		**Module offered by**	
holder of the Chair of Computer Science VII		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

- Introduction
- Hilbert Spaces and Operators
- Quantum Mechanics
- Quantum States
- Quantum Circuit Elements
- Entanglement and Its Applications
- Quantum Key Distribution
- Quantum Channel
- Quantum Error Correction Coding
- Continuous-Variable Quantum Communications
- Further Topics

Intended learning outcomes

Students will

- develop a solid foundation in quantum information technology, including qubits, quantum gates, entanglement, and quantum measurements,
- learn about secure communications using quantum mechanics, including protocols like Quantum Key Distribution (QKD),
- gain familiarity with protocols such as quantum teleportation, superdense coding and error correction, and
- understand the effects of noise and decoherence in quantum communications and learn strategies to mitigate their impact.

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

V (2) + V (2)
Module taught in: 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: 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): LR

Workload

150 h

Teaching cycle
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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)