



## Subject card

Subject name and code	, PG_00051069						
Field of study	Technical Physics						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2022/2023		
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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Atomic, Molecular and Optical Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Paweł Wojda					
	Teachers	dr inż. Paweł Wojda					
Lesson types and methods of instruction	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						
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		75.0	125
Subject objectives	The aim of the course is to educate the student a coherent view on the basic issues of physics / mathematics / techniques and tools to solve these problems.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U02	The student refers to the knowledge gained during the studies in physics / mathematics and uses IT tools.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	K6_W05	The student knows the basics of programming, computing, data reading and data processing.			[SW1] Assessment of factual knowledge		
	K6_U03	Student uses symbolic calculations and uses basic commands, such as loops, in C ++			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	K6_W03	The student is able to explain the solution of a problem in physics or mathematics.			[SW1] Assessment of factual knowledge		

Subject contents	<p>Introduction. Symbolic computation program (Mathematica, Maple, etc).</p> <p>Mathematical Modelling. General mathematical notions and symbols.</p> <p>Algebraic manipulations. Algorithm. Programs.</p> <p>Polynomials, intertwine relations. Integral and difference operators factorization.</p> <p>Differential operators factorization. Differential equations solution. Eigenvectors.</p> <p>Algorithm for the tridiagonal matrix (Thomas algorithm).</p> <p>Numerical and analytical solution of ordinary differential equations and partial differential equations.</p> <p>Mathematical description of physical phenomena.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 757 794 786">Subject passing criteria</th> <th data-bbox="799 757 1137 786">Passing threshold</th> <th data-bbox="1142 757 1481 786">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 792 794 822">passing laboratories</td> <td data-bbox="799 792 1137 822">50.0%</td> <td data-bbox="1142 792 1481 822">70.0%</td> </tr> <tr> <td data-bbox="456 828 794 857">passing tests</td> <td data-bbox="799 828 1137 857">50.0%</td> <td data-bbox="1142 828 1481 857">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	passing laboratories	50.0%	70.0%	passing tests	50.0%	30.0%
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passing tests	50.0%	30.0%										
Recommended reading	Basic literature	<p>1. D. Kincaid, W. Cheney, Numerical analysis</p> <p>2. Mathematica. Wolfram Research. <a href="https://www.wolfram.com/mathematica/online/">https://www.wolfram.com/mathematica/online/</a></p>										
	Supplementary literature	Symbolic calculation algorithms. S. Leble, Script in Polish										
	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Obliczenia symboliczne w fizyce 2022/2023 - Moodle ID: 27461  <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=27461">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=27461</a></p>										
Example issues/ example questions/ tasks being completed	Determine eigenvectors, eigenvalues of the matrix. Determine the solutions of the system of first order differential equations. Description of sound propagation.											
Work placement	Not applicable											