

Subject card

Subject name and code	Optical Methods, PG_00188582						
Field of study	Metody optyczne (Wykład)						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study 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	2		Language of instruction		Polish Polish		
Semester of study	4		ECTS credits		1.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Paweł Niedziałkowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	The aim of the course is to acquaint students with the theoretical foundations and practical application of optical methods used in forensic investigations in scientific laboratories. The lecture will include topics aimed at developing skills in selecting, operating, and interpreting forensic analysis results obtained using optical techniques such as microscopy, spectroscopy, and imaging methods. Students will learn how to use optical tools to reveal, analyze, and document forensic evidence, as well as understand the limitations of individual methods and the principles of proper documentation.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[AKRL3_U10] The graduate is able to interpret data from different analytical techniques to reconstruct events or identify evidence material.	Acquires knowledge in the methods of measurement data analysis. Acquires knowledge in the field of analysis in order to establish a consistent expert opinion.	[SU4] test/egzamin - ustny lub pisemny
	[AKRL3_W09] The graduate knows and understands the principles of documentation, securing, and interpreting evidence material, as well as the use of microscopic and spectroscopic methods.	Gains knowledge of the functioning of optical equipment used in forensics. Gains knowledge of the documentation and securing of evidence and measurement results obtained using optical methods.	[SW4] test/egzamin - ustny lub pisemny
	[AKRL3_W02] The graduate knows and understands, at an advanced level, the analytical methods used in forensic laboratories, in particular spectroscopic, chromatographic and electroanalytical methods.	Acquaints themselves with the basic optical methods used in forensics. Is able to list the equipment used in forensic analysis using optical methods.	[SW4] test/egzamin - ustny lub pisemny
	[AKRL3_U06] The graduate is able to use specialised software and advanced ICT techniques to develop and visualise experimental data.	Acquires knowledge in the field of methods for analyzing measurement data obtained using optical methods. Acquaints with optical methods used in forensics.	[SU4] test/egzamin - ustny lub pisemny
Subject contents	Introduction to the basics of optics, including types and applications of microscopes, light microscopy and fluorescence microscopy techniques. Introduction to the basics of optical spectroscopy. Presentation of examples of forensic trace imaging methods. Use of light in revealing biological traces. Photographic and optical documentation, analysis of spectra and microscopic images. Discussion of limitations and errors in optical methods. The concept, scope and tasks of forensic microbiology. The role of microorganisms in forensics. The use of the microbiome in determining the time of death (PMI), the place of origin of material, and the examination of tissue degradation. Overview of biological material: blood, body fluids, biological traces, biofilms, environmental microorganisms. The importance of imaging and optical techniques: Why optics in forensic microbiology? Advantages of non-invasive methods: in situ analysis, no need for staining, reduced identification time. Limitations of optical methods in the identification of microorganisms.		
Prerequisites and co-requisites	Prerequisites: application of safety rules in a chemical laboratory. Specification of other subjects: completed course in inorganic, analytical, and organic chemistry. Basic microbiology		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test/exam	51.0%	100.0%
Recommended reading	Basic literature	1. A. Oleś, Metody doświadczalne fizyki ciała stałego, WNT, 1998	
		2. J. Litwin, M. Gajda, Podstawy technik mikroskopowych, Wydawnictwo Uniwersytetu Jagiellońskiego, 2011	
	Supplementary literature	1. R. Bachliński, A. Polichna, Fizykochemiczne badania śladów kryminalistycznych, Centralne Laboratorium Kryminalistyczne Policji, 2013.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Describe how an optical microscope works. 2. Describe the methods used to analyze microtraces.		

Work placement	Not applicable
----------------	----------------

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