

Subject card

Subject name and code	Optical Methods, PG_00188317						
Field of study	Metody optyczne (Ćw.laboratoryjne)						
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	0.0	0.0	15.0	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 laboratories is to practically teach students about optical methods used in forensics, including microscopy and basic optical spectroscopy. The classes are designed to develop the ability to observe, document, and interpret forensic evidence using optical tools, learn how to properly maintain laboratory documentation, and apply safety and ethical principles in the laboratory.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[AKRL3_U03] The graduate is able to perform analyses using instrumental methods (spectroscopy, chromatography, microbiological tests) and interpret research results.		Can conduct and interpret the results of compound analysis using optical methods. Can perform analysis and identification of test samples using optical methods.		[SU2] prezentacja/projekt/referat/ raport [SU4] test/egzamin - ustny lub pisemny		
	[AKRL3_W03] The graduate knows and understands the structure and chemical properties of compounds relevant in forensic examinations.		Able to conduct and interpret the results of chemical compound analysis using optical methods used in forensics.		[SW4] test/egzamin - ustny lub pisemny [SW2] prezentacja/projekt/referat/ raport		
	[AKRL3_K06] The graduate is ready to follow occupational health and safety regulations in the laboratory and care for the safety of themselves and others.		Recognizes the risks associated with the use of chemicals in the laboratory. Keeps and ensures the safety of themselves and others present in the chemical laboratory		[SK2] prezentacja/projekt/referat/ raport [SK4] test/egzamin - ustny lub pisemny		
	[AKRL3_K03] The graduate is ready to maintain confidentiality of research data and evidence material.		Defines the basic principles of securing evidence and the rules for storing materials for analysis.		[SK2] prezentacja/projekt/referat/ raport [SK4] test/egzamin - ustny lub pisemny		

Subject contents	Fundamentals of optics, types of microscopes and their application in forensics on selected analytes. Light microscopy techniques, phase contrast microscopy. Introduction to optical spectroscopy. Application of optical methods as a method of revealing and analyzing biological, mechanoscopic, and chemical traces using light on selected examples. Photographic and optical documentation; interpretation of images and spectra. Application of optical techniques in the analysis of selected forensic evidence.		
	Preparation of specimens: smears, swabs, surface samples. Microscopic identification of basic morphotypes of bacteria and fungi. Observation of biofilms on surfaces of objects (tools, clothing, glass). Microphotographic documentation (standards, scale, focus, lighting parameters).		
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. Fotografia, 2013. 2. Forensic Microbiology Editor(s): David O. Carter, Jeffery K. Tomberlin, M. Eric Benbow, Jessica L. Metcalf First published: 3 April 2017 Print ISBN: 9781119062554 Online ISBN: 9781119062585	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Describe the structure of microscopes. 2. What optical methods are used to analyze microtraces. 3. how to prepare appropriate microscope slides		
Work placement	Not applicable		

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