



Subject card

Subject name and code	Mathematics II, PG_00024047						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2026/2027		
Education level	first-cycle 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	2	ECTS credits			8.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Mathematics Center -> Vice-Rector For Education						
Name and surname of lecturer (lecturers)	Subject supervisor	dr Anita Dąbrowicz-Tlałka					
	Teachers	dr Anita Dąbrowicz-Tlałka mgr Dorota Grott					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	45.0	0.0	0.0	0.0	90
	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	90	10.0		100.0	200	
Subject objectives	Students obtain competence in the range of using methods of mathematical analysis and linear algebra and knowledge to solve simple problems that can be found in the field of engineering.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions	Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future. Student recognizes the importance of self-expanding knowledge.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K6_W01] has basic knowledge in the field of mathematics including algebra, geometry, mathematical analysis, probabilistics, numerical methods - necessary to describe and analyze automation and robotics systems	Student determines convergence of number series. Student calculates the radius of convergence and the interval of convergence of a power series. Student expands a function in Taylor and Maclaurin series. Student determines the Fourier series of a given function. Student examines functions of several variables, using the concept of a limit, continuity and derivatives. Student determines local and global extremes of functions of two variables. Students calculates double integrals, and explains the method of substitution in the double integral. Student applies double integrals in solving geometrical problems. Student demonstrates some techniques for solving ordinary differential equations. Student determines general and particular solutions of certain types of the first-order differential equations. Student finds the right method for solving the second - order ordinary differential equations. Student determines general and particular solutions of the second -order linear differential equations with constant coefficients.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[K6_K02] can work in a group taking on different roles in it	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student understands the need of lifelong learning. Student is able to inspire others and organize their learning process.	[SK2] Assessment of progress of work [SK1] Assessment of group work skills

Subject contents	<p>Course content – lecture Providing theoretical knowledge, linking it to material already covered, and analyzing examples of the use of knowledge and skills in tasks related to:</p> <p>Functions of two variables, partial derivatives, applications (maxima and minima, gradient, divergence, rotation, potential field).</p> <p>Double integral, polar coordinates and generalized polar coordinates, applications.</p> <p>Ordinary differential equations - definition of the differential equation and its solution, general and particular solution, the Cauchy initial value problem. Variables separable equations. First order linear differential equations. Linear differential equations of order n with constant coefficients.</p> <p>Number series.</p> <p>Power series, Taylors, Maclaurins and Fourier series.</p> <hr/> <p>Course content – exercises Exercises in determining partial derivatives, calculations in the field of applications (extrema and gradient, divergence, rotation, potential).</p> <p>Tasks related to calculating double integrals, representing areas in polar coordinates and generalized polar coordinates, solving tasks from selected applications of double integrals.</p> <p>Solving ordinary differential equations - general and specific solutions, Cauchy's initial value problem.</p> <p>Properly identifying the type of equation and applying the appropriate method: equations with separated variables, first-order linear differential equations, nth-order linear differential equations with constant coefficients.</p> <p>Tasks involving the selection of criteria for determining the convergence or divergence of numerical series.</p> <p>Power series as an example of functional series, examining the radius of convergence, sums, differentiation and integration of series to determine the sum, expanding functions into Taylor, Maclaurin, and Fourier series.</p>																	
Prerequisites and co-requisites	- active participation in tutorial - passing written tests and colloquiums																	
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 1393 794 1417">Subject passing criteria</th> <th data-bbox="801 1393 1139 1417">Passing threshold</th> <th data-bbox="1145 1393 1482 1417">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1426 794 1451">Math Project</td> <td data-bbox="801 1426 1139 1451">50.0%</td> <td data-bbox="1145 1426 1482 1451">5.0%</td> </tr> <tr> <td data-bbox="456 1460 794 1485">Active participation</td> <td data-bbox="801 1460 1139 1485">0.0%</td> <td data-bbox="1145 1460 1482 1485">10.0%</td> </tr> <tr> <td data-bbox="456 1494 794 1518">Midterm colloquium</td> <td data-bbox="801 1494 1139 1518">0.0%</td> <td data-bbox="1145 1494 1482 1518">40.0%</td> </tr> <tr> <td data-bbox="456 1527 794 1552">Written and oral exam</td> <td data-bbox="801 1527 1139 1552">50.0%</td> <td data-bbox="1145 1527 1482 1552">45.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Math Project	50.0%	5.0%	Active participation	0.0%	10.0%	Midterm colloquium	0.0%	40.0%	Written and oral exam	50.0%	45.0%
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<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> 1. Compute the sum of the given series with general term a_n. 2. Check whether the given series is convergent using the ratio test, the root test, the comparison test or the integral test. 3. Compute partial differentials of the second order for the given function $f(x,y)$. 4. Find extreme values of the function $f(x,y)$. 5. Compute the double integral of the given function $f(x,y)$ over the region D. 6. Find a particular solution of the differential equation satisfying the given initial conditions . 7. Find the general solution of the differential equation . by the method of variation of parameters .
<p>Practical activities within the subject</p>	<p>Not applicable</p>

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