

Subject card

Subject name and code	Data analysis in transcriptomics and metabolomics, PG_00156419						
Field of study	Bioinformatics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		3.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Environmental Analysis -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Łukasz Haliński				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		0.0		45.0	75
Subject objectives	1. To familiarize students with issues related to the analysis of transcriptomic data 2. To familiarize students with issues related to metabolomic data analysis						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[BIOINL3_W04] Has knowledge of basic research techniques and tools used in bioinformatics		The student is familiar with basic omics databases, methods of preprocessing omics data, knows the basic computer methods of determining doses leading to perturbations in transcriptomic pathways, knows the procedures used to acquire omics data, and understands the impact of the various steps of the procedures on the quality and reliability of the data obtained.		[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report		
	[BIOINL3_U03] Graduate applies fundamental mathematical and statistical methods to describe phenomena and analyze data; has the ability to perform basic data analysis in professional databases used in bioinformatics		Students are able to independently perform preprocessing of omics data, identify basic computer methods for determining doses leading to perturbations in transcriptomic pathways, interpret analytical results and assess their reliability, and critically compare available metabolomic data.		[SU2] presentation/project/paper/ report		
Subject contents	1. Available transcriptomic and metabolomic databases 2. Preprocessing of "omics" data 3. Changes in gene expression vs. transcriptomic pathways 4. Tools for determining doses leading to perturbations in transcriptomic pathways 5. Adverse Outcome Pathways (AOP) 6. Analytical procedures used in metabolomics and transcriptomics 7. Interpretation of analytical data: raw and processed data 8. Application of chromatographic and mass spectrometric techniques in metabolomics 9. Limitations of the metabolomics approach using lipidomics as an example 10. Reliability of analytical results and its impact on the quality of metabolomics data						

Prerequisites and co-requisites	1. Genomics 2. Cell biology and metabolism 3. Statistical analysis and probability calculus for bioinformaticians 4. Multidimensional data mining techniques 5. Have a basic knowledge of multivariate data mining techniques		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Pass work (project, presentation; 240 min)	51.0%	100.0%
Recommended reading	Basic literature	Current scientific publications and studies and review articles.	
	Supplementary literature	1. J. Mazerski, Podstawy chemometrii, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2000 2. S.P. Putri, E. Fukusaki (Eds) "Mass Spectrometry-Based Metabolomics: A Practical Guide", CRC Press, Taylor & Francis, Boca Raton, 2014 3. N. Lutz, J. Sweedler, R. Wevers "Methodologies for Metabolomics : Experimental Strategies and Techniques", Cambridge University Press, Nowy Jork, 2012	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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