



Subject card

Subject name and code	Mathematical software, PG_00036611						
Field of study	Mathematics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study 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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Nonlinear Analysis and Statistics -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Magdalena Chmara				
	Teachers		dr hab. Sergey Kryzhevich dr inż. Magdalena Chmara				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=6924 Moodle ID: 6924 Pakiety matematyczne 2026/27 https://enauczanie.pg.edu.pl/2025/course/view.php?id=6924						
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	45		5.0		50.0	100
Subject objectives	The objectives of the course are: selecting the right tool for the problem; to become proficient in using the tools; to develop basic programming skills in the discussed environments; acquiring the ability to search for functions needed to solve new problems (including in English); developing a critical approach to the results obtained and the habit of verifying them; developing flexibility—I can also cope in a new environment; exploring the possibilities of applying the acquired skills to solving mathematical problems. Translated with DeepL.com (free version)						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W09		Using programs such as Mathematica, MATLAB, or R and using them to solve mathematical problems.		[SW1] Assessment of factual knowledge		
	K6_U07		Learning a number of computational procedures provided with the programs and creating its own procedures. Resolving mathematical problems and issues using programming skills. Critical thinking.		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		

Subject contents	Course content – lecture		
	The lecture introduces three environments: Wolfram Language/Mathematica, MATLAB, and R/RStudio, treating them as tools for modeling, symbolic and numerical computation, data processing, and communicating results. It discusses the organization of a computational project, notebooks, scripts, Live Scripts, and R Markdown, as well as the principles of reproducibility. In the section on Mathematica, it covers symbolic expressions, exact and approximate numbers, variables, functions, lists, as well as elements of linear algebra, mathematical analysis, and differential equations. The MATLAB module focuses on scripts, functions, vectorization, ODE solvers, 2D/3D visualization, file operations, and symbolic computations. The R section covers data types, data frames, the tidyverse, data import and export, data quality control, the basics of regression, and reporting. The course emphasizes the comparison of symbolic, numerical, and approximate computations, error analysis, model validation, and the interpretation of results. It will also introduce elements related to MCP tools and the principles of safe AI use, including the verification of code generated by assistants, testing results, and documenting limitations. Optionally, selected Python libraries may be introduced. Translated with DeepL.com (free version)		
	Course content – laboratory		
	The labs cover the practical use of Mathematica/Wolfram Language, MATLAB, and R/RStudio (optionally Python) in solving simple mathematical problems and carrying out computational projects. In the Mathematica section, students become familiar with the working environment and the basics of the Wolfram Language; they learn to define variables and functions, work with lists, create graphs, and use the software to solve and explore selected topics in mathematical analysis, symbolic computation, and numerical computation - in particular, to solve simple equations and models. The MATLAB module covers the basics of the environment, vectors and matrices, scripts, functions, file operations, data visualization, and basic numerical computations. In the R section, students learn about basic data structures, importing, exporting, and transforming data, initial data exploration, creating visualizations, and reporting results in R Markdown. The labs also cover the organization of a computational project, documenting the successive stages of the solution, exchanging data between packages in standard file formats, and preparing a simple, reproducible report that integrates the results obtained in different environments. Translated with DeepL.com (free version)		
Prerequisites and co-requisites	There are no prerequisites, the student learns the programs from scratch.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lab Assignments	50.0%	30.0%
	Lecture Quizzes	50.0%	20.0%
	Project	50.0%	50.0%
Recommended reading	Basic literature	Roozbeh Hazrat, Mathematica®: A ProblemCentered Approach, Springer, 2015/2016 Hiebeler, David E. R and MATLAB / by David E. Hiebeler. 1st edition.Boca Raton, FL: Chapman and Hall/CRC, 2018. Print. R cookbook : proven recipes for data analysis, statistics, and graphics / J. D. Long and Paul Teetor. Tkachenko, Nikita. <i>Data Insight Foundations: Step-by-Step Data Analysis with R</i> . Apress, 2025.	
	Supplementary literature	none	
	eResources addresses	Basic https://www.mathworks.com/help/matlab/index.html - MATLAB documentation https://reference.wolfram.com/language/ - Wolfram Language & System Documentation Center 10.09.2025 https://www.r-project.org/ - The R Project for Statistical Computing 10.09.2025	
Example issues/ example questions/ tasks being completed	Solving first-order differential equations symbolically and numerically, and validating the results. Operations on vectors and matrices Function plots Data exchange between software packages		
Practical activities within the subject	Not applicable		

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