University of Gdańsk

Subject card

Subject name and code	Analysis of Transcriptomic and Metabolomic Data, PG_00193544		
Field of study	Bioinformatics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	Bachelor's studies	Subject group	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	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_U03] Graduate applies mathematical and statistical methods to describe phenomena and analyze data; has the ability to perform 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
[BIOINL3_W04] Has advanced knowledge of 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

<table>
<tr><td>Subject contents</td><td>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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>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</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Pass work (project, presentation; 240 min)</td><td>51.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Current scientific publications and studies and review articles.</td></tr>
<tr><td>Supplementary literature</td><td>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</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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