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_U09] has the ability to give oral presentations in Polish or English on specific issues in medical biology	realizowane na ćwiczeniach z przedmiotu	[SU4] test/exam - oral or written
[BIOLMEDL3_U05] synthesises data from different sources and draws appropriate conclusions from them	realizowane na ćwiczeniach z przedmiotu	[SU4] test/exam - oral or written
[BIOLMEDL3_W16] explains the theoretical basis of experimental methods and lists the most important techniques of biological sciences that can be applied to 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_U11] is able to use language specialized for medical biology in a way that is clear and accessible to both specialists and non-specialists alike	realizowane na ćwiczeniach z przedmiotu	[SU4] test/exam - oral or written
[BIOLMEDL3_W12] is oriented in 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_K03] is aware of his/her own limitations and knows when to seek expert assistance	realizowane na ćwiczeniach z przedmiotu	[SK4] test/exam - oral or written
[BIOLMEDL3_K01] understands the need for lifelong learning and to update his/her knowledge of medical biology and related disciplines	realizowane na ćwiczeniach z przedmiotu	[SK4] test/exam - oral or written
[BIOLMEDL3_U15] learns independently, in a focused manner	realizowane na ćwiczeniach z przedmiotu	[SU4] 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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