

Subject card

Subject name and code	Application of genetic engineering in diagnostics, PG_00203468						
Field of study	Medical Biology						
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 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	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			2.0		
Learning profile	academic	Assessment form			credit		
Conducting unit	Faculty of Biology -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Marian Sęktas				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	0.0	0.0	0.0	0.0	20
	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	20		3.0		27.0	50
Subject objectives	Introduction of basic concepts in the field of genetic engineering, molecular and cellular cloning (hybridoma), DNA amplification, gene expression 2. Principles of using DNA restriction and modification enzymes, plasmid vectors, creation of genetic fusions 3. Methods of diagnostics of genetic, microbiological and epidemiological diseases based on DNA 4. Basics of DNA analysis (sequencing, genotyping, genetic fingerprinting) 5. DNA editing (CRISPR-Cas)						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[BIOLMEDL3_W16] has an advanced knowledge of the experimental methods and the most important techniques of biological sciences that can be applied to medical biology and diagnostics		The student explains the theoretical foundations of experimental methods and lists the most important genetic engineering techniques that can be used in medical biology and diagnostics BM_W16		[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion		
	[BIOLMEDL3_U03] performs simple tasks or research expertise typical of medical biology under the guidance of a supervisor		under the supervision of a scientific supervisor, performs simple tasks and research expert opinions in the field of genetic engineering BM_U03		[SU1] oral statement/conversation/discussion [SU5] implementation of a problem task		
Subject contents	Genetic engineering in medical diagnostics. Basic tools of genetic engineering - DNA restriction and modification enzymes, DNA vectors (plasmids). DNA molecular and cellular cloning (hybridoma). Ensuring the quality of DNA/RNA in clinical materials. Genetic and microbiological diagnostics (genotyping methods: RFLP, PFGE, qPCR, RAPD, MLVA, AFLP, MLST, MP-PCR). DNA amplification (PCR). DNA sequencing using the Sanger and NGS methods. Chromosomal markers STR and VNTR - genetic fingerprint. Vaccine therapy (monoclonal antibodies and their modifications) Phage therapy. DNA editing - CRISPR-Cas						
Prerequisites and co-requisites	knowledge of Microbiology, Biochemistry, Molecular Biology is required						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		Written exam (test) graded on a percentage basis	51.0%
Recommended reading	Basic literature	Jerzy Bal. Biologia molekularna w medycynie. Elementy genetyki klinicznej. PWN. Warszawa 2001 Marian Sęktas. Zastosowanie inżynierii genetycznej w biotechnologii. Molekularne podstawy ekspresji genów. Wydawnictwo UG. Gdańsk. 2000	
	Supplementary literature	Publications available in the Pubmed database https://pubmed.ncbi.nlm.nih.gov	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Detection of nucleic acids with SYBR-green dye is used for: 2. Indicate the incorrect statement regarding genotyping by sequences of several genes (MLST) 3. A specific PCR reaction product (target sequence) is obtained after only 1 PCR cycle when 4. Which of the DNA analysis techniques for bacterial diagnostics provides the most information distinguishing the compared strains		
Work placement	Not applicable		

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