GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematical software, PG_00036611		
Field of study	Pakiety matematyczne		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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 -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Magdalena Chmara	
	Teachers	dr inż. Magdalena Chmara dr hab. Sergey Kryzhevich	

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=937

Moodle ID: 937 Pakiety matematyczne 2025/26
https://enauczanie.pg.edu.pl/2025/course/view.php?id=937

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 purpose of the subject is:

proficient use of tools;
develop basic programming skills in the discussed environments;
acquiring the ability to find functions needed to solve new problems (also in English);
develop critical thinking about the results obtained and the habit of verifying them
developing flexibility - "I can also cope in a new environment";
learning how to apply the acquired skills in solving mathematical problems;

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W09	Using Mathematica/ Matlab/R programs. Performing symbolic and numerical calculations with them.	[SW1] Ocena wiedzy faktograficznej
K6_U07	To learn a range of calculation procedures supplied with programs and to create their own procedures. Solving mathematical problems using programming skills.	[SU4] Ocena umiejętności korzystania z metod i narzędzi [SU1] Ocena realizacji zadania

Subject contents	Lecture: Introduction to Mathematica: description of the work environment, program kernel, use of help, data entry. Numbers and variables: types of numbers, approximations, number systems, constants Mathematica, arithmetic operations, defining variables, accuracy of calculations, logical operators, comparison operators. Lists and arrays: creating lists and basic operations on lists, modifying lists using using the program's built-in functions. Elements of programming: conditional instructions, iterative loops, defining procedures. Vectors and matrices: basic operations on vectors and matrices, solving systems of linear equations. Elements of mathematical analysis: operations on polynomials, definition of functions, solving equations and systems of nonlinear equations, differentiation and integration of functions. Introduction to Matlab environment: description of working environment, program kernel, use of help, data entry, M-script files. Elements of programming: conditional instructions, iterative loops, defining procedures, M-function files, pointers to functions, anonymous functions. Data presentation: data types data, format for displaying variables, writing data to the screen and to a file, reading data from a file, graphical presentation. Issues of linear algebra. Symbolic computing package. Introduction to R language and RStudio environment: data types, operations on data sets and files. Labs: 1.Introduction to Mathematica 2.Mathematica. Vectors and Matrices 3.Mathematica. Functions 4.Mathematica. Graphs 5 Mathematica. Mathematical Analysis and Differential Equations. 6. Mathematica Colloquium 7. Introduction to R 8. R: data structures 9.R - project - import and preliminary data analysis 10.R - project - import and preliminary data analysis 11.Matlab - introduction to the program, vectors and matrices 12. Matlab - scripts and functions 13. Matlab - file operations 14. Matlab - Graphs and symbolic calculations 15. Matlab - Colloquium
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
Project	50.0%	30.0%
Tests and lecture activity	50.0%	10.0%
Individual tasks in the classroom	50.0%	30.0%
2 Semestral tests	50.0%	30.0%

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.

	Supplementary literature	1. R cookbook : proven recipes for data analysis, statistics, and graphics / J. D. Long and Paul Teetor.
	eResources addresses	Supplementary https://rc2e.com/ - R Cookbook, 2nd Edition https://www.r-project.org/ - The R Project for Statistical Computing 10.09.2025 https://reference.wolfram.com/language/ - Wolfram Language & System Documentation Center 10.09.2025 https://www.mathworks.com/help/matlab/index.html - MATLAB Help Center 10.09.2025
Example issues/ example questions/ tasks being completed	The task of the student will be writing programs solving mathematical problems, such as 1 Write a program defining the Fibonacci sequence; 2 Write a program resolving the differential problem.	
Practical activites within the subject	Not applicable	

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