

Subject card

Subject name and code	Molecular genetics of bacteria, PG_00147111						
Field of study	Genetics and Experimental Biology						
Date of commencement of studies	October 2025		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	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		2.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Department of Molecular Genetics of Bacteria -> Faculty of Biology -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Katarzyna Potrykus				
	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		4.0		16.0	50
Subject objectives	- To familiarize students with the course and regulation of basic processes related to the replication and protection of the integrity of bacterial genetic material as well as expression of the genetic information contained therein - To familiarize students with the latest trends and concepts in molecular genetics of bacteria - To familiarize students with classic and novel research tools used in bacterial genetics						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GBEL3_K01] The utilization of theoretical knowledge in laboratory and production practice.	Student is ready to use theoretical knowledge in laboratory and production practice	[SK4] test/exam - oral or written
	[GBEL3_K02] Critical assessment of one's own knowledge and methods in the field of molecular biology and related disciplines, as well as the commercialization of research.	Student is ready to critically evaluate methods in the field of molecular biology	[SK4] test/exam - oral or written
	[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.	Student knows the principles of research planning based on the achievements of bacterial genetics and the possibilities of using their results in practice, the principles of operation of equipment and apparatus used in research in the field of molecular genetics of bacteria and the principle of interpreting phenomena and processes taking place in bacterial cells based on empirical data in research work and activities practical	[SW4] test/exam - oral or written
	[GBEL3_W04] applied knowledge in microbiology and plant biotechnology.	Student has basic knowledge of microbial biotechnology	[SW4] test/exam - oral or written
	[GBEL3_W01] Understanding the structure and properties of basic types of biological macromolecules, molecular mechanisms of metabolic pathways and genetic information flow, as well as sources of genetic variability in organisms and mechanisms of evolution; explaining the rules of inheritance, elucidating differences in the structure and functioning of prokaryotic and eukaryotic cells, and understanding the structure and functional relationships at the cellular and tissue levels.	student describes the structure and properties of basic types of biological macromolecules, molecular mechanisms of basic metabolism pathways and the flow of genetic information in bacterial cells and the sources of variability of bacterial cells; explains the rules of replication and inheritance of genetic material	[SW4] test/exam - oral or written

Subject contents	- DNA structure and organization of the bacterial chromosome - DNA replication in bacterial cells: initiation, elongation and termination of replication and chromosome segregation - Mechanisms of DNA repair and recombination - Mutagenesis: methods of introducing, selecting and mapping changes in the genetic material of bacteria; basics of genetic engineering - Gene expression: RNA, transcription, translation, post-transcriptional and post-translational regulation mechanisms - Transcription regulation: promoters and terminators, sigma factors, transcription repression and activation, gene organization - Control of the translation process - Global mechanisms of transcription regulation, including: catabolic repression, stringent response, "quorum sensing", two-component systems, SOS response and response to thermal shock, regulation of nitrogen assimilation - Bacterial cell biology and cell cycle: structure and synthesis of bacterial coatings, cell division, secretion, sporulation process and its regulation, cell cycle regulation - Bacterial viruses - bacteriophages - Plasmids - Horizontal gene transfer (process of conjugation, transformation and transduction), homologous and non-homologous recombination - Mobile genetic elements - Genetic methods used in the study of bacterial cells, including: complementation, reporter genes - High-throughput methods used in microbiology, including: genomics, transcriptomics, metabolomics, phenomics		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	100.0%
Recommended reading	Basic literature	Snyder L., Peters J.E., Henkin T.M., Champness W., Molecular Genetics of Bacteria, 4th Edition, ASM Press 2013 Henkin, T.M., Peteres J.E., Snyder & Champness Molecular Genetics of Bacteria, 5th Edition, ASM Press 2020	
	Supplementary literature	Dylewski M, Sobala M, Bruhn-Olszewska B, Potrykus K (2018). 50-ta rocznica odkrycia magicznych plamek - najnowsze osiągnięcia w badaniach nad (p)ppGpp. Postępy Biochemii 64 (1) 1-8 Materials selected by the instructor from current literature available on a given topic.	
	eResources addresses		

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable

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