

Subject card

Subject name and code	Medical aspects of cell signalling, PG_00198167						
Field of study	Biotechnology						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2026/2027		
Education level	Master's 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	1	ECTS credits			2.0		
Learning profile	academic	Assessment form			credit		
Conducting unit	Intercollegiate Faculty of Biotechnology UG-MUG -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Rafal Sadej				
	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		5.0		30.0	50
Subject objectives	To convey in-depth knowledge about eukaryotic cell signaling, regulation, and disruptions of cellular processes. Emphasis will be placed on signaling pathways that are elements of targeted therapies. - the student understands biological phenomena at the molecular level, knows their significance for biotechnology, - the student has advanced knowledge in related scientific fields and disciplines, enabling them to recognize connections and dependencies in nature, - the student has knowledge of issues currently discussed in the relevant literature that are significant in biotechnology						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BIOTECHMU2_W03] The graduate has in-depth, specialized knowledge of therapy and diagnostic methods of human diseases, including the mechanisms of action of selected drugs, immunotherapy, cellular and gene therapy, understanding the ethical, legal and social dilemmas involved and being able to evaluate them from the perspective of the patient's well-being and the public interest.	The student knows key signaling pathways, their disorders, and the associated diseases. They understand the concept of targeted therapies, their mechanisms, and applications	[SW4] test/exam - oral or written
	[BIOTECHMU2_W01] The graduate has in-depth knowledge of complex biological phenomena at the molecular level and knows their importance for biotechnology, is able to analyze them in an interdisciplinary approach and assess their ethical, social and environmental implications.	The student knows and understands the complex molecular mechanisms of human cells, and can relate their importance to biotechnology and other disciplines.	[SW4] test/exam - oral or written
	[BIOTECHMU2_W04] The graduate has in-depth knowledge of selected biotechnology problems currently discussed in the literature.	The student knows and understands contemporary issues and problems in biotechnology, including the development and application of targeted therapies	[SW4] test/exam - oral or written
Subject contents	<ol style="list-style-type: none"> 1. Protein kinases chemical activity, regulation, structure, families of protein kinases, dysregulation of kinase activity, kinase inhibitors in therapy. Protein phosphatases mechanism of action, types of phosphatases. Interdependence of kinase/phosphatase in major signaling cascades. 2. Adhesion receptors importance of cell adhesion, major adhesion receptors integrins and their ligands extracellular matrix proteins, cadherins, selectins, glycosylation of adhesion receptors. Adhesion disorders, cell migration - consequences. 3. G protein-coupled receptors cAMP and phosphatidylinositol signaling pathways. Interleukin-dependent signaling, JAK-STAT factors. 4. Growth factor receptors RTK - family of tyrosine kinase receptors main representatives, classical activation pathway, alternative pathways, RTK signaling disorders, growth factor receptor inhibitors in therapy. 5. Steroid hormone receptors mechanism of action, significance in the physiology of the mammary and prostate glands, disorders in oncology, hormone therapies. 6. Transcription factors link with cellular signaling. Mechanisms of transcription factor activation. Transcription factors in pathology. <ul style="list-style-type: none"> • Control of the cell cycle, cell death, autophagy, protein sorting in the cell integrations. 		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	51.0%	100.0%
Recommended reading	Basic literature	Cell Signalling 4th Edition. JT Hancock	
	Supplementary literature	Cellular Signal Transduction in Toxicology and Pharmacology: Data Collection, Analysis, and Interpretation. Boyd Jonathan W. Neubig Richard R.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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