



Subject card

Subject name and code	, PG_00065403						
Field of study	Biotechnology						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group					
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			1.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Pharmaceutical Technology and Biochemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Monika Pawłowska					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	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	0.0	0.0	15		
Subject objectives	The aim of the course is to familiarize students with the conditions and factors influencing the growth and development of a cancerous tumor and to translate the knowledge acquired into laboratory conditions enabling the cultivation of cancer cells in hypoxic conditions.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W05] knows the basis of civilization diseases, including cancer, and chemical structures and properties of various groups of active substances, including anticancer drugs	he student has knowledge about the process of carcinogenesis and how various anticancer compounds affect the functioning of a cancer cell at the molecular level.			[SW1] Assessment of factual knowledge		
	[K7_U05] is able to apply instrumental methods of quantitative and qualitative analysis and studies on activity of biomolecules, select and apply diagnostic and analytical methods in the field of his/her specialty with particular emphasis on genetic, molecular and microbiological diagnostics and diagnostics based on antigen-antibody reaction	The student knows the techniques necessary to investigate the molecular causes of cancer and the changes that anticancer drugs can cause. He is able to grow cancer cells on his own in various growth conditions and oxygen availability.			[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		
	[K7_K02] is aware of the limitations and the necessity of continuous development of knowledge and technology; understands the need for education and constant training	The student is aware that in the case of cancer research, it is necessary to constantly follow literature data and update his knowledge.			[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	<ol style="list-style-type: none"> 1. Stages of carcinogenesis factors influencing the development of cancer extended list of changes according to the theory of Weidberg and Hannahan. 2. Techniques of culturing cancer cells: in suspension, as a monolayer, in the form of 3D structures (spheroids) 3. Conditions of culturing cancer cells normoxia and hypoxia 4. Adaptation of hypoxic conditions to the culture of human breast cancer cells 5. Methods of isolating mRNA from human cells 6. Qualitative and quantitative assessment of changes in the genetic profile of cancer cells growing in different physiological conditions normoxia and hypoxia, Real-Time PCR technique 						
Prerequisites and co-requisites	Knowledge of disciplines like cell biology, biochemistry, molecular biology, basics of genetics and genetic engineering.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Verification knowledge in particular areas through short tests or oral answers; final report on the preparation of cell cultures in hypoxia conditions.	60.0%	100.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. R.A. Weinberg "The biology of cancer" 2014. 2. A. Mackiewicz "Biologia komórki nowotworowej w erze inżynierii genetycznej." UM Poznań, 2021 3. L. Pecorino "Biologia molekularna nowotworów w praktyce klinicznej." Edra Urban & Partner, 2018 4. A. Lewandowska Ronnegren "Techniki laboratoryjne w biologii molekularnej." MedPharm Polska., 2018 	
	Supplementary literature	L.B. Jorde, J.C. Carey, M.J. Bamshad "Medical genetics" Edra Urban & Partner, 2019	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. What are the characteristics of a cancer cell? 2. What types of cancer cell growth are used in the laboratory? 3. What is hypoxia and how can it be reproduced in the laboratory? 4. What does the Real-Time PCR technique allow? 		
Work placement	Not applicable		

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