GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics 1, PG_00041990		
Field of study	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	English
Semester of study	1	ECTS credits	6.0
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	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	60.0	0.0	0.0	0.0	90
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	90	15.0	45.0	150

Subject objectives

Students obtain competence in using methods of mathematical analysis (single variable calculus) and linear algebra, and knowledge how to solve simple problems that are found in the field of engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems	Student uses various methods to solve systems of linear equations. Student analyzes and solves problems from the area of analytic geometry. Student applies the basic properties of derivatives. Student analyzes the properties of functions with the use of its first and second derivatives. Student applies basic formulas and techniques of integration to calculate indefinite integrals. Student uses basic operations on complex numbers. Student solves the ordinary differential equations of the first and second order.	[SU3] Assessment of ability to use knowledge gained from the subject
[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 programme to calculate a needed value. He knows what mathematical aparatus the programme uses to calculate the data.	[SK2] Assessment of progress of work
[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	Assessment of ability to use knowledge gained in the different modules.	[SW1] Assessment of factual knowledge

Subject contents	Elements of linear algebra. • Matrices and matrix operations. • Determinants and their properties. • Inverse matrix. • Rank of a matrix. Systems of linear equations. Analytic geometry in 3-space. • The vectors, dot product, cross product and triple scalar product and their applications. • Equations of lines and planes Elementary functions. • Linear function • Quadratic function • Polynomials • Power function • Exponential function • Logarithmic function • Cyclometric and trigonometric functions Sequences. • Definition. • Monotone sequences. • Limit of a sequence. Differential calculus of one variable functions. • Computing derivatives by formulas (incl. logarithmic derivatives) • Applications differential calculus of one variable functions (monotonicity, concavity, extremas) • approximating values by derivative • Text exrecises Anti-derivate. • The substitution method of integration and integration by parts. • Integration of rational, trigonometric and irrational functions. • application to phisics (velocity, acceleration) . Definite integrals • Application (areas, phisical appl. (force, mass, center of mass) Improper integrals.
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Written final exam	40.0%	50.0%
Tests	50.0%	50.0%

Recommended reading	Basic literature	W.W.Sawyer, What is Calculus About?, MAA Volume 2 (1962) Rhonda Huettenmueller, College Algebra DeMYSTiFieD, McGraw-Hill Education; 2 edition (December 27, 2013) George B. Thomas, Jr., Ross L. Finney., Calculus and analytic geometry, Addison-Wesley Publishing Company; 7th edition (January 1988) T.Jankowski, Linear algebra, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2001.

	Supplementary literature	Praca zbiorowa pod redakcja B.Wikieł, Matematyka. Podstawy z elementami matematyki wyższej. Wydawnictwo Politechniki Gdanskiej, Gdansk, 2007. M.Gewert, Z.Skoczylas, Analiza matematyczna I - Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS M.Gewert, Z.Skoczylas, Analiza matematyczna I - Przykłady i zadania, Oficyna Wydawnicza GiS K. Jankowska, T. Jankowski, Zbior zadan z matematyki. Wydawnictwo Politechniki Gdanskiej , Gdansk, 2007.
	eResources addresses	Podstawowe https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26608 - Moodle course https://tutorial.math.lamar.edu/Classes/CalcI/CalcI.aspx - Online course of calculus at Lamar University, Beaumont, Texas. Adresy na platformie eNauczanie: Mathematics Energy tech - Moodle ID: 26608 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26608
Example issues/ example questions/ tasks being completed	• Solve the system of linear equations • Write a given vector by other vectors • find the inverse matrix (to a given matrix). • solve matrical equation (using inverse matrix). • Find the equation of a line perpendicular to a plane • Compute limits of given sequencies (using the sandwich theorem) • Compute limits of sequencies(using roots, the 'e-type' sequencies). • Compute limits of functions (rational functions, root functions). • Determine asymptotes of a function. • Calculate derivatives (using formulas) • Determine the monotonicity of a function and find it's extreme values (using derivatives). • Approximate value of a root (using derivatives). • Find tangent line to the graph of a functions • Evaluate an indefinite integral i.e. antiderivatives (by parts, by substitutions) • Compute antidervatives for rational functions (using patrial fraction) • Calculate definitive integral • calculate areas and other phisical applic, (total force, center of mass) • Improper integral (unbounded areas)	
Work placement	Not applicable	