



Subject card

Subject name and code	, PG_00065404						
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			2.0		
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	30.0	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	0.0	0.0	30		
Subject objectives	The aim of the course is to learn advanced techniques for analyzing cancer cell biology and use them in the independent development of methods for examining the impact of anticancer compounds on cell functioning.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[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	The student is able to independently propose and perform experiments to determine the functioning of cancer cells and the effect of anticancer compounds.			[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work		
	[K7_U02] has practical skills in commonly used biochemical methods including enzyme activity and kinetics assays, electrophoresis, western blotting, ELISA assays, fluorescence microscopy, flow cytometry	The student knows the techniques necessary to study the biology and functioning of cancer cells (flow cytometry, Western blotting, microscopy) and is able to experimentally determine the effects that anticancer drugs can cause in them.			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K7_W05] knows the basis of civilization diseases, including cancer, and chemical structures and properties of various groups of active substances, including anticancer drugs	The student has knowledge of various molecular biology and genetic engineering techniques for studying cancer cells, including those exposed to anticancer compounds.			[SW1] Assessment of factual knowledge		
	[K7_W02] has advanced knowledge of structure and activity of enzymes and biologically active compounds also in pharmacological context, knows basic instrumental methods of qualitative and quantitative analysis and activity studies of biomolecules	The student knows the action of anticancer compounds and their impact on the functioning of cell components, including enzymes; is able to use various methods of qualitative and quantitative analysis in studying the functioning of a cancer cell.			[SW1] Assessment of factual knowledge		

Subject contents	<ol style="list-style-type: none"> 1. Flow cytometry in the examination of the vital functions of a cancer cell. 2. Flow cytometry in examining the level of proteins characteristic of the induction of apoptosis by anticancer compounds. 3. Light microscopy - real-time imaging and recording of cell growth 4. Fluorescence microscopy to study cell life processes and the impact of anticancer compounds on them 5. Confocal microscopy in creating complex images showing intracellular structures and the location of specific proteins. 6. Isolation of protein from human cells. 7. Analysis of protein levels in human cells using Western blotting 8. Real-Time PCR technique in testing the impact of compounds on cancer cell biology 		
Prerequisites and co-requisites	Basic knowledge of the structure and biology of cells and knowledge of the most important techniques used in studying cell biology and determining the expression of genes and level of proteins.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Short tests or oral answers on a given area of knowledge; reports on the application of specific molecular biology laboratory techniques.	60.0%	100.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. A. Mackiewicz "Biologia komórki nowotworowej w erze inżynierii genetycznej." UM Poznań, 2021 2. A. Lewandowska Ronnegren "Techniki laboratoryjne w biologii molekularnej." MedPharm Polska., 2018 3. M.J. Bamshad, J.C. Carey, L.B. Jorde "Genetyka medyczna" Edra Urban & Partner, 2021 	
	Supplementary literature	1. P. Węglarski "Genetyka molekularna", PWN, 2006	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. What is the principle of operation of a flow cytometer? 2. What structures can be viewed using a confocal microscope? 3. What is the procedure for isolating proteins from human cells and determining the level of the selected receptor? 		
Work placement	Not applicable		

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