GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Methematics, PG_00064173						
Field of study	Transport						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2024/2025			
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	6.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Mathematics Center -> Vice-Rector for Education						
Name and surname of lecturer (lecturers)	Subject supervisor	dr Krzysztof Radziszewski					
	Teachers	dr Adam Gnatek dr Krzysztof Radziszewski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	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	60		15.0	75.0		150
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_U08] able to carry out simple engineering tasks related to the construction and operation of a selected element of the transport system, select the right methods and tools	Student:uses definite integral to solve geometrical tasks, analyses a tasks from analitycal geometry, uses the basic operations on complex numbers, examines functions of several variables, using the concept of limit, continuity and derivatives, calculates double integrals, and explains the substitution method, applies double integrals to solve geometrical problems, demonstrates some techniques for solving ordinary differential equations. Student recognizes the importance of self-expanding knowledge and take the challenge of working with a group to solve a problem.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_W01] has knowledge of mathematical analysis, algebra, calculus of probability and operational research required for describing and solving transport problems	Student:uses definite integral to solve geometrical tasks, analyses a tasks from analitycal geometry, uses the basic operations on complex numbers, examines functions of several variables, using the concept of limit, continuity and derivatives, calculates double integrals, and explains the substitution method, applies double integrals to solve geometrical problems, demonstrates some techniques for solving ordinary differential equations. Student recognizes the importance of self-expanding knowledge and take the challenge of working with a group to solve a problem.	[SW1] Assessment of factual knowledge

Subject contents

Integrals of rational functions. Definite Riemann integral. Improper integrals. Applications of integral calculus. Analytic geometry: basic vectors definitions and properties, dot product, cross product, their properties and its applications, the
triple scalar product and applications, equations of lines and planes in 3-space, the distance from a point to a plan, angles between planes and lines. Complex numbers: algebraic, trigonometric, exponential form, operations, exponentiation (Moivre formula), finding roots of complex numbers. Functions of several variables. Partial derivatives. Total differential. Maxima and minima of a function of several variables. Ordinary differential equations: separable diff. eq., linear first-order diff. eq., Bernoullis eq., linear diff. eq. with constant coefficients of higher order. Double integrals. Applications of double integrals.

Prerequisites and co-requisites

There is no requirement.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm colloquium	50.0%	100.0%

Recommended reading

Basic literature	1. K. Jankowska, T. Jankowski, Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna, PG, Gdańsk 2005. 2. K. Jankowska, T. Jankowski, Zadania z matematyki wyższej, PG, Gdańsk 1999. 3. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 i 2 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2003. 4. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 i 2 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2003. 5. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne , Oficyna Wydawnicza GiS, Wrocław 2001.
Supplementary literature	6. R. Leitner, Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 2001. 7. R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1999. 8. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998.
eResources addresses	Adresy na platformie eNauczanie: WILiŚ - Transport sem.2 - Matematyka 2024/25 (K.Radziszewski) - Moodle ID: 43079 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43079

Example issues/ example questions/ tasks being completed	1. Sketch the graph of the function $f(x,y)=(9-x^2-y^2)^{1/2}$. 2. Identify any local extrema of the function $f(x,y)=e^{x-y}(x^2-2y^2)$. 3. Find the absolute extrema of the function $f(x,y)=xy-x(x+1)-y(y+1)$ on the set $D=\{(x,y): x^2+y^225, y3\}$. 4. Solve the equation $y''+6y'+9y=10\sin x$. 5. Find the area between the two curves $y^2=4+x$ and $x+3y=0$. 6. Find the distance between lines l: $(x-9)/4 =(y+2)/(-3)=z$ and k: $x/(-2)=(y+7)/9=(z-2)/2$.
Work placement	Not applicable

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