

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Quantum Physics		Code 1011105251011103578
Field of study Engineering Management - Part-time studies -	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 5
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) elective
Cycle of study: First-cycle studies	Form of study (full-time,part-time) part-time	
No. of hours Lecture: 10 Classes: - Laboratory: - Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art		ECTS distribution (number and %)
Responsible for subject / lecturer: prof dr hab Danuta Wróbel email: danuta.wrobel@put.poznan.pl tel. (+48 61) 665-31-79 Faculty of Technical Physics ul. Nieszawska 13A, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge on physics and mathematics
2	Skills	Ability to solve simple problems from the area of physics and mathematics, ability to collect information from suggested sources
3	Social competencies	Understanding and necessity of expanding own competences from the range of modern science and technology in order to have the ability to work in a team; understanding the necessity of cooperation with other students; understanding of the necessity of taking decisions in favor of the academic society and society as a whole.
Assumptions and objectives of the course:		
1. Presentation of the knowledge from the range of basics of modern quantum physics and the correlation between physics and managerial skills 2. Presentation of the knowledge on the importance of modern physics in the development of the society 3. Giving knowledge on fundamental quantum phenomena and presentation during lectures 4. Interactive lectures realized in cooperation with students and forming the skill of teamwork		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. knows basic methods, techniques, instruments and materials applied for solving simple engineer tasks from the range of machine construction and implementation - [K04-InzA_W02] 2. knows typical industrial technologies and deeply knows technologies of machine construction and implementation - [K07-InzA_W5]		
Skills:		
1. is able to identify project tasks and solve simple project tasks from the range of machine construction and implementation - [K01-InzA_U6] 2. is able to apply typical methods of solving simple tasks from the range of machine construction and implementation - [K01-InzA_U7]		
Social competencies:		
1. is aware of the importance of physics and it consequences in the engineer activity - [K01-InzA_K1]		
Assessment methods of study outcomes		

<p>Forming assessment: a) laboratories: on basis of the current progress in realization of topics evaluated on basis of written reports b) lectures: on basis of responses to questions concerning subjects from former lectures,</p> <p>Final assessment: a) laboratories: on basis of the average of fragmentary evaluations formulating evaluations b) lectures: final assessment in written form of a test. Entering the test is possible after passing the final assessment of laboratory classes</p>		
Course description		
<p>Wave - corpuscular duality. De Broglie's hypothesis. Photoelectric phenomenon. Compton's phenomenon. Creation of pairs. Rutherford's experiment. Model of hydrogen atom. Ideal black body radiation. Schroedinger's equation. Wave functions. Quantum -mechanical oscillator. Tunnelling. EPR paradox. Hidden variable hypothesis. Quantum - based teleportation</p> <p>Lecture - informative and conversational lecture Laboratory - laboratory method</p>		
Basic bibliography:		
<ol style="list-style-type: none"> Wykład z fizyki cz. 2 Elementy fizyki współczesnej, Sylwester Kania , Wydawnictwo Politechniki Łódzkiej, 2012 Wprowadzenie do mechaniki kwantowej i fizyki statystycznej, Robert Kosiński, Oficyna Wydawnicza Politechniki Warszawskiej, 2013 Wykłady z fizyki t.3 Optyka kwantowa. Fizyka atomu. Fizyka ciała stałego. Fizyka jądra atomowego i cząstek elementarnych, I.W. Sawieliew, PWN 2002 		
Additional bibliography:		
<ol style="list-style-type: none"> Podstawy fizyki relatywistycznej i mechaniki kwantowej, Marian Kozielski, Oficyna Wydawnicza Politechniki Warszawskiej, 1999 		
Result of average student's workload		
Activity	Time (working hours)	
1. lecture	10	
2. consultation	5	
3. final assessment and exam	10	
4. preparing to exam	30	
Student's workload		
Source of workload	hours	ECTS
Total workload	55	2
Contact hours	25	1
Practical activities	5	0