GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics I, PG_00055861						
Field of study	Power Engineering, Power Engineering, Power 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		Polish		
Semester of study	1		ECTS credits		10.0		
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 Marcin Szyszkowski					
	Teachers	dr Marcin Szyszkowski mgr Danuta Beger					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	60.0	0.0	0.0	0.0	105
	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	105		24.0	121.0		250
Subject objectives	Obtaining competences by a student in using the apparatus of mathematical analysis and equations and applying the acquired knowledge to solve simple problems occurring in engineering fields						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W01] has basic knowledge of mathematics necessary to describe the phenomena related to the processes of energy conversion and transfer; uses information technology to solve mathematical problems	Student: Can name the basic properties of elementary functions. Solves the equations and inequalities containing elementary functions. Computes the limits of sequences and functions by definition. He knows the definition of a derivative and its applications, finds monotonicity intervals of functions and its extremes. Analyzes properties of a functions based on its first and second derivative. Applies the basic techniques of integration to calculate indefinite an definite integrals Examines the convergence of improper integrals. The student defines the basic the concepts of linear algebra. Defines the basic concepts of matrix calculus. Detetmines the position of the straight lines and planes in space. Uses packages mathematical to carry out calculations and visualization of mathematical concepts.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
	[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems	The student joins the knowledge in mathematics with knowledge from others fields.	[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
	[K6_K01] is aware of the need for training and self-improvement in the profession of energy and the possibility of further education; can think and act in a creative and entrepreneurial manner; can define priorities for the implementation of an individual or group task	Student can use a computer program to calculate the needed values. He knows what mathematical methods are used in programs for technical calculations.	[SK2] Assessment of progress of work

Subject contents	Elements of linear algebra. Matrices and determinants. Operations on matrices. Inverse of a matrix. System of linear equations. Matrical equations. Elementary functions. Sequences. Definition. Monotonicity. Limit. Computing limits (by 'sandwich theorem', using roots, the 'e-type' limits (lim (1+3/(2n+2))^ (3n-2)) Calculus Finding derivative (using formulas). Applications of derivative (monotnicity, concavity, extrema). Text exercises (for optimalization). Line tangent to the graph (approximating using tangent line). Higher order derivatives (Taylor's polynomial). Indefinite integral. Integration by parts and by substitution. Integration of rational (partial fractions) trigonometric (methods of substitution) and irrational functions. Definite integral. Application of definite integral (calculating areas and some phisical applicatons (total force, center of mass)). Improper integrals. Calculating 'unbounded areas'
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Tests during the semeter	50.0%	60.0%
Exam	50.0%	35.0%
other (activity, homework)	0.0%	5.0%

Recommended reading

Basic literature

1. Jurkiewicz T., Skoczylas Z., Algebra liniowa 1, GiS, Wrocław 2006

2. Leja F., Rachunek różniczkowy i całkowy, PWN, Warszawa 1965

3. Mostowski A., Stark M., Elementy algebry wyższej, PWN,Warszawa 1968

4. Jankowska K., Jankowski T., Zbiór zadań z matematyki,Wydawnictwo PG, Gdańsk 1998

5. Wikieł B., Podstawy z elementami matematyki wyższej,Wydawnictwo PG, Gdańsk 2007

	Supplementary literature	1. Fichtencholtz G. M., Rachunek różniczkowy i całkowy, t. 1-2,PWN, Warszawa 1962 2. Jankowska K., Jankowski T., Zbiór zadań z matematyk wyższej,Wydawnictwo PG, Gdańsk 2004 3. Krysicki W., Włodarski W., Analiza matematyczna w zadaniach, cz.1, PWN, Warszawa 1994 4. Krysicki W., Włodarski W., Analiza matematyczna w zadaniach, cz.2, PWN, Warszawa 1994
	eResources addresses	Podstawowe https://dydmat.mimuw.edu.pl - https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24482 -
Example issues/ example questions/ tasks being completed	1. Solve a system of equations. 2. Find the inverse matrix. 3. Solve the matrix equation eg. np. 3X-AX=B jeżeli A=[5 6; 7 8], B=[-1 -3; 2 -1]. 4 Compute limits of sequecncies. 5, Check by definition that a given sequence has limit. 6. Compute limits of functions, 7. Find asymptotes of a given function. 8. Calculate derivatives (using formulas). 9. Examine the intervals of monotonicity and extremes of a function. 10 Find tangent line to the graph, approximate value of eg. sqrt(14) 11. optimalizating exercise 12. Calculate antiderivative (eg of a rational function, trigonometric f-tion).13. Calculate the improper integral. 14. Calculate definiteve integral (find area or center of mass and such).	
Work placement	Not applicable	