



Subject card

Subject name and code	Basic Bioinformatics, PG_00058230						
Field of study	Biotechnology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle 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	1	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Pharmaceutical Technology and Biochemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Wojciechowski					
	Teachers	dr hab. inż. Marek Wojciechowski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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		2.0		18.0	50
Subject objectives	The aim of this subject is to familiarise the students with the idea of algorithms and basic computational methods used in the analysis of various genomics and molecular biology problems. Students get acquainted with protein sequence and structure analysis methods, structural and sequence databases and the tools for effective data analysis. In the laboratory course students have the opportunity to use the knowledge and practice their skills in solving real bioinformatics problems.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W04] has a structured knowledge of the application of informatics tools in biotechnology and molecular modeling of biomolecules	Student knows the basic IT tools. and is able to use them to build and analyze the properties of biomolecules and to solve various bioinformatics problems			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U06] is able to apply statistical methods, computer solutions, especially bioinformatics methods to design experiments and technologies, analyze experimental results and technological processes and solve problems in the field of biotechnology, is able to use biotechnological databases	Student is able to use remote and local tools, including bioinformatics databases, to solve problems in the field of bioinformatics. The student is able to carry out a correct analysis and interpretation of the obtained results			[SU4] Assessment of ability to use methods and tools		
	[K7_K02] is aware of the limitations and the necessity of continuous development of knowledge and technology; understands the need for education and constant training	The student is aware of the speed of changes taking place in biotechnology and understands the need for continuous training in this field.			[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	Definition of an algorithm. Basic data structures and programming strategies. Abstract data structures: lists, trees, stacks, queues. Rule and divide strategy, dynamic programming, greedy algorithm, recursion. Computational complexity. Information processing in living cells. Genetic code. Replication, transcription and translation. Protein sequence, structure and function relationship. Local and remote databases. Aminoacids substitution matrices. Protein sequence comparison. Protein sequence databases. Heuristic algorithms for sequence database searching. Phylogenetic analysis. Multiple sequence alignment. Sequence motifs, profiles and regular expressions. Structural protein databases. Databases of protein families. Protein sequence and structure alignment. Analysis of protein structure and function. Protein tertiary structure prediction methods.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final test of the lecture material	60.0%	50.0%
	Practical project	60.0%	50.0%
Recommended reading	Basic literature	1) Educational materials provided by the lecturer. 2) Bioinformatics and Molecular Evolution, PG. Higgs, TK. Attwood, Blackwell publishing 2005	
	Supplementary literature	1) Introduction to algorithms T.H.Cormen, Ch.E.Leiserson, R.L.Rivest, MIT Press 2009. 2) BIOINFORMATICS, ed. Paul H. Dear, SCION Publishing ltd, 2007.	
	eResources addresses	Adresy na platformie eNauzanie:	
Example issues/ example questions/ tasks being completed	1) Classification and protein function analysis based on its primary structure. 2) Protein structure prediction from its amino acid sequence		
Work placement	Not applicable		