

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Optical microscopy		Code 1010401151010421149
Field of study EDUCATION IN TECHNOLOGY AND	Profile of study (general academic, practical) general academic	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: 2 Classes: - Laboratory: - Project/seminars: -		No. of credits 2
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 technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: dr Andrzej Jarosz email: andrzej.jarosz@put.poznan.pl tel. 61 6653226 Faculty of Technical Physics ul. Nieszawska 13A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Knowledge of experimental physics and mathematics at the undergraduate engineering course level.
2	Skills	Skill in elementary physical problem solving, skill in acquiring information from listed sources.
3	Social competencies	Understanding the necessity of continuous self-improvement.
Assumptions and objectives of the course: 1. Acquaintance of the students with the basic geometric and wave optics problems with special consideration of optical microscope construction and application in science and technology. 2. Development of skills in knowledge of physics application to the analysis of optical instruments construction and operation. 3. Moulding students' abilities to acquire information and arrange self-education process.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. Student, who has completed the course, is able to explain structure and principle of operation of selected optical instruments especially optical microscope. - [K_W02] 2. Student, who has completed the course, is able to define parameters of components commonly applied to optical microscopes constructions. - [K_W10, K_W13]		
Skills: 1. Student, who has completed the course, is able to acquire from literature, databases and other sources information concerning materials, sub-assemblies and modules essential to develop simple optical instrument. - [K_U01] 2. Student, who has completed the course, is able to calculate selected parameters of developed instrument. - [K_U04, K_U08] 3. Student, who has completed the course, is able to define parameters of the system for optical microscopy paying special attention to its application in selected fields of science and technology - [K_U16, K_U23]		
Social competencies: 1. Student, who has completed the course, demonstrates activity in professional competence self-improvement - [K_03] 2. Student, who has completed the course, understands the need of technical knowledge transfer to the fields important from the public interest point of view, like environmental protection, health care and is aware of the special role of technical university graduates in this process. - [K_06, K_09]		

Assessment methods of study outcomes		
<p>W01, W02 Assessment of knowledge demonstrated during written examination on the basis of scored points: 3,0 50,1%-70,0% 4,0 70,1%-90,0% 5,0 od 90,1%</p> <p>U01, U02, U03 Assessment of skills demonstrated during written examination on the basis of scored points: 3,0 50,1%-70,0% 4,0 70,1%-90,0% 5,0 od 90,1%</p> <p>K01, K02 Assessment of attitudes during written examination on the basis of scored points: 3,0 50,1%-70,0% 4,0 70,1%-90,0% 5,0 od 90,1%</p>		
Course description		
<p>1. Geometric an wave optics fundamentals. 2. Properties of optical materials. Phenomena at a boundary of optical media. 3. Basic optical components. Lenses and mirrors ? types and parameters. Optical filters. Polarizers ? basic properties. 4. Image formation by mirrors, lenses and lens systems. 5. Optical aberrations. 6. Photometric and radiometric quantities. 7. Light sources and their properties. 8. Detectors of light, image acquisition systems. 9. Review of selected optical instruments construction and operation principle. 10. Construction of optical microscope. Types of optical microscopes. 11. Optical, optoelectronic and mechanical modules used in optical microscopes construction. 12. Elements of image processing technology. 13. Advanced techniques of optical microscopy. 14. Application of optical microscopy in science and technology.</p>		
Basic bibliography:		
<p>1. Instrumenty optyczne, F. Ratajczyk, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2002 2. Fizyka doświadczalna. Tom IV ? Optyka, S. Szczeniowski, Państwowe Wydawnictwo Naukowe, Warszawa 1983 3. Wstęp do optyki, J.R. Meyer-Arendt, Państwowe Wydawnictwo Naukowe, Warszawa 1979</p>		
Additional bibliography:		
<p>1. Practical Optics, N Menn, Elsevier Academic Press, Boston 2004</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	30	
2. Instructor's hours	2	
3. Study for the examination	20	
4. Participation in the examination	2	
Student's workload		
Source of workload	hours	ECTS

Total workload	54	2
Contact hours	34	1
Practical activities	0	0