

**Subject card**

Subject name and code	Protein phosphorylation in bacteria, PG_00196923						
Field of study	Biotechnology						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2027/2028	
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	2	Language of instruction				Polish	
Semester of study	3	ECTS credits				2.0	
Learning profile	academic	Assessment form				credit	
Conducting unit	Intercollegiate Faculty of Biotechnology Office -> Intercollegiate Faculty of Biotechnology UG-MUG -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Michał Obuchowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	14.0	0.0	0.0	0.0	0.0	14
	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	14		5.0		31.0	50
Subject objectives	The aim of the course is to provide knowledge about the chemistry of protein phosphorylation and its significance for all living organisms. The student becomes familiar with selected protein phosphorylation systems functioning in various bacterial species at the molecular level, learns to identify the relationships between these systems and the behavior of microorganisms in the environment, and to predict the consequences of their malfunction for bacterial cell physiology and interactions with other living organisms.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[BIOTECHL3_W03] The graduate possesses structured and advanced knowledge of organism-environment relationships and their importance for understanding biological processes and biotechnological applications.		The student is able to identify relationships between protein phosphorylation systems and microbial behavior in the environment, and to predict the effects of their disruption on bacterial cell physiology and interactions with other organisms.			[SW4] test/exam - oral or written	
	[BIOTECHL3_W01] The graduate possesses structured and advanced knowledge of biological phenomena at the molecular level and understands their importance for biotechnology.		The student knows and is able to describe selected protein phosphorylation systems occurring in various bacterial species at the molecular level.			[SW4] test/exam - oral or written	
Subject contents	General concept of regulation of protein activity by phosphorylation. Structure and function of protein kinases and phosphatases. Selected examples of systems using protein phosphorylation such as: regulation of the chemotactic response in bacteria ( <i>E. coli</i> ), operation of the general stress response mechanism ( <i>B. subtilis</i> ), control of the absorption of bioavailable nitrogen ( <i>E. coli</i> ), regulation of virulence ( <i>V. cholerae</i> and <i>P. aeruginosa</i> ), formation of bacterial spores ( <i>B. subtilis</i> ), regulation of bacterial bioluminescence ( <i>V. fischeri</i> , <i>V. harveyi</i> ), mechanism of acquiring natural genetic competence ( <i>B. subtilis</i> ), regulation of phosphorylation-coupled sugar transport into the cell ( <i>B. subtilis</i> ).						
Prerequisites and co-requisites							

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final colloquium	51.0%	100.0%
Recommended reading	Basic literature	"Protein phosphorylation in bacteria" script, literature indicated by the lecturer.	
	Supplementary literature	None	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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