University of Gdańsk

Subject card

Subject name and code	Modern methods in biochemical analysis, PG_00154546						
Field of study	Medical Biology						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study Optional subject group 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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		2.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Laboratory of Microbial Biochemistry -> Department of General and Medical Biochemistry -> Faculty of Biology -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Dorota Kuczyńska-Wiśnik				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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		4.0	16.0	50	
Subject objectives	Introducing students to modern methods of protein analysis.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOLMEDL3_K01] is aware of the importance of lifelong learning and keeping up to date with developments in medical biology and related disciplines, and applies this knowledge to the planning and design of professional activities	realizowane na ćwiczeniach z przedmiotu	[SK4] test/exam - oral or written
[BIOLMEDL3_U08] is able to give oral presentations in Polish or English on specific topics in medical biology and can use specialist medical biology terminology in a way that is clear and accessible to both specialists and non-specialists	realizowane na ćwiczeniach z przedmiotu	[SU4] test/exam - oral or written
[BIOLMEDL3_W10] has an advanced understanding of the principles of assessing processes and phenomena occurring within the body, using physical or chemical measurements, and possesses advanced knowledge of experimental methods and the key techniques of the biological sciences that may be applied in medical biology and diagnostics	lists the most important techniques used in protein analysis, explains the theoretical basis of these methods and indicates their application in medical biology and diagnostics	[SW4] test/exam - oral or written
[BIOLMEDL3_W08] has an advanced understanding of the development and current state of knowledge and the latest trends in medical biology; indicates their relationship with other disciplines of natural or medical sciences	is familiar with the development and current state of knowledge and the latest trends in the field of biochemical analysis methods used in medical biology; indicates their relationship with other disciplines of natural or medical sciences	[SW4] test/exam - oral or written
[BIOLMEDL3_U04] synthesises data from different sources and draws appropriate conclusions from them	realizowane na ćwiczeniach z przedmiotu	[SU4] test/exam - oral or written
[BIOLMEDL3_K02] is aware of their own limitations and knows when to turn to experts who have the resources, technologies and knowledge to provide certainty on a given topic, save time and avoid mistakes	realizowane na ćwiczeniach z przedmiotu	[SK4] test/exam - oral or written

Subject contents

The following methods will be discussed:1. protein crystallography and basics of structural X-ray 2. NMR nuclear magnetic resonance - application in structural proteomics 3. protein mass spectrometry (ionization methods and ion analyzers, MALDI, SELDI, ESI, fragmentation-assisted protein identification, de novo sequencing, LC-MS and multidimensional techniques) 4. modern electrophoretic methods of protein separation (two-way electrophoresis and DIGE) 5. HPLC high performance liquid chromatography 6. FRET spectroscopic method in the study of interactions between proteins 7. chemical cross-linking of proteins 8. two-hybrid system 9. protein and peptide arrays 10. immunological techniques in proteomics 11. flow cytometry 12. methods of protein localization In addition, the following topics will be discussed: 13. proteomics of post-translational modifications 14. clinical proteomics 15. application of bioinformatics in proteomics

Prerequisites and co-requisites

general and analytical chemistry; organic chemistry; knowledge of the structure and function of proteins and nucleic acids as well as basic biological processes occurring in the cell

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written exam	51.0%	100.0%

Recommended reading

Basic literature	Johnstone R.A.W., Rose M.E. (2001) Spektrometria mas, PWN Silverstein, F.X. Webster, D.J. Kiemle (2007) Spektroskopowe metody identyfikacji związków organicznych, PWN Kraj A., Drabik A., Silberring J. (2010) Proteomika i metabolomika, Wydawnictwa Uniwersytetu Warszawskiego and articles in specialized journals
Supplementary literature	A. Cooper (2010) Chemia biofizyczna Wydawnictwo PWN
eResources addresses	

Example issues/ example questions/ tasks being completed	Provide the correct order of the elements building a mass spectrometer Which method is used to detect post-translational modifications?
Work placement	Not applicable

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