University of Gdańsk

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. Rafał Sądej				
	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 targered 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

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.

- 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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