

## 。 GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

Subject name and code	Calculus, PG 00045353								
Field of study	Data Engineering								
Date of commencement of studies	October 2025		Academic year of realisation of subject			2025/2026			
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			English			
Semester of study	1		ECTS credits			5.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Faculty Of Electronics Telecommunications And Informatics -> Wydziały Politechniki Gdańskiej								
Name and surname of lecturer (lecturers)	Subject supervisor	dr Ewa Kozłowska-Walania							
	Teachers		dr Ewa Kozłowska-Walania						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study hours	15.0	30.0	0.0	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		13.0		67.0		125	
Subject objectives	Students obtain competence in using methods of mathematical analysis (single variable calculus) and knowledge how to solve simple problems that are found in the field of engineering, in particular connected to data engineering.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K6_W02] demonstrates advanced preparation in methods and techniques for formulating and solving problems		Student knows the main theorems, methods and tools presented during the lecture and knows how top use them.			[SW1] Assessment of factual knowledge			
	[K6_U04] formulates logical solutions to complex or unstructured problems		Student is able to analyze a problem and choose, from the methods presented during the class, the tools necessary for its correct solution.			[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment			

Subject contents	<ul> <li>Limits of functions. Asymptotes. Continuity.</li> <li>Derivative of a function of one variable. Geometrical and physical interpretation. Basic differentiation formulas.</li> <li>Product, quotient, and chain rules. Higher order derivatives. Information about partial derivatives.</li> <li>Applications of differentiation. De LHospitals rule. The differential. Optimization. Concavity.</li> <li>Indefinite integral. Basic formulas. Integration by parts, by substitution, by partial fraction decomposition, by trigonometric substitution.</li> <li>Definite integral. Geometrical interpretation. Fundamental Theorem of Calculus.</li> </ul>						
	Geometrical applications of definite integrals: areas, volumes, lengths. <ul> <li>Number series convergent and divergent. Criteria for convergence testing.</li> <li>Power series. Radius and interval of convergence.</li> <li>Taylor and McLaurin series. Differentitation and integration of power series.</li> <li>Information about Fourier series.</li> </ul>						
Prerequisites and co-requisites	Completion of the Precalculus class						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Final Exam	40.0%	60.0%				
	Tests	50.0%	40.0%				
Recommended reading	Basic literature Supplementary literature	<ul> <li>H. Anton, <i>Calculus with analytic geometry</i>, John Wiley &amp; Sons, 1989.</li> <li><i>Matematyka. Podstawy z elementami matematyki wyższej</i>, edited by B. Wikieł, PG publishing house</li> <li>J.Dymkowska, D.Beger, <i>Rachunek różniczkowy w zadaniach</i>, PG publishing hous</li> <li>J.Dymkowska, D.Beger, <i>Rachunek całkowy w zadaniach</i>, PG publishing house</li> <li>J.Dymkowska, D.Beger, <i>Rachunek całkowy w zadaniach</i>, PG publishing house</li> <li>B.Sikora, E. Łobos, <i>Advanced calculus - selected topics, Publishing house of Silesian University of Technology</i>, 2009.</li> <li>B.Sikora, E.Łobos, <i>A first course in calculus</i>, Publishing house of Silesian University of Technology, 2010.</li> <li>H. Anton, <i>Calculus : a new horizon</i>, John Wiley &amp; Sons, 6th ed</li> <li>K. Jankowska, T. Jankowski, <i>Zbiór zadań z matematyki</i>, PG publishing house, 2010</li> <li>W. Żakowski, <i>Algebra i analiza matematyczna dla licealistów i kandydatów na wyższe uczelnie</i>, WNT, Warszawa 1999</li> <li>M. Gewert, Z.Skoczylas, <i>Analiza Matematyczna 1</i>. GiS</li> </ul>					
	eResources addresses	<ul> <li>M.Gewert, Z. Skoczylas, Analiza Matematyczna 2, GIS 2007;</li> <li>Adresy na platformie eNauczanie:</li> </ul>					

Example issues/ example questions/ tasks being completed	<ol> <li>Find the local extrema and intervals of monotonicity of the function f(x)=(ln2x)/x</li> <li>2.</li> </ol>
	Find the area between the x-axis and the curves $y=x \ln(x)$ , $x=e$ , and $x=e$ .
	Find the volume of the solid obtained by rotating about the x-axis, the region bounded by y=1/ (x2+2x+5).
	<ol> <li>Determine the convergence of the series with terms given by an= (2nn!) / (nn).</li> </ol>
	<ol> <li>Using differentiation and integration of power series find the formula for the sum of xn / (n+1), and then use to evaluate the sum 1/((n+1)2n)</li> </ol>
Work placement	Not applicable

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