GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Calculus, PG_00045353		
Field of study	Data Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
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		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Magdalena Musielak	
	Teachers	dr Ewa Kozłowska-Walania dr Magdalena Musielak	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	30.0	0.0	0.0	0.0	45

E-learning hours included: 0.0

WETI (Data Engineering) - Mathematics 2022/23 (M.Musielak) - Moodle ID: 25005
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25005

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_U05] Uses matrix calculus in the theory of systems of linear equations, uses differential, integer and vector calculus, performs operations on complex numbers and determines polynomial elements.	Student defines basic elements of single variable calculus, evaluates derivatives and integrals of functions of one variable. Student is able to analyze functions using the notions of limit, continuity, and derivative; is aware of some geometrical applications of integration. Student analyzes the convergence of number series and uses power series to approximate computations. Student uses mathematical software for numerical and symbolic computation, and interprets the results of such computation	[SU4] Assessment of ability to use methods and tools
[K6_W01] has basic knowledge in the field of mathematics, including mathematical analysis, algebra, geometry, probability calculus, statistics and numerical methods, necessary to formulate and solve simple tasks in the field of IT	Student uses methods of mathematical analysis to formulate and solve simple problems found in the field of data engineering.	[SW1] Assessment of factual knowledge
[K6_K01] is aware of quickly changing trends and the resulting need for further education and self-improvement in the area of the performed profession of an engineer with IT and economic-financial skills.	Student recognizes the importance of skillful use of mathematical analysis apparatus in the context of engineering studies.	[SK2] Assessment of progress of work

Subject contents	• Limits of functions. Asymptotes. Continuity. • Derivative of a function of one variable. Geometrical and physical interpretation. Basic differentiation formulas. • Product, quotient, and chain rules. Higher order derivatives. Information about partial derivatives. • Applications of differentiation. De LHospitals rule. The differential. Optimization. Concavity. • Indefinite integral. Basic formulas. Integration by parts, by substitution, by partial fraction decomposition, by trigonometric substitution. • Definite integral. Geometrical interpretation. Fundamental Theorem of Calculus. • Geometrical applications of definite integrals: areas, volumes, lengths. • Number series convergent and divergent. Criteria for convergence testing. • Power series. Radius and interval of convergence. • Taylor and McLaurin series. Differentitation and integration of power series. • Information about Fourier series.
Prerequisites and co-requisites	Completion of the Precalculus class

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Tests	50.0%	40.0%
Final Exam	40.0%	60.0%

Recommended reading

Basic literature	• H. Anton, *Calculus with analytic geometry,* John Wiley & Sons, 1989. • *Matematyka. Podstawy z elementami matematyki wyższej,* edited by B. Wikieł, PG publishing house • J.Dymkowska, D.Beger, *Rachunek różniczkowy w zadaniach*, PG publishing hous • J.Dymkowska, D.Beger, *Rachunek całkowy w zadaniach*, PG publishing house • B.Sikora, E. Łobos, *Advanced calculus - selected topics, Publishing house of Silesian University of Technology*, 2009.
Supplementary literature	• B.Sikora, E.Łobos, *A first course in calculus,* Publishing house of Silesian University of Technology, 2010. • H. Anton, *Calculus : a new horizon,* John Wiley & Sons, 6th ed • K. Jankowska, T. Jankowski, *Zbiór zadań z matematyki,* PG publishing house, 2010 • W. Żakowski, *Algebra i analiza matematyczna dla licealistów i kandydatów na wyższe uczelnie,* WNT, Warszawa 1999 • M. Gewert, Z.Skoczylas, *Analiza Matematyczna 1,* GiS • M.Gewert, Z. Skoczylas, *Analiza Matematyczna 2,* GIS 2007;
eResources addresses	

Example issues/ example questions/ tasks being completed	1. Find the local extrema and intervals of monotonicity of the function f(x)=(ln2x)/x 2. Find the area between the x-axis and the curves y=x ln(x), x=e , and x=e. 3. Find the volume of the solid obtained by rotating about the x-axis, the region bounded by y=1/ (x2+2x+5). 4. Determine the convergence of the series with terms given by an= (2nn!) / (nn). 5. 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)
Work placement	Not applicable