

Subject card

Subject name and code	Enzymatic and peptidic biomarkers in forensics, PG_00211871						
Field of study	Forensic Analytics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2028/2029		
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		English		
Semester of study	6		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Molecular Biochemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Agata Gitlin-Domagalska				
	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		33.0	50
Subject objectives	The aim of this course is to provide students with an understanding of the role of enzymes, proteins, and peptides in forensic science, with particular emphasis on enzymatic and peptide biomarkers employed in forensic diagnostics. Students will explore the application of enzymatic activity, protein and peptide degradation pathways, and other biochemical processes in the estimation of the post-mortem interval (PMI), the identification of biological evidence, and the interpretation of molecular post-mortem changes. The course equips students with the skills necessary for the critical analysis, evaluation, and interpretation of biochemical data used in forensic investigations and forensic research.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[AKRL3_K01] The graduate is prepared to critically evaluate their own knowledge and its relevance to solving cognitive, practical, and societal problems, as well as to responsibly make use of expert opinions.	The student is prepared to critically assess the value and limitations of knowledge related to enzymatic and peptide biomarkers applied in forensic science, and to responsibly utilize scientific evidence and expert opinions in the interpretation of biochemical data for forensic purposes.	[SK4] test/exam - oral or written
	[AKRL3_W03] The graduate knows and understands the structure and chemical properties of compounds relevant in forensic examinations.	The student knows and understands the structure, chemical properties, and biological functions of enzymes, proteins, and peptides used as biomarkers in forensic science and forensic investigations.	[SW4] test/exam - oral or written
	[AKRL3_U12] The graduate is able to use a foreign language at the B2 level in the field of chemical and forensic terminology.	The student is able to use specialist English terminology related to enzymatic and peptide biomarkers and to interpret scientific literature concerning biochemical applications in forensic science.	[SU4] test/exam - oral or written
	[AKRL3_K04] The graduate is ready to cooperate with representatives of other fields—law, medicine, biology—within forensic expertise.	The student is prepared to collaborate with professionals from the fields of law, medicine, biology, and forensic science in the interpretation and application of biochemical data in forensic investigations.	[SK4] test/exam - oral or written
	[AKRL3_W05] The graduate knows and understands toxicokinetic and toxicodynamic processes and the methods of identifying toxic substances in forensic contexts.	The student understands the role of enzymatic and peptide biomarkers in monitoring toxicokinetic and toxicodynamic processes, as well as their significance in the identification and assessment of the effects of toxic substances in forensic investigations.	[SW4] test/exam - oral or written
Subject contents	Introduction to enzymatic and peptide biomarkers in forensic science Structure and functions of serine proteases Enzymatic biomarkers in the identification of biological traces Application of proteases and peptide markers in post-mortem interval (pmi) estimation Protease inhibitors as research and diagnostic tools in forensic science Biochemistry of body fluids in forensic diagnostics Methods for peptide analysis in forensic science Peptide and protein toxins in forensic toxicology		
Prerequisites and co-requisites	Knowledge of the structure and properties of amino acids, peptides, and proteins, as well as the fundamentals of organic chemistry, biochemistry, and molecular biology. Basic knowledge of enzymology. Ability to use scientific literature, including English-language sources. Basic knowledge of analytical methods applied in biomolecular research.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written exam	51.0%	100.0%

Recommended reading	Basic literature	Stryer L., Berg J.M., Tymoczko J.L., Gatto G.J. Biochemia, Wydawnictwo Naukowe PWN, 2018 Sewald N., Jakubke H.-D. Peptides: Chemistry and Biology, WileyVCH, 2009 Silverstein R.M., Webster F.X., Kiemle D.J. Spektroskopowe metody identyfikacji związków organicznych, Wydawnictwo Naukowe PWN, 2008 Parker G.J. et al., Forensic proteomics, Forensic Science International: Genetics, 2021 Cianci, V., <i>et al.</i> Forensic applications of postmortem protein analysis in estimating the time since death: a systematic review. <i>International journal of legal medicine</i>, 2026
	Supplementary literature	van Steendam K. et al., Mass spectrometry-based proteomics as a tool to identify biological matrices in forensic science. <i>International journal of legal medicine</i>, 2013 Huang et al., The Role of Protein Degradation in Estimation Postmortem Interval and Confirmation of Cause of Death in Forensic Pathology: A Literature Review, <i>International Journal of Molecular Sciences</i>, 2024
	eResources addresses	
Example issues/ example questions/ tasks being completed	Proteases and their role in postmortem processes Applications of peptides in biological trace identification Limitations of biomarkers in forensic investigations Molecular biomarkers for PMI estimation	
Work placement	Not applicable	

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