

Subject card

Subject name and code	Instrumental Optics, PG_00179283						
Field of study	Physics						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2025/2026		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		4.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Dzmitryi Ushakou				
	Teachers		dr Dzmitryi Ushakou				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	20.0	0.0	0.0	0.0	40
	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	40		0.0		0.0	40
Subject objectives	Familiarising students with the basic concepts of wave and geometric optics. Familiarising students with basic optical instruments, including measuring instruments.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[FIZL3_W01] has a general knowledge of basic physical concepts, principles and theories, understands their historical development and importance not only for physics, but also for other sciences and natural sciences and cognition of the world		The student is able to: formulate the basic laws of geometric and wave optics; describe optical phenomena.		[SW1] oral statement/ conversation/discussion [SW3] text preparation/written work [SW5] implementation of a problem task		
	[FIZL3_W02] understands the role of physical experiments, mathematical theoretical models approximating reality and computer simulations in the methodology of scientific research; is aware of technological, equipment and methodological limitations in scientific research		The student knows: basic concepts of optics; basic optical phenomena; principles of optical instrument construction.		[SW1] oral statement/ conversation/discussion [SW3] text preparation/written work [SW5] implementation of a problem task		

Subject contents	Electromagnetic waves. Electromagnetic wavelength ranges. Spectral sensitivity of the eye. Refractive index and light dispersion. Geometric optics and its scope of application. Optical path and Fermat's principle. Geometric optics. Basic elements of optical systems: lenses, spherical and flat mirrors, prisms and wedges. Fundamentals of visual photometry. Luminous flux, luminous intensity, illuminance, emittance and luminance. Absorption and transmission of electromagnetic radiation. Bouguer-Lambert-Beer's law. Absorbance. Molar absorption coefficient (extinction coefficient). Determination of molar and mass concentration of substances using Lambert-Beer's law based on the absorption spectrum. Wave optics. Monochromaticity of radiation. Coherence of electromagnetic waves. The phenomenon of light interference. Basic types of interferometers. Interference in thin layers. Anti-reflective coatings based on the phenomenon of interference. Light diffraction. Huygens-Fresnel principle. Diffraction gratings. Light polarisation. The phenomenon of birefringence. Polarising elements. The photoelectric effect.		
Prerequisites and co-requisites	Knowledge of mathematical analysis and the fundamentals of physics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test 2	51.0%	40.0%
	Test 1	51.0%	20.0%
	Work during classes	51.0%	40.0%
Recommended reading	Basic literature	Romuald Jóźwicki. Optyka instrumentalna / Wydawnictwa Naukowo Techniczne WNT. 1970 David Halliday, Robert Resnick, Jearl Walker. Podstawy fizyki/ Wydawnictwo Naukowe PWN. 2015	
	Supplementary literature	Feynman Lectures on Physics Volume 1 Part 2 Optics Thermodynamics Wave	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

Document generated electronically. Does not require a seal or signature.