GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Applications of Quantum Effects, PG_00069338		
Field of study	Nanotechnology		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Nanomaterials Physics -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jarosław Rybicki	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	0.0	0.0	15.0	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	1.0	9.0	25

Subject objectives

The aim of the course is to familiarize students with the possible applications of quantum engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K05] can present effects of their own work, provide information in a clear manner, communicate and self-evaluate, and give constructive feedback on the work of others.	The ability to present the results of work on a selected issue in the field of quantum engineering in an understandable manner.	[SK4] Assessment of communication skills, including language correctness
[K6_U01] can learn independently, obtain information from literature, databases and other properly selected sources	The ability to independently obtain information from databases and other sources	[SU5] Assessment of ability to present the results of task
[K6_U11] can prepare dissertations, papers, oral presentations, in Polish and English, concerning detailed problems in physics and related fields and disciplines of science.	Ability to prepare a presentation on the applications of quantum engineering and convey its content in the form of an oral presentation.	[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task

<table>
<tr><td>Subject contents</td><td>Course content – seminar
1. Quantum Effects in Electronics: Diodes, Transistors.

2. Quantum Effects in Lithography.

3. Quantum Effects in Lasers.

4. Quantum Effects in STM Microscopy.

5. Quantum Effects in Medicine: MRI, PET.

6. Quantum Interferometers.

7. Quantum Clocks.

8. Quantum Cryptography

9. Quantum Computers and Their Potential Applications.

10. Quantum Navigation Systems: GPS, Galileo.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Completed courses in "Physics in Experiment" I and II and the course "Modern Physics"</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>Participation in the seminar</td><td>90.0%</td><td>20.0%</td></tr>
<tr><td>Preparing a presentation and delivering a seminar</td><td>50.0%</td><td>80.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Students must find and select the materials needed to prepare presentations and deliver seminars independently. Resource selection can be discussed with the teacher.</td></tr>
<tr><td>Supplementary literature</td><td>Students must find and select the materials needed to prepare presentations and deliver seminars independently. Resource selection can be discussed with the teacher.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Sample seminar topics:

Quantum Effects in Lasers

Quantum Effects in STM Microscopy.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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