



Subject card

Subject name and code	Genetic Engineering-Team Project, PG_00058615						
Field of study	Biotechnology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle 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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Microbiology -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Paweł Sachadyn					
	Teachers	prof. dr hab. inż. Paweł Sachadyn dr hab. inż. Anna Stanisławska-Sachadyn					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	15.0	0.0	45
	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	45		5.0		25.0	75
Subject objectives	<p>The aim of lecture is to broaden the knowledge of students on genetic engineering applications in research and industry.</p> <p>The aim to project is to design and perform an experiment of molecular cloning in silico .</p> <p>The aim of laboratory is to carry out an experiment of in vitro cloning of an animal gene to a bacterial plasmid vector.</p>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U10] is able to use knowledge about possibilities, aims and limitations of biotechnology to develop, design and obtain products and biotechnological processes in the area of his/her specialization	The student is able to improve the existing and design new biotechnological products.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K7_W01] has advanced knowledge of methods of genetic engineering and molecular genetics, functioning of the immune system and mechanisms of immune system response, diagnostic methods, and analytical methods in the area of specialty	The student possesses broadened and detailed knowledge of the methods and applications of genetic engineering	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
	[K7_U07] is able to consider bioethical issues and regulations in research planning and design of biotechnological products and processes	Student is ready to consider bioethical issues in research and industry	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
	[K7_K04] is aware of the need to solve problems and perform tasks, independently formulate questions to solve a given problem or task; is able to plan the execution of a larger task by dividing it into partial tasks and draw up an appropriate schedule	Team performance of multi-step molecular cloning project.	[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills [SK2] Assessment of progress of work
[K7_U01] can individually design and perform a molecular cloning experiment into a plasmid vector	The student is able to design and perform an experiment of molecular cloning using a plasmid vector	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task	
Subject contents	Molecular cloning vectros, inserts and ligation methods. Genetic engineering of mammalian cell cultures. Induced pluripotent stem cells. Genetic engineering of animals techniques for genetic modifications in animals. Knock-out and transgenic animals in science. Cre-lox system genetic modifications in selected tissues. Production of pharmaceutical proteins in milk. Humanized antibodies. Genetic engineering of plants techniques for genetic modifications in plants. Gene therapy methods and questions Expression systems for production of pharmaceutical proteins.		
Prerequisites and co-requisites	basics of molecular biology, genetics, and microbiology		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam (test of choice)	60.0%	45.0%
	laboratory (experiment result and final report)	60.0%	30.0%
	molecular cloning project and presentation	60.0%	25.0%
Recommended reading	Basic literature	lecture print-outs	
	Supplementary literature	publications cited in the lecture	
	eResources addresses	Adresy na platformie eNauczanie:	

<p>Example issues/ example questions/ tasks being completed</p>	<p>Lecture 1: Molecular Cloning</p> <p>Key steps of molecular cloning.</p> <p>Vectors used in molecular cloning</p> <p>Applications of molecular cloning</p> <p>Applicaions of pET-Blue vector (cloning + expression).</p> <p>Obtaining Inserts.Artificial DNA synthesis - pros and cons.Codon usage optimisation or host choice (pRARE plasmid in E. coli Rosetta).Rapid amplification of cDNA ends (RACE) system.DNA ligase T4 substrates and co-factor.DNA topoisomerase as a cloning tool.Adavantages and applications of clonase (lambda phage integrase).</p>
<p>Work placement</p>	<p>Not applicable</p>