

Subject card

Subject name and code	Forensic Biology , PG_00188252						
Field of study	Biologia sądowa (Wykład)						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
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	1		Language of instruction		Polish polish		
Semester of study	1		ECTS credits		3.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Department of Microbiology -> Faculty of Biology -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Magdalena Plotka				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	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	30		10.0		35.0	75
Subject objectives	The aim of the lecture is to provide students with systematic knowledge on the principles of using biological material in forensics. The lecture covers the types of biological traces, their formation, properties, and methods of their identification and analysis in laboratory conditions. The course familiarizes students with the basics of molecular biology in the context of evidence proceedings, with particular emphasis on DNA analysis, develops the ability to understand biological processes relevant to the reconstruction of events, and teaches how to interpret test results in accordance with the principles of forensics and legal requirements.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[AKRL3_U01] The graduate is able to identify, analyse and solve complex research problems in chemistry and forensic science by selecting appropriate methods and information sources.	The student is able to identify and analyze a research problem concerning biological traces, selecting appropriate biological or microbiological methods to solve it. The student is able to correctly interpret the results of biological and molecular analyses, taking into account the quality of the material, the limitations of the techniques, and the probability of error. The student is able to assess the usefulness and reliability of available sources of biological information (DNA databases, scientific literature, laboratory reports) in order to solve a forensic problem. The student is able to formulate conclusions regarding the reconstruction of an event based on the analysis of biological and microbiological processes, such as DNA degradation, microbiological colonization, or the dynamics of bodily fluid traces.	[SU4] test/egzamin - ustny lub pisemny
	[AKRL3_K04] The graduate is ready to cooperate with representatives of other fields—law, medicine, biology—within forensic expertise.	The student understands the role of specialists in various fields in the judicial opinion process and is able to cooperate with experts in the fields of law, medicine, and biology in the interpretation of biological material.	[SK4] test/egzamin - ustny lub pisemny
	[AKRL3_K01] The graduate is ready to critically evaluate their own knowledge, understand its importance for solving cognitive and practical problems, and to seek expert opinions when necessary.	The student is aware of the importance of scientific integrity in the interpretation of biological material and the consequences of analytical errors in the justice system. The student understands the need to continuously update their knowledge of modern biological, microbiological, and molecular analysis techniques used in forensics.	[SK4] test/egzamin - ustny lub pisemny
	[AKRL3_W04] The graduate knows and understands the basics of biological analysis of evidence material, including principles of DNA identification, proteins and other biological traces.	The student know the basics of molecular biology and microbiology applied in forensics (e.g., PCR, sequencing, DNA typing, microbiome analysis)	[SW4] test/egzamin - ustny lub pisemny

Subject contents	1. Introduction to forensic biology The scope and significance of forensic biology in criminalistics. Types of biological traces: blood, saliva, semen, hair, tissues, cells, microorganisms. 2. Fundamentals of molecular biology in criminalistics DNA as evidence: structure, stability, degradation. DNA analysis techniques: isolation, PCR, STR, mitochondrial analysis. DNA databases and sources of scientific information. 3. Mechanisms of biological trace formation Biological processes occurring in the body and their reflection in traces. Factors affecting the quality and interpretation of biological material. 4. Methods of detection and identification of biological traces Preliminary and confirmatory tests. Macroscopic and microscopic analysis of biological material. Methods specific to microbiological testing. 5. Assessment of the evidential value of biological test results Interpretation of DNA and microbiological test results. Limitations of forensic biology techniques; error risk analysis. Solving complex research problems using biological methods. 6. Interdisciplinary cooperation in forensic expertise Collaboration between a biologist and experts in forensic medicine and law. The importance of biological opinions in court proceedings. Principles of communication and expert responsibility. 7. Legal and ethical aspects of working with biological material The chain of evidence. Genetic data protection. Principles of forensic biology expert responsibility.		
Prerequisites and co-requisites			
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. Forensic Medicine Volume 2. Edited by Teresiński, Grzegorz: PZWL Medical Publishing House, 2020, 934 pages. ISBN 978-83-200-6201-4 2. Iwona Bogusz, Marek Bogusz Forensic evidence for basic vocational training students, CSP materials (Bogusz & Bogusz, 2013) 3. John M. Butler Fundamentals of Forensic DNA Typing (Elsevier/ Academic Press, 2009) John M. Butler Elsevier, Forensic DNA Typing 2nd ed. 4. Alan Gunn Essential forensic biology (Wiley)	
	Supplementary literature	1. Max M. Houck Forensic Biology (Academic Press / Elsevier, 2015). 2. Richard Li Forensic Biology (CRC/Taylor & Francis; 1st (2008) and later editions)	
	eResources addresses	Basic https://www.gov.pl/web/ies/przewodnik-zrozumiec-genetyke-sadowa--co-dna-moze-powiedziec-o-przestepstwie - Guidebook: "UNDERSTANDING FORENSIC GENETICS – What DNA can tell us about crime" https://www.csp.edu.pl/csp/e-biblioteka/1184,Materialy-Dydaktyczne.html - position 137 Forensic evidence for students of basic vocational training	

Example issues/ example questions/ tasks being completed	Sample topics: The use of molecular biology methods in forensic medicine: victim identification, paternity testing, kinship testing. Polymerase chain reaction (PCR) and its applications in forensics. The risk of contamination of biological evidence and methods of minimizing it. Sample questions: 1. When securing biological evidence, it is important to minimize DNA degradation. Which action is most effective for this purpose? a) Drying the material at room temperature and storing it in a closed container in the dark. b) Immediately placing the sample in a buffer solution containing proteolytic enzymes. c) Freezing the sample at 20°C or 80°C and storing it in sterile, impermeable containers. d) Immersing the sample in distilled water and storing it in a cool room. 2. In the case of biological traces containing a mixture of DNA from several individuals, Y-STR analysis can be particularly useful because: a) Y-STR allows the proportions of male and female DNA in the mixture to be determined, regardless of kinship. b) Y-STR identifies only paternal haplotypes, allowing male DNA to be distinguished from female DNA in a complex sample. c) Y-STR is mainly used to identify male phenotypic traits. d) Y-STR allows amplification of the entire male genome in the presence of female DNA.
Work placement	Not applicable

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