

Subject card

Subject name and code	Application of genetic engineering in biotechnology, PG_00146066						
Field of study	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		
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			1.0		
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	15.0	0.0	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		2.0		8.0	25
Subject objectives	Introduction to basic concepts of gene expression and protein overproduction and genetic engineering. 2. Principles of using DNA restriction and modification enzymes and the proper selection of DNA vectors. 3. Localization and importance of prokaryotic transcriptional and translational signals. 4. Protein and non-protein regulatory factors of gene expression 5. Understanding the functioning and control of expression of basic gene expression systems in Escherichia coli cells. 6. Specialized plasmid vectors						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[BIOLL3_W10] The graduate is familiar with the development and current state of knowledge and the latest trends in biology, as well as their relationship with other natural disciplines		The student is familiar with the development of genetic engineering and the latest trends in molecular biology and indicates their relationship with other natural sciences B_W10		[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion		
	[BIOLL3_K01] The graduate is prepared to evaluate his/her own knowledge, understand the need for continuous learning and development, and is open to new ideas		The student understands that biotechnology improves its methods and sets new directions, therefore he knows the limitations of his own knowledge and understands the need for continuous learning and development and is opened to new ideas B_K01		[SK4] test/exam - oral or written		
	[BIOLL3_U07] The graduate should be able to independently search for and use available sources of biological information, including electronic sources		Independently searches for and uses available sources of biological information, including electronic sources B_U07		[SU3] text preparation/written work [SU4] test/exam - oral or written		
	[BIOLL3_W14] The graduate knows the theoretical basis of experimental methods and the most important techniques of the biological sciences		The student explains the theoretical foundations of experimental methods and lists the most important genetic engineering techniques B_W14		[SW4] test/exam - oral or written		

Subject contents	Methods of genetic engineering and molecular cloning. DNA restriction and modification enzymes, in vitro DNA recombination. Features of Escherichia coli bacterial strains useful in biotechnology. Homologous and non-homologous recombination as a tool in bacterial genetics. Characterization of plasmids as DNA vectors. Stability of plasmid maintenance and regulation of their copy number. Expression of prokaryotic genes - regulation of transcription, control of initiation and termination of this process. Transcription signals - structure of the gene and promoter. Vectors enabling strict control of gene expression. Factors influencing mRNA stability. Translation signals encoded in DNA. Polymerase chain reaction (PCR) in site-specific gene mutagenesis. Overproduction of proteins in a system based on T7 phage regulatory elements. Review of specialized plasmid vectors and their applications.		
Prerequisites and co-requisites	Basics of Microbiology and Biochemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	the assessment includes material from the lecture term I: written test with closed questions sit-up term – written test or oral assessment the written test is assessed according to the percentage	51.0%	100.0%
Recommended reading	Basic literature	Marian Sętkas: Zastosowanie inżynierii genetycznej w biotechnologii. Molekularne podstawy ekspresji genów. Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2000	
	Supplementary literature	Selected scientific publications available in the database https://pubmed.ncbi.nlm.nih.gov	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. When does transcription and translation become asynchronous? 2. What do typical type II restriction enzymes require to function? 3. What is meant by the term polarity of transcription? 4. The transcription start point (+1) in promoters recognized by the sigma 70 RNA polymerase subunit is located in the DNA region preceding the coding sequence of the E. coli gene:		
Work placement	Not applicable		

Document generated electronically. Does not require a seal or signature.