University of Gdańsk

Subject card

Subject name and code	Mass spectrometry in proteomics , PG_00153633		
Field of study	Biotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	Master's studies	Subject group	
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	English
Semester of study	2	ECTS credits	2.0
Learning profile	academic	Assessment form	
Conducting unit	Intercollegiate Faculty of Biotechnology UG-MUG -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Paulina Czaplewska	
	Teachers	dr hab. Paulina Czaplewska	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	20.0	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	5.0	15.0	50

Subject objectives
• learning and acquiring basic concepts and terminology used in mass spectrometry (K_W01, K_W04) • acquiring the knowledge and skills necessary to independently prepare a sample and conduct proteomic analysis of peptides and proteins (K_W01, K_W04, K_U01, K_U05, K_K05) • familiarization with methods of identifying peptides and proteins based on ESI and MALDI mass spectra (K_W05, K_U05, K_K05) • familiarization with the analysis of fragmentation spectra of peptides (K_W01, K_U05, K_K01)

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOTECHMU2_U04] The graduate is able to use scientific information fluently, including English-language information on biotechnology; analyse and select information critically; use electronic sources; use appropriate databases	Has the skills necessary for laboratory work; is able to plan and conduct an experiment; independently documents activities and results; in laboratory work, under the supervision of a supervisor, uses complex research techniques and tools; has the ability to operate laboratory equipment (K_U01) Collects and interprets empirical data; uses statistical methods and IT tools to analyze data; formulates conclusions based on empirical data (K_U05).	[SU2] presentation/project/paper/ report
[BIOTECHMU2_U01] The graduate is able to do laboratory work; plan and carry out an experiment; document activities and results; use complex techniques and research tools under the supervision of a tutor in laboratory work; operate laboratory equipment; apply the principles of occupational health and safety; understand the dangers of working in a laboratory	Is aware of the importance of occupational safety rules, especially work in the laboratory; applies work safety rules; is responsible for the safety of himself and others; is able to deal with threats (K_K05).	[SU8] observation of student's independent or team work
[BIOTECHMU2_W05] The graduate knows and understands the methods used in science and natural sciences necessary to understand biological phenomena and processes at the molecular level	Understands complex biological phenomena at the molecular level, knows their importance for biotechnology and connections with other fields and disciplines of science (K_W01) Knows the basic principles of occupational health and safety; understands the dangers of working in the laboratory; knows the risks associated with conducting laboratory tests; knows the risks of working with pathogenic organisms and GMOs (K_W04)	[SW1] oral statement/ conversation/discussion

Subject contents

- Introduction to mass spectrometry, physical basis of MS spectrum measurement, equipment and basics of recording MS spectra.
- Qualitative and quantitative analysis in proteomic analysis using mass spectrometry
- Sample preparation methods for MS analysis, registration and analysis of peptide and protein spectra (ESI, MALDI)
- Analysis of post-translational modifications in MS
- Protein depletion before MS analysis, solution digestion and in-gel digestion
- Analysis of MS data using MS spectra and protein databases.

Prerequisites and co-requisites

No formal requirements.Entrance requirements:It is required to obtain knowledge, skills and competences specified for the following courses: Biochemistry (lecture), Organic Chemistry (lecture).

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Final project	51.0%	75.0%
Report on laboratory classes	51.0%	25.0%

Recommended reading

Basic literature	Johnstone Robert A.W. I Malcolm E.Rose, Spektrometria mas, PWN 2001 De Hoffmann, Edmond, Charette, Jean Joseph, Stroobant, Vincent, Spektrometria mas, Wydawnictwa Naukowo-Techniczne 1998

	Supplementary literature	K. Macur,·J. GrzenkowiczWydra, L. Konieczna, J. Bigda, C. Temporini, S. Tengattini, T. Bączek. A (2018) ProteomicBased Approach to Study the Mechanism of Cytotoxicity Induced by Interleukin1 and Cycloheximide ***Chromatographia*** 81:4756 (doi.org/10.1007/s10337-017-3382-3) M. Rafalik, M. Spodzieja, A.S. Kołodziejczyk, S. Rodziewicz-Motowidło, A. Szymańska, A. Grubb, P. Czaplewska (2018) The identification of discontinuous epitope in the human cystatin c monoclonal antibody hCC3 complex. ***Journal of Proteomics (***doi.org/10.1016/j.jprot.2018.04.020) M Prądzińska, I Behrendt, M Spodzieja, AS. Kołodziejczyk, S Rodziewicz-Motowidło, A Szymańska, SL. Lundström, RA. Zubarev, K Macur, P Czaplewska (2016). *Isolation and characterization of autoantibodies against human cystatin C.* ***Amino Acids*** (DOI 10.1007/s00726-016-2271-7) AE. Lewandowska, K. Macur, P. Czaplewska, J. Liss , K. Łukaszuk, S. Ołdziej. (2017) Qualitative and Quantitative Analysis of Proteome and Peptidome of Human Follicular Fluid Using Multiple Samples from Single Donor with LC-MS and SWATH Methodology. ***J Proteome Research*** (**DOI**: 10.1021/acs.jproteome.7b00366) Primers for Proteomics https://doi.org/10.1142/13595 | May 2024 Pages: 250 Edited by: Paulina Czaplewska (*University of Gdańsk, Poland & Medical University of Gdańsk, Poland*), Katarzyna Macur (*University of Gdańsk, Poland & Medical University of Gdańsk, Poland*), and Paweł Ciborowski (*University of Nebraska Medical Center, USA*)
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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