University of Gdańsk

Subject card

Subject name and code	Physical Implementations of Quantum Information, PG_00193481						
Field of study	Quantum Information Technology						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
Education level	Master's studies		Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	English			
Semester of study	3		ECTS credits	2.0			
Learning profile	academic		Assessment form	credit			
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Michał Horodecki				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	15		0.0		35.0	50
Subject objectives	To familiarize the students with experimental platforms relevant for implementations of quantum information techniques.						

<table>
<tr><td>Learning outcomes</td><td>
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<tr><th>Course outcome</th><th>Subject outcome</th><th>Method of verification</th></tr>
<tr><td>[QITL3_W02] knows and understands on deepened level key and selected advanced detailed issues in the field of quantum information technology, including methods of their research and development, and their applications in the context of dynamic technological changes, in particular in the area of information processing, cryptography and the development of advanced computing systems</td><td></td><td></td></tr>
<tr><td>[QITL3_U02] is able to use their knowledge of quantum information technology – formulate and solve complex and unusual problems and innovatively perform tasks in unpredictable conditions by appropriately selecting sources and information derived from them, evaluating, critically analyzing, synthesizing, creatively interpreting, and presenting this information, as well as by selecting and applying appropriate methods and tools, including advanced information and communication techniques and adapting existing methods and tools or developing new ones</td><td></td><td></td></tr>
<tr><td>[QITL3_W01] knows and understands in depth selected facts, objects and phenomena, as well as the methods and theories related to them, explaining the complex relationships between them, constituting advanced general knowledge in the field of quantum information technology, as well as the scientific research methodology specific to this discipline and its importance in the context of contemporary directions of development of science and technology</td><td></td><td></td></tr>
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<tr><td>Subject contents</td><td>Implementations of quantum information in with quantum optics, with ions and neutral cold atoms, as well as spins in semiconductor quantum dots, NV centers and molecules.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>essay</td><td>51.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Quantum computation and quantum information, Michael A. Nielsen & Isaac L. Chuang, Cambridge : Cambridge University Press, 2000</td></tr>
<tr><td>Supplementary literature</td><td>None.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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