

Subject card

Subject name and code	Data analysis and numerical methods, PG_00143859						
Field of study	Informatics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study		
Mode of study	part-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		4.0		
Learning profile	academic		Assessment form				
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Adrian Karpowicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	0.0	20.0	0.0	0.0	40
	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	40		0.0		60.0	100
Subject objectives	The aim of the course is to familiarize students with numerical calculations, their applications and problems arising when conducting such calculations.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[INFL3_U03] can design and analyze algorithms for their correctness and computational complexity using appropriate algorithmic techniques and data structures		can write simple procedures in known programs that allow solving selected mathematical problems numerically and analyzes the results of their operation		[SU2] presentation/project/paper/report [SU8] observation of student's independent or team work		
	[INFL3_U02] can precisely formulate questions to deepen one's understanding of a given topic or find missing elements of reasoning		designs and analyzes algorithms for solving mathematical problems numerically		[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report		
	[INFL3_W01] has knowledge in mathematics including issues of mathematical analysis and linear algebra with geometry and numerical methods		knows the theoretical foundations of computational methods used to solve selected mathematical problems numerically		[SW4] test/exam - oral or written		
	[INFL3_U01] can apply mathematical knowledge to formulate, analyze and solve problems related to computer science		Applies knowledge of mathematical analysis and linear algebra to the design of numerical algorithms and data analysis.		[SU2] presentation/project/paper/report [SU4] test/exam - oral or written		
	[INFL3_W10] knows the basic principles of occupational health and safety in the IT profession		knows the basic principles of occupational health and safety in the IT profession		[SW1] oral statement/conversation/discussion		
Subject contents	1. Examples of numerical algorithms solving a given mathematical problem precisely, e.g. polynomial interpolation, solving systems of linear equations. 2. Examples of numerical algorithms solving a given mathematical problem, e.g. the problem of function approximation, finding approximate solutions to equations and systems of equations. 3. Data prediction using linear regression. 4. Data grouping methods, e.g. k-means grouping.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	51.0%	65.0%
	Projects	51.0%	35.0%
Recommended reading	Basic literature	- Wojciech Kordecki, Karol Selwat, Metody numeryczne dla informatyków, Helion, 2020. H. Zhou, Eksploracja danych za pomocą Excela, Metody uczenia maszynowego krok po kroku, Helion, 2024.	
	Supplementary literature	- David Kincaid, Analiza numeryczna, WNT, 2006. R. Johansson, Matematyczny Python. Obliczenia naukowe i analiza danych z użyciem NumPy, SciPy, Matplotlib. Helion, 2021.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Determine the LU decomposition of a given matrix. Discuss its application in solving systems of linear equations. 2. Find the line that best approximates the given measurement data using the least squares method. Calculate the error of the method. 3. Load a dataset containing coordinates of points in two-dimensional space. Apply the k-means clustering algorithm to group the points into three clusters. Additionally: - Visualize the points with cluster assignments marked in different colors. - Determine the coordinates of the cluster centers (centroids). - Compute the total within-cluster sum of squared distances between the points and their centroids		
Work placement	Not applicable		

Document generated electronically. Does not require a seal or signature.