Uniwersytet Gdański

KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez
Unię Europejską w ramach
Europejskiego Funduszu
Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Quantum computation	13.2.0417

Name of unit administrating study

null

Studies

faculty	field of study	type	all
Faculty of Mathematics, Physics and Informatics	Quantum Information Technology	form	all
		specialty	all
		specialization	all

Teaching staff

prof. dr hab. Paweł Horodecki; mgr Ricard Ravell Rodríguez; prof. UG, dr hab. Karol Horodecki; dr Paweł Mazurek

Forms of classes, the realization and number of hours	ECTS credits
Forms of classes	4
Auditorium classes, Lecture	lecture - 3 ECTS
The realization of activities	exercises - 2 ECTS
classroom instruction, online classes	
Number of hours	
Auditorium classes: 15 hours, Lecture: 30 hours	

The academic cycle

2022/2023 winter semester

Type of course	Language of instruction
obligatory	english

Teaching methods	Form and method of assessment and basic criteria for eveluation or examination requirements
- multimedia-based lecture	**Final evaluation**
- problem-focused lecture	- Graded credit
	- Examination
	Assessment methods
	- (mid-term / end-term) test
	- written exam (test)
	The basic criteria for evaluation
	The final grade is determined according to the indicator percentage ("UG Study Regulations").

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements
none

B. Prerequisites
none

Aims of education

To show main algorithms performed by quantum computing and analyze their specific features

Course contents

Measurement and quantum teleportation

No cloning, entanglement, and density matrices

Non-local games

Entropy and Entanglement Distillation

The Deutsch-Josza and Bernstein-Vazirani algorithms

Simon's algorithm and applications to cryptography

The Quantum Fourier Transform

Shor's quantum factoring algorithm

Grover search and approximate counting

Bibliography of literature

Nielsen and Chuang, Quantum Computation and Quantum Information

The learning outcomes (for the field of study and specialization)	Knowledge
	W01: Main algorithms of quantum computing (K_W01, K_W02, K_W04)
K_W01	W02: Specific features and abilities of quantum computation (K_W04)
K_W02	**Skills**
K_W04	
K_U01	U01: Analyze properties of quantum algorithms (K_U01)
K_U02	U02: Solve problems within the theory of quantum computation (K_U02)
	Social competence

Contact

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