

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject laser techniques and measuring apparatus		Code 1010401261010421280
Field of study TECHNICAL PHYSICS	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 6
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: 2 Classes: - Laboratory: - Project/seminars: -		No. of credits 12
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		ECTS distribution (number and %) 12 100%
Responsible for subject / lecturer: dr Andrzej Krzykowski email: Andrzej.Krzykowski@put.poznan.pl tel. 61 665 3222 Faculty of Technical Physics ul. Nieszawska 13A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of physics and mathematics in the first degree studies. Basic knowledge in optics, atomic physics and quantum
2	Skills	Ability to solve basic problems of physics on the basis of their knowledge, skills in obtaining information from identified sources
3	Social competencies	Willingness to work together as a team. Understanding the need to expand their competences
Assumptions and objectives of the course: Provide basic knowledge on the design and use of lasers and practical skills in research planning and the use of laser radiation with measurements carried out with very high accuracy		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. He knows the basic concepts of physical conditions in the description of the experimental research, to use the basic knowledge in the field of metrology, knows the different methods of measurement using coherent light - [W01] 2. knows the structure and scope of applicability of the basic measuring devices, modules, components can recognize test equipment, to determine their role in measuring poultrice - [W02]		
Skills:		
1. can benefit from an understanding of scientific publications and gain knowledge from other sources, in a synthetic way to make the development of the acquired knowledge - [U01] 2. able to design experimental systems or make changes in the construction of test equipment in order to comply with special requirements - [U02] 3. can handle basic measuring devices and laser equipment in accordance with the requirements and safety rules - [U03]		
Social competencies:		
1. can actively and independently expand their skills and work together as a team - [-]		
Assessment methods of study outcomes		
Lecture - Examination, laboratory - assessment, project - assessment		
Course description		

Physical basics of lasers, construction, types, and distribution of lasers. Spectroscopy using tunable lasers. Lasers for materials processing. Lasers in metrology, the use of the atomic clocks. Lasers in medical diagnostics and therapy. The use of strong beam of light in a non-linear spectroscopy. Frequency doubling and mixing light cooling and trapping of atoms		
Basic bibliography:		
1. B. Ziętek Lasery wyd. UMK 2009r		
2. W. Demtröder Spektroskopia laserowa wyd. nauk. PWN 1993r		
Additional bibliography:		
1. Współczesna metrologia zagadnienia wybrane -praca zbiorowa WNT 2004r		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation to the lectures	30	
2. preparation for the exam	20	
3. exam	3	
4. Participation in the laboratory	75	
5. preparation for the laboratory	45	
6. development of results	30	
7. construction of the project	45	
8. participation in consultations related to laboratory and project	30	
9. participation in consultations related to the lecture	15	
10. Participation in the seminar	15	
Student's workload		
Source of workload	hours	ECTS
Total workload	308	12
Contact hours	135	5
Practical activities	75	3