

Subject card

Subject name and code	Molecular Diagnostics of Microorganisms, PG_00147841						
Field of study	Genetics and Experimental Biology						
Date of commencement of studies	October 2024	Academic year of realisation of subject				2026/2027	
Education level	undergraduate 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					
Conducting unit	Pracownia Biochemii Mikroorganizmów -> Katedra Biochemii Ogólnej i Medycznej -> Faculty of Biology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Karolina Stojowska-Swędryńska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	15.0	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		12.0		23.0	50
Subject objectives	The aim of the lecture is to present the possibilities and limitations of using molecular phenotypic and genotypic diagnostics in various aspects of microbiological research.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GBEL3_K07] Lifelong learning and updating knowledge in the field of molecular genetics and other disciplines.	The student understands the need for lifelong learning and updating knowledge in the field of molecular genetics and other related fields.	[SK1] oral statement/conversation/discussion
	[GBEL3_U04] Capable of reading scientific texts in English and Polish with comprehension, synthesizing the knowledge contained within them, preparing well-documented studies on biological issues, as well as those related to research commercialization.	The student is able to read and understand scientific texts in English and synthesize the knowledge contained therein.	[SU1] oral statement/conversation/discussion [SU5] implementation of a problem task
	[GBEL3_W06] the development and current state of knowledge, as well as the latest trends in molecular genetics and related fields; indicating their relationship with other disciplines in the natural or medical sciences and the possibilities of their practical application.	The student is familiar with the development and current state of knowledge, as well as the latest trends in molecular genetics and related fields; indicates their relationship with other disciplines of natural or medical sciences and the possibility of their practical use.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion
	[GBEL3_W05] the principles of research planning based on achievements in biological sciences and related fields, the potential application of their results in practice, the principles of operation of equipment and apparatus used in molecular genetics research, and the principle of interpreting biological phenomena and processes based on empirical data in research and practical activities, with consideration for sustainable use of biological diversity.	The student knows the principles of research planning based on the achievements of biological sciences and related fields, the possibilities of using these results in practice, the principles of operation of devices and equipment used in molecular genetics research and the principles of interpretation of biological phenomena and processes based on empirical data in research and practical activities, including the sustainable use of biodiversity.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW5] implementation of a problem task
[GBEL3_K01] The utilization of theoretical knowledge in laboratory and production practice.	The student is ready to use theoretical knowledge in laboratory and diagnostic practice.	[SK1] oral statement/conversation/discussion	
Subject contents	<ul style="list-style-type: none"> • Application of molecular diagnostics in medicine, microbiology and biotechnology. • Standardization of diagnostic methods and verification of molecular tests. • Conducting diagnostic tests, controls, the problem of contamination, false positive and false negative results • Genetic material for diagnostic tests (source, isolation methods) • Genetic polymorphism and regions conserved evolutionarily. • Detection and species specific identification of microorganisms • Detection of virulence and antibiotic resistance genes • Genetic typing methods of microorganisms (DNA fingerprinting, e.g. Restriction Enzyme Analysis Pulsed-field Gel Electrophoresis, Ligation Mediated PCR, Restriction Fragment Length Polymorphism, Variable Number Tandem Repeat, Ribotyping) • Application of molecular typing methods in epidemiology. 		
Prerequisites and co-requisites	Knowledge of basic issues in the field of molecular biology, biochemistry, genetic engineering and microbiology. Knowledge of the structure, properties and functions of basic biological macromolecules (including DNA, RNA, restriction enzymes, DNA polymerases), knowledge of basic techniques of molecular biology and genetic engineering (including PCR, electrophoresis), basic knowledge of the structure and biochemistry of microorganisms.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	problem task	50.1%	20.0%
	written or oral colloquium	50.1%	80.0%
Recommended reading	Basic literature	<ul style="list-style-type: none"> • scientific publications and multimedia presentations provided to students during the course 	

	Supplementary literature	<ul style="list-style-type: none"> • Persing, Tenover, Hayden, <i>Molecular Microbiology</i>, American Society for Microbiology, 2016 • Elizabeth van Pelt-Verkuil, <i>Molecular Diagnostics</i>, Springer-Verlag GmbH, 2019 • Vira, Bhat, Chavan, <i>Diagnostic molecular microbiology and its applications: Current and future perspectives</i>, Clin Microbiol Infect Dis, 2016, doi: 10.15761/CMID.1000105 • Karolina Stojowska, Beata Krawczyk - A new double digestion ligation mediated suppression PCR method for simultaneous bacteria DNA-typing and confirmation of species: an <i>Acinetobacter</i> sp. Model. PLoS One. 2014 Dec 18;9(12):e115181. doi: 10.1371/journal.pone.0115181. • Karolina Stojowska-Swędryńska, Beata Krawczyk. A new assay for the simultaneous identification and differentiation of <i>Klebsiella oxytoca</i> strains. Appl Microbiol Biotechnol. 2016 Dec;100(23): 10115-10123. doi: 10.1007/s00253-016-7881-1.
	eResources addresses	Adresy na platformie eNauzanie:
Example issues/ example questions/ tasks being completed	Topics and sample tasks required for the exam are provided throughout the course.	
Work placement	Not applicable	

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