



Subject card

Subject name and code	Physical Optics, PG_00045769						
Field of study	Technical Physics						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Atomic, Molecular and Optical Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Mykola Shopa				
	Teachers		dr Mykola Shopa				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	15.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		5.0		35.0	100
Subject objectives	Introduction of students into modern optical studies						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W02] Has enhanced, theoretically-founded, detailed knowledge of selected field of physics, and sufficient knowledge of related fields of science or technology.	The student obtains knowledge in the scope of the subject of Optics. In particular, he learns the basics of selected optical experiments, is able to use a mathematical apparatus to calculate the interaction of light with matter in the field of scattering or light passing through various media.			[SW1] Assessment of factual knowledge		
	[K7_U03] Has enhanced laboratory work experience.	Student is able to use measuring instruments in an optical laboratory, is able to independently perform and conduct measurements.			[SU5] Assessment of ability to present the results of task		
[K7_U09] Can popularize the achievements in physics and related fields of science.	The student has knowledge of modern directions of optical research and is able to describe, explain and popularize them			[SU5] Assessment of ability to present the results of task			

Subject contents	History of optics		
	Electromagnetic spectrum and black body radiation		
	Electromagnetic waves		
	Light sources, lasers		
	Polarization control		
	Light impulses		
	Optical activity		
	Maxwell equations		
	Light interaction with matter		
	Metamaterials		
	Light scattering		
	Nanoscale optical phenomena, surface plasmons		
	Nonlinear optics		
Ultrafast optics			
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	practice	50.0%	33.0%
	seminar	50.0%	33.0%
	exam	50.0%	34.0%
Recommended reading	Basic literature	D. Meschede „Optics, Light and Lasers”, Wiley-VCH (2004)	
		M. Born, E. Wolf „Principles of Optics”, Pergamon (1970+)	
		E. Hecht „Optics”, Addison-Wesley (1974+)	
		D. Griffiths "Introduction to Electrodynamics". (1999)	
	Supplementary literature	G. Chartier „Introduction to Optics”, Springer (2005)	
		M. Fox „Optical properties of Solids”, Oxford (2001)	
	eResources addresses	Adresy na platformie eNauczanie: Optyka Fizyczna 23/24 - Moodle ID: 26559 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=26559	

Example issues/ example questions/ tasks being completed	EM wave equation, energy density and Poynting vector Mie theory calculations Optical metamaterials conditions calculations Laser action conditions
Work placement	Not applicable