



Subject card

Subject name and code	Mathematical analysis, PG_00063330						
Field of study	Nanotechnology						
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	1	ECTS credits			7.0		
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 Anna Niewulis					
	Teachers	dr Anna Niewulis					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	45.0	0.0	0.0	0.0	75
	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	75	5.0		95.0		175
Subject objectives	Students obtain competence in the range of using methods of mathematical analysis and knowledge how to solve simple problems that can be found in the field of engineering.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W02] possesses structured knowledge of mathematics useful for formulating and solving complex problems in nanotechnology and related sciences.	Student mentions basic properties of elementary functions. Student solves equations and inequalities with elementary functions. Student calculates limits of the sequences and functions Student determines intervals of monotonicity of a given functions and its extrema. Student calculates antiderivatives using the substitution method of integration and integration by parts. Student applies definite integrals to solving geometrical problems.			[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects		
	[K6_U01] is able to engage in lifelong self-directed learning and to acquire and synthesize information from literature, databases, and other appropriately selected sources.	Student recognizes the importance of self-expanding knowledge and take the challenge of working with a group to solve a problem.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>Course content – lecture</p> <p>Functions of one variable and their properties: The absolute value function definition, solving equations and inequalities with absolute value, graphs of functions with absolute value. Power functions solving power and polynomial equations and inequalities. Rational functions solving rational equations and inequalities. Exponential function properties and graphs, solving exponential equations and inequalities. Logarithmic functions properties and graphs, solving logarithmic equations and inequalities. Trigonometric and cyclometric functions properties and graphs, solving trigonometric equations and inequalities.</p> <p>Limits and continuity: Infinite sequences. Fundamental definitions of a limit of a sequence, convergence and divergence, limit theorems. Applications to solving equation.</p> <p>Differential calculus of one variable functions and its applications: Definition of a first derivative and differential. Rolls and Lagranges theorems. Higher derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De l'Hospital's Thorem. Asymptotes. Applying differential calculus to studying the properties of one variable functions.</p> <p>Integral calculus of one variable functions antiderivatives: The process of finding antiderivatives and integration formulas the substitution method of integration and integration by parts. Definite integrals in Riemanns sense: Newton-Leibniz Thorem. Integration formulas, the substitution method of integration and integration by parts for definite integrals.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 837 794 871">Subject passing criteria</th> <th data-bbox="794 837 1141 871">Passing threshold</th> <th data-bbox="1141 837 1477 871">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 871 794 904">Exam</td> <td data-bbox="794 871 1141 904">50.0%</td> <td data-bbox="1141 871 1477 904">50.0%</td> </tr> <tr> <td data-bbox="448 904 794 943">Colloquium</td> <td data-bbox="794 904 1141 943">50.0%</td> <td data-bbox="1141 904 1477 943">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Exam	50.0%	50.0%	Colloquium	50.0%	50.0%
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Exam	50.0%	50.0%										
Colloquium	50.0%	50.0%										
Recommended reading	Basic literature	Basic literature K. Kuratowski, Introduction to calculus, Pergamon press, 1961										
	Supplementary literature	Supplementary literature										
	eResources addresses											
Example issues/ example questions/ tasks being completed	<p>Find the domain and the set of values of the function $f(x)=\dots$. Determine the inverse function of f.</p> <p>Evaluate the limit of the function $f(x)=$</p> <p>Sketch the graph of the function $f(x)=$. Identify any local extrema and points of inflection.</p> <p>Find the area between the two curves $y=$ and $y=$ from $x=$ to $x=$.</p> <p>Evaluate the indefinite integral of the function $f(x)=$</p>											
Practical activities within the subject	Not applicable											

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