

Subject card

Subject name and code	Bioinformatics - applications , PG_00153620						
Field of study	Biotechnology						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Intercollegiate Faculty of Biotechnology UG-MUG -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Małgorzata Waleron				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		5.0		30.0	50
Subject objectives	Getting students acquainted with the basic knowledge in the area of bioinformatics that allows students to consciously use bioinformatics methods and tools applied in biotechnology and other fields of science. Students will widen their knowledge in the related areas and disciplines of science that will allow them to see relationships and dependencies in nature, in particular those essential for biotechnology.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[BIOTECHMU2_W05] The graduate possesses in-depth knowledge of methods used in the field of exact and natural sciences, necessary to understand biological phenomena and processes at the molecular level.		The student has knowledge in the field of mathematical methods, including statistical ones, applied in biotechnology.		[SW4] test/exam - oral or written		
	[BIOTECHMU2_W02] The graduate has in-depth knowledge of the application of laboratory techniques and methods of genetic modification of cells and organisms and their use in biotechnology.		The student has an extended knowledge of the performance and interpretation of bioinformatics analyses and their use in biotechnology.		[SW4] test/exam - oral or written		

Subject contents	1. Review of sequential databases. Collection, storage and preparation of sequences to be deposited in public databases. 2. Sequence comparison (comparison of pairs of sequences, comparison of many sequences). 3. Search for similar sequences in databases. 4. Chimeric sequences. OTU (operational taxonomic units) determination, Metagenomics 5. Genomics and projects of genome sequencing 6. Genome assembly and annotation 7. Comparative genomics. Phylogenetic profiles and regions of genome plasticity. 8. Pangenomics. Pangenome, core genome and dispensable genes discrimination. 9. Overall Genome Related Index (<i>OGRI</i>) <i>methods</i>: ANI/AAI, DNA-DNA hybridisation in silico. 10. Phylogenetics . Evolution models. Phylogenetic prediction 11. Searching for the gene clusters encoding secondary metabolites 12. Searching for plasmids, prophages, mobile genetic elements in NGS data		
Prerequisites and co-requisites	Unicellular organisms - Structure, diversity and environment Fundaments (M03_B1) Unicellular organisms - Genetics Methodology (M03_B2) Unicellular organisms - Genetics Metabolism (M03_B3)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Graded test with open questions	51.0%	100.0%
Recommended reading	Basic literature	• Applied Bioinformatics : An Introduction, Paperback by Selzer, Paul M. (EDT) Springer 2018 • Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins (Methods of Biochemical Analysis • Bioinformatics and Molecular Evolution. Paul G. Higgs, Teresa K. Attwood.	
	Supplementary literature	• Bioinformatics. Sequence and genome analysis". D.W. Mount. 2001. • Students individually search for materials concerning classes using electronic resources	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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