

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Elements of Modern Physics		Code 1010401131010430578
Field of study EDUCATION IN TECHNOLOGY AND	Profile of study (general academic, practical) general academic	Year /Semester 2 / 3
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: 2 Laboratory: - Project/seminars: -		No. of credits 5
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art		ECTS distribution (number and %)
Responsible for subject / lecturer: dr hab. Eryk Wolarz email: eryk.wolarz@put.poznan.pl tel. 616653167 Faculty of Technical Physics ul. Nieszawska 13A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	basic knowledge of general physics as carried on the Education in Technology and Informatics specialization
2	Skills	ability to solve basic problems of general physics based on their knowledge
3	Social competencies	understanding of the need to expand their competences
Assumptions and objectives of the course: -Acquainting students with selected areas of modern physics. -Developing students' ability to analyze physical phenomena and solving by them technical problems on the basis of the achievements of modern physics.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. Define the physical concepts to the extent specified by the Elements of Modern Physics course program. - [K_W02] 2. Formulate and explain the laws of physics to the extent specified by the content of the course program and to determine the extent of their applicability. - [K_W02] 3. Describe the current state of research and the latest development trends in physics. - [K_W17]		
Skills: 1. Apply the laws and formulas binding physical quantities to solve simple problems specified in the program content of the subject of the study. - [K_U01] 2. Draw conclusions on the basis of the results of calculations. - [K_U01] 3. Use with the understanding of the indicated sources of knowledge (basic bibliography) and to acquire knowledge from other sources. - [K_U01, K_U02]		
Social competencies: 1. Actively engage in solving the questions posed. - [K_K01]		
Assessment methods of study outcomes		

Effect of education	Type of evaluation	Evaluation criteria	
W02	written/oral exam	3	50.1%-70.0%
		4	70.1%-90.0%
		5	above 90.1%
W017	written/oral exam	3	50.1%-70.0%
		4	70.1%-90.0%
		5	above 90.1%
U01	test	3	50.1%-70.0%
		4	70.1%-90.0%
		5	above 90.1%
U02	test	3	50.1%-70.0%
		4	70.1%-90.0%
		5	above 90.1%
K01	oral answers on the tutorials and show a strong commitment to solving problems - the student gets an extra score for the test result for any presentation of solution to the problem at the blackboard.)	(The student alone seeks a solution on the basis of acquired knowledge)	
Course description			
1. Elements of relativistic mechanics. 2. Photons and matter waves. 3. Elements of quantum mechanics. 4. The atomic structure of matter. 5. The basic physics of lasers. 6. Metals and semiconductors. 7. Applications of semiconductors. 8. Elements of nuclear physics. 9. Elementary particles and the quark model.			
Basic bibliography:			
1. D. Halliday, R. Resnick, J. Walker, Podstawy fizyki, tom 4 i tom 5, Wydawnictwo Naukowe PWN, Warszawa, 2005.			
Additional bibliography:			
1. J. Orear, Fizyka, tom 2, Wydawnictwa Naukowo - Techniczne, Warszawa, 2004.			
2. J. Massalski, Fizyka dla inżynierów. Część II. Fizyka współczesna, Wydawnictwa Naukowo - Techniczne, Warszawa, 2005.			
Result of average student's workload			
Activity			Time (working hours)
1. Participation in lectures			30
2. Analysis of the lectures			6
3. Participation in tutorials			30
4. Preparing for tutorials			15
5. Preparing for colloquia			15
6. Consultation			2
7. Preparing for exams			20
8. Exam			2
Student's workload			
Source of workload		hours	ECTS
Total workload		120	5
Contact hours		64	3
Practical activities		30	1