GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Programming in Matlab, PG_00047928		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Optional subject group 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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Theoretical Physics and Quantum Informaton -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Patryk Jasik	
	Teachers	dr inż. Patryk Jasik	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	15.0	0.0	0.0	15

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 30101 Programowanie w Matlabie (2025)
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30101

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	15	1.0	9.0	25

Subject objectives

The main aim of the course is to show students functionalities and capabilities of the Matlab environment. The specific aim of the course is to develop practical programming skills in this environment, based on the programming knowledge acquired previously by students and using the knowledge of linear algebra and mathematical analysis.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W04] knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	The student knows and understands the principles, methods, and techniques of programming in the Matlab environment.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study	The student is able to use his knowledge of programming methods and techniques to create scripts in the Matlab environment.	[SU1] Assessment of task fulfilment

Subject contents

Introduction to Matlab environment. Basic features: arithmetic operations, variables, mathematical functions, vectors, graphs. Scripts and functions: creation of the scripts, creation of the functions, control blocks. Matrix Operations. Integration: symbolic integration and numerical integration. Differential Equations: symbolic solution of differential equations, numerical solution of differential equations.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3"></td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Reports of the three laboratory classes</td><td>50.0%</td><td>100.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Dokumentacja programu Matlab, http://www.mathworks.com/help/matlab/

2. S. R. Otto, J. P. Denier, "An introduction to programming and numerical methods in Matlab", Springer</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. S. Attaway, "Matlab: A Practical Introduction to Programming and Problem Solving. Third Edition" Butterworth-Heinemann</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Task: Calculate the area of the figure bounded by the curves. Plot the graphs of the curves to show the formed figure. Calculate the volume of the solid formed by rotating the curve around the x-axis. Plot the graph of the curve in the given interval. Compute the necessary integrals symbolically, and then numerically using three methods. Which integration method is the most accurate?

Task: Consider the following differential equation with an initial condition. a) Solve the equation symbolically. b) Solve the equation numerically using the second-order (RK2) and fourth-order (RK4) Runge-Kutta methods. Compare the results obtained in parts a) and b) over a selected interval and calculate the error resulting from using numerical methods.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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