







Projekt jest współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

Course title	ECTS code 13.2.0416						
	4 1		15.	2.0110			
Department of Mathema	way tics Physics and Inform	atics					
Studios	ites, i hysics and inform	ancs					
Faculty	Field of study/ phd	Type Form					
Quantum Information	studies/doctoral		stationary				
Technology	school/postgraduate studies						
	MISC studies						
Tooching stoff							
Dr hab. Marcin Pawłowski; D	r Nikolai Miklin						
Forms of classes, the realization and number of hours			ECTS credits				
A. Forms of classes, in acco	rdance with the UG Rector's		Total:	5 ECTS	5 including	g:	
regulations			30 h of	f lecture	e – 1 ECTS	5 point;	
Lecture, auditory e	xercises		30 h of	f exercis	ses – 1 EC'	TS point;	
B. The realization of activit	ies ing room of the University of	Cdańsk	30 h of	f consul f studor	tation -1	ECTS point;	nointe
blended learning	ing room of the University of	Gualisk	00 11 01	i studen	t s own we	OFK - 2 EC 15	points.
C. Number of hours							
Lecture: 30, exercis	ses: 30						
The academic cycle							
According to study	program						
Type of course	Lang	uage of in	structio	on			
mandatory	H	nglish					
Teaching methods		8					
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Projekt "Wdrożenie nowoczesnych modeli zarządzania jakością w Uniwersytecie Gdańskim (MODEL_UG)" Nr umowy: UDA-POKL.04.01.01-00-056/11-00









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Required courses and intro	ductory requirements									
A. Formal requirement	nts									
none										
B. Prerequisites										
Basic knowledge of mathematics at high school level is required.										
Aims of education										
Knowledge and unders	standing of standard methods and aims of quantum cryptography. The									
student should know b	asic quantum protocols for key distribution, randomness generation and									
cryptoanalysis. The stu	ident should also be able to sketch their security proofs and know their									
applications.										
Course contents										
 The course contents Basics of classical cry cryptography. Quantum key distrib Quantum cryptoanal Quantum random m Device independent of Quantum hacking: p Other quantum cryptore Elements of practica 	presentation of the following concepts (lecture and exercises will be devoted to the same topics): yptography: symmetric and asymmetric protocols; security proofs; typical attacks; post-quantum ution: BB84, E91 and BBM92 protocols and their security proofs. lysis: Shor's algorithm. imber generators: methods of generation; randomness amplification. cryptography: Bell inequality-based; semi-device independent protocols. hoton number splitting, intercept-resend and detector blinding attacks. tographic protocols: secret sharing; quantum fingerprinting; oblivious transfer; bit commitment. I quantum cryptography: typical setups; known issues; current trends.									
 A. Literature required "Quantum Press. Collection 	d to pass the course a Computation and Quantum Information", M.A. Nielsen, I.L. Chuang, Cambridge University of scientific papers supplied by the lecturer.									
The leavesting and a sure of	Veculadas									
for the field of study and	Knowledge									
(for the field of study and specialization)	WUI. The student knows examples of several quantum cryptographic protocols, understands their scope									
K W02	of applications, advantages, common issues and vulnerabilities (K, W02, K, W03)									
Student has in-depth	W02									
knowledge of advanced	The student knows basics of classical cryptography – especially problems which can be solved									
mathematics, mathematical	with its quantum counterpart and dangers due to quantum computers. (K_W02, K_W03)									
and computer methods	Skills									
problems of medium	U01									
complexity and advanced in	The student can analyze security of quantum key distribution protocols. (K_U02)									
the area of quantum	U02 The student knows how to perform attacks on basic grantegraphic systems and how to counteract									
information and its	mation and its [11] Find them (K, 1102)									
technological aspects	U03									
K W03	The student can establish key and randomness generation rates for given protocols. (K_U02)									
Student knows advanced	Social competence									
experimental, observational	K01									
and numerical techniques	<i>I numerical techniques</i> The student understands the importance of data security in modern society and knows the impact of quantum technologies in that field. (K_K01)									
allowing to plan and perform a										
complex physical experiment										
K_U02										
Student can apply										
mathematical knowledge to										

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formulating, analyzing and solving problems related to information theory			
K_K06 Student is aware of the dangers of obtaining information from unverified sources, including those from the Internet			
Contact marcin.pawlowski@ug.edu	.pl		

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