GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics, PG_00044535		
Field of study	Transport		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research 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	14.0
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 Krzysztof Radziszewski	
	Teachers	mgr Małgorzata Suchecka dr Krzysztof Radziszewski	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	60.0	75.0	0.0	0.0	0.0	135
	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	135	15.0	200.0	350

Subject objectives	Students obtain competence in the range of using methods of mathematical analysis and linear algebra 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_U71] is able to apply knowledge from humanistic, social, economic or legal sciences in order to solve problems in a social environment	Student:solves equations and inequalities, containing elementary functions geometrically interprets the results of an examination of a graph of a function using the concept of limit, continuity and derivatives of functions,examines the convergence of series,uses definite integral to solve geometrical tasks, defines the basic concepts of linear algebra, analyses a tasks from analitycal geometry, uses the basic operations on complex numbers, recognizes the importance of selfexpanding knowledge and take the challenge of working with a group to solve a problem.	[SU1] Assessment of task fulfilment
[K6_W01] has basic knowledge of mathematical analysis, algebra, calculus of probability and operational research required for describing and solving transport problems	Student:solves equations and inequalities, containing elementary functions geometrically interprets the results of an examination of a graph of a function using the concept of limit, continuity and derivatives of functions,examines the convergence of series,uses definite integral to solve geometrical tasks, defines the basic concepts of linear algebra, analyses a tasks from analitycal geometry, uses the basic operations on complex numbers, recognizes the importance of selfexpanding knowledge and take the challenge of working with a group to solve a problem.	[SW1] Assessment of factual knowledge

Subject contents

Absolute value of a real number. Functions and their properties. Elementary functions: polynomials, rational functions, exponential functions, logarithmic functions, trigonometric and inverse trigonometric functions. Sequences of numbers. Limit of a sequence. Infinite series. Convergent series. The sum of an infinite series. Tests for convergence of series. Limit and continuity of a function. Differential calculus: derivative and differential of a function, Taylors formula, asymptotes of functions, maxima and minima, concavity and points of inflection. Antiderivative and the indefinite integral. Integrals of rational, trigonometric and irrational functions. Definite Riemann integral. Improper integrals. Applications of integral calculus. Matrices. Determinants. Inverse matrix. Rank of the matrix. Systems of linear equations: Cramers theorem, Kronecker-Capelly theorem, Gauss-Jordan elimination. 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.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	50.0%	60.0%
Midterm colloquium	50.0%	40.0%

Recommended reading

Basic literature	1. Praca zbiorowa pod redakcją B. Wikieł, Matematyka - Podstawy z elementami matematyki wyższej, PG, Gdańsk 2007. 2. K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG, Gdańsk 1997. 3. Praca zbiorowa pod red. E. Mieloszyka, Matematyka Materiały pomocnicze do ćwiczeń, PG, Gdańsk 2004. 4. R. Leitner, Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 2001. 5. R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1999. 6. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2001.
Supplementary literature	7. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2001. 8. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998. 9. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2002. 10. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2002. 11. E. Mieloszyk, Macierze, wyznaczniki i układy równań, PG, Gdańsk 2003.
eResources addresses	Adresy na platformie eNauczanie: WILiŚ - Transport sem.1 - Matematyka 2023/2024 (K.Radziszewski) - Moodle ID: 31178 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31178

Example issues/ example questions/ tasks being completed	1. Find the domain and the set of values of the function f(x)=arcsin(3x-2)+. Determine the inverse function of f. 2. Find the derivative of $y=4x(3x^2+5)^5$. 3. Sketch the graph of the function f(x)=x-lnx. Identify any local extrema and points of inflection. 4. Find the absolute extrema of $f(x)=4x-36x^{-1}$ on the interval [1,6]. 5. Calculate $4x^2$ lnx dx. 6. Find the area between the two curves $y=e^x$ and $y=3-e^x$ from x=-2 to x=0. 7. Find A^{-1} if the matrix A is a 2x2 matrix of the elements $a_{ij} = 3i - j$. 8. 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