

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Quantum Physics		Code 1011101351010413578
Field of study Engineering Management - Full-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) full-time	
No. of hours Lecture: 15 Classes: - Laboratory: 15 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 technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: Chair of Control and Systems Engineering email: office_cse@put.poznan.pl tel. (+48 61) 665-21-99 Faculty of Computing 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 its consequences in the engineer activity - [K01-InzA_K1]		

Assessment methods of study outcomes		
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, 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		
Course description		
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		
Basic bibliography:		
1. Richard P. Feynman, Feynmana wykłady z fizyki Tom 3, Wydawnictwo Naukowe PWN, Warszawa, 2004 r.		
Additional bibliography:		
1. Quantum Mechanics and 21st Century Business Management. Neuroleadership Summit, Asolo, Italy, May 14-16, 2007 - materiały konferencyjne		
Result of average student's workload		
Activity	Time (working hours)	
1. lecture	15	
2. laboratory classes	15	
3. consultation	5	
4. preparation for laboratories	15	
5. final assessment and exam	10	
Student's workload		
Source of workload	hours	ECTS
Total workload	60	2
Contact hours	45	1
Practical activities	15	0