

Subject card

Subject name and code	Methods in molecular biology, PG_00147834						
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				Polish	
Semester of study	6	ECTS credits				2.0	
Learning profile	academic	Assessment form					
Conducting unit	Faculty of Biology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Monika Glinkowska				
	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		3.0		17.0	50
Subject objectives	<ul style="list-style-type: none"> - Familiarizing students with classical and cutting-edge tools used in molecular biology, with a particular focus on methods for studying protein-DNA and protein-protein interactions in vitro and in cells. - Introducing students to the potential applications of these methods for solving research and practical problems. - Developing skills for selecting appropriate research tools to solve biological problems. - Cultivating the ability to independently read specialized literature and learn. 						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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; they identify their connection to other disciplines of natural sciences or medicine and their potential applications in practice.	[SW2] presentation/project/paper/report [SW3] text preparation/written work
	[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.	Understands the principles of planning research based on achievements in biological sciences and related disciplines, the potential applications of their results in practice, the functioning principles of equipment and apparatus used in molecular genetics research, as well as the principle of interpreting biological phenomena and processes based on empirical data in research work and practical activities.	[SW2] presentation/project/paper/report [SW3] text preparation/written work
	[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.	student is able to prepare and present oral presentations in Polish and English on specific topics in biology, as well as present their ideas and results in written and oral form.	[SU2] presentation/project/paper/report [SU3] text preparation/written work
	[GBEL3_U06] Prepare and deliver oral presentations in Polish and English on specific topics within the field of biology, as well as present ideas and results in written and oral form.	student is able to prepare and present oral presentations in Polish and English on specific topics in biology, as well as present their ideas and results in written and oral form.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU3] text preparation/written work
	[GBEL3_U07] Work in a team and organize work while adhering to occupational health and safety principles and ergonomics.	Student is able to work as a part of team	[SU3] text preparation/written work
	[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 can do critical evaluation of one's own knowledge and methods in the field of molecular biology and related disciplines, as well as commercialization of research	[SK1] oral statement/conversation/discussion
	[GBEL3_K04] Application of the principles of bioethics.	does not apply	[SK1] oral statement/conversation/discussion
	[GBEL3_K01] The utilization of theoretical knowledge in laboratory and production practice.	student is able to apply theoretical knowledge in laboratory and production practice.	[SK2] presentation/project/paper/report [SK3] text preparation/written work
Subject contents	<ul style="list-style-type: none"> - DNA and protein labeling - Methods for studying protein-DNA interactions in vitro, including gel retardation assays, footprinting techniques, surface plasmon resonance - Methods for studying protein-DNA interactions in vivo, including chromatin immunoprecipitation, the use of reporter systems to assess the kinetics of protein-DNA interaction in the cell, in vivo footprinting, study of the relationship between DNA structure and protein interaction - Methods for studying DNA modification and its structure in cells - Methods for studying protein-protein interactions: including immunoprecipitation, pull-down techniques, crosslinking, FRET (Foerster Resonance Energy Transfer), two-hybrid systems, study of protein-ligand interactions using microcalorimetry - Methods for studying gene expression regulation in vivo and in vitro: reporter systems, methods for identifying regulatory factors; RT-PCR and transcriptomics; assessment of the kinetics of individual transcription stages in vitro and in vivo; study of RNA stability. 		
Prerequisites and co-requisites	basic knowledge in biochemistry of proteins and nucleic acids, basic knowledge on processes such as DNA replication, transcription and translation		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	research project proposal	50.0%	90.0%
	presentation and discussion	0.0%	10.0%
Recommended reading	Basic literature	Moss T. Protein-DNA interactions. Principles and Protocols. 3rd edition. Humana Press 2009Meyerkord C.L., Fu H. (Ed.) Protein-protein interactions. Methods and Applications. Springer 2015	

	Supplementary literature	Moss T. Protein-DNA interactions. Principles and Protocols. 3rd edition. Humana Press 2009 Meyerkord C.L., Fu H. (Ed.) Protein-protein interactions. Methods and Applications. Springer 2015
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	How can we determine if a protein interacts with a specific DNA sequence? How can we identify the DNA sequences that interact with the protein of interest in a cell? How can we identify the components of a protein complex?	
Work placement	Not applicable	

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