

Subject card

Subject name and code	Information Technology, PG_00155237						
Field of study	Mathematical Modeling and Data Analysis						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Bachelor'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	1		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
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	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		5.0		15.0	50
Subject objectives	Acquiring proficiency in using a spreadsheet to solve mathematical problems, implement simple algorithms and analyze data. Implementation for using the Linux and Windows terminal.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MMiADL3_K03] is ready to work in a team; understands the need for systematic work on all projects that have a long-term character		The student is ready to work in a team while preparing a group project related to data analysis.		[SK2] presentation/project/paper/report [SK8] observation of student's independent or team work		
	[MMiADL3_W09] knows and understands the basics of computational and programming techniques supporting mathematician's work and understands their limitations		The student knows and understands the fundamentals of techniques related to numerical methods that solve a given problem either exactly or approximately.		[SW5] implementation of a problem task		
	[MMiADL3_U09] is able to use the learned software package or the learned programming language to solve selected problems from the known fields, in particular from mathematical analysis, linear algebra and statistics		The student is able to use a spreadsheet to solve selected mathematical models.		[SU5] implementation of a problem task		
	[MMiADL3_U13] knows how to use computer programmes in the field of data analysis		Can use a spreadsheet to analyze data.		[SU2] presentation/project/paper/report [SU5] implementation of a problem task		

Subject contents	1. Processing numerical data in Excel using mathematical, logical, financial, and statistical formulas, as well as creating diagrams, line charts, and surface charts. 2. Processing textual data in Excel using text functions, date and time formulas, and data validation tools. 3. Examples of implementing numerical algorithms and data mining using Excel. 4. Analysis of statistical data in Excel using lookup functions, Power Query, and pivot tables and charts. 5. Using the Solver tool to solve linear and nonlinear optimization problems. 6. Applying trendlines for data approximation and linear regression for data prediction, using the Data Analysis Toolpak. 7. Basics of using terminal environments in Linux and Windows systems. 8. Using artificial intelligence tools to create shell scripts in Linux and Windows (PowerShell). 9. Using artificial intelligence tools to create macros and scripts in Excel.														
Prerequisites and co-requisites															
Assessment methods and criteria	<table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Project</td><td>51.0%</td><td>20.0%</td></tr><tr><td>Activity</td><td>0.0%</td><td>5.0%</td></tr><tr><td>Test</td><td>51.0%</td><td>75.0%</td></tr></table>	Subject passing criteria	Passing threshold	Percentage of the final grade	Project	51.0%	20.0%	Activity	0.0%	5.0%	Test	51.0%	75.0%		
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Recommended reading	Basic literature	H. Zhou, Eksploracja danych za pomocą Excela, Helion, 2024. Maciej Gonet, Excel w obliczeniach naukowych i technicznych, Helion, 2010.													
	Supplementary literature	G. Mount, Nowoczesna analiza danych w Excelu, Helion 2025. A. Obecny, Matematyka w Excelu, Helion 2001. Brian Ward, Jak działa Linux: podręcznik administratora, Helion, Gliwice, 201													
	eResources addresses	Basic https://www.excelszkolenie.pl/ - Excel and VBA training.													

Example issues/ example questions/ tasks being completed	Task to be completed in Microsoft Excel a) Sketch a chart showing how the total surface area of a cylindrical can with a volume of 0.25 liters changes depending on the radius of its base. Label the axes, including the appropriate units for radius and volume. b) Based on the chart, determine what the minimum surface area of the can is. Verify your assumptions using the Solver tool. c) Assuming that the cost of the metal sheet used for the top and bottom of the can (with a volume of 0.25 L) is twice as high as the cost of the sheet for the rest of the can, determine the optimal dimensions of the can that would minimize the total cost of the material needed for its production. Task to be completed in Microsoft Excel Download the file <i>akwizytorzy.xlsx</i>. Create a pivot table report presenting information about sales in the year 2024, broken down by quarters and sales representatives. The report should match the layout shown in the example diagram.
Work placement	Not applicable

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