



## Subject card

Subject name and code	Mathematics I, PG_00055040						
Field of study	Management and Production Engineering						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2026/2027		
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			8.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Mathematics Center -> Vice-Rector For Education						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr Katarzyna Kujawska				
	Teachers						
Lesson types	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		11.0		99.0	200
Subject objectives	The aim of this subject is to obtain the student's competence in the range of using the basic methods of mathematical analysis. Furthermore, the student is able to use this knowledge to solve simple theoretical and practical problems that can be found in the field of engineering.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W01] has knowledge of linear algebra, differential equations, analysis and mathematical statistics useful for modelling and interpreting mechanical systems, manufacturing processes and operating properties of devices, has structured knowledge of physics including classical mechanics, optics, electricity and magnetism, demonstrates knowledge of elements of quantum physics	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.	[SW1] Assessment of factual knowledge
	[K6_K03] is aware of the social role of a graduate of a technical university, understands the importance of non-technical aspects and effects of engineering activities including their impact on the environment and responsibility for decisions, sees the need to formulate and provide the public with information and opinions on the achievements of technology, correctly identifies and resolves dilemmas associated with the job of an engineer	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem.	[SK3] Assessment of ability to organize work
	[K6_U05] is able to prepare and present a presentation on the results of analysis of the tasks in the area of production engineering, is able to plan and carry out experiments, measurements, computer simulations and analyses and interpret the results and draw conclusions is able to use analytical methods, simulation and experiments for formulating and solving problems associated with production engineering	The student is able to apply the learned mathematical methods for analysis to solve problems in the field of production management.	[SU3] Assessment of ability to use knowledge gained from the subject
Subject contents	<p>Course content – lecture</p> <ul style="list-style-type: none"> <li>• Functions of one variable and their properties: absolute value - definition, solving equations and inequalities, graphs. Power functions, rational, exponential, logarithmic, trigonometric - equations and inequalities, graphs.</li> <li>• Sequences of numbers and continuity of functions: definitions, properties, theorems.</li> <li>• Complex numbers.</li> <li>• Elements of linear algebra: matrices, determinants, systems of linear equations.</li> <li>• Vector calculus in three-dimensional space: definitions and properties of vectors, scalar, vector, mixed product and their applications.</li> <li>• A line and a plane in space: definitions, the distance of a point from a plane, the angle between planes and lines.</li> <li>• Differential calculus of functions of one variable: definition of derivative and differential, higher order derivatives and differentials. Applications - monotonicity and extremes of functions, concavity, convexity, inflection points, theorem de l'Hospital, asymptotes of a function.</li> </ul>		
Prerequisites and co-requisites	No recommendations		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final exam	50.0%	50.0%
	Midterms	0.0%	50.0%

Recommended reading	Basic literature	<p>B. Wiekieł, Matematyka, Podstawy z elementami matematyki wyższej, Wydawnictwo Politechniki Gdańskiej Gdańsk 2009,</p> <p>Jurkiewicz T., Skoczylas Z., Algebra liniowa 1, GiS, Wrocław 2006</p> <p>K. Jankowska, J. Jankowski, Zbiór zadań z matematyki, Wydawnictwo Politechniki Gdańskiej Gdańsk 2003,</p> <p>W. Kryszewski, L. Włodarski Analiza matematyczna w zadaniach część I, PWN, Warszawa 1986.</p> <p>G.M. Fichtenholz, Rachunek różniczkowy i całkowy, Tom 1, Wydawnictwo Naukowe PWN, Warszawa 2002 ,</p>
	Supplementary literature	<p>M. Gewert, Z. Skoczylas, Analiza matematyczna 1, GiS, Wrocław 2000,</p> <p>R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej, cz. 1, WNT, Warszawa 1992,</p> <p>W. Żakowski, Ćwiczenia problemowe dla politechnik, WNT, Warszawa, 1991.</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Prove that this sequence is monotonic <math>a_n = (n^2 + 1)/n!</math>.</li> <li>2. Evaluate the limit of a given sequence <math>a_n = (3n^2 + 6n)^{1/2} - 3^{1/2}n</math>.</li> <li>3. Find the limit of the function <math>f(x) = x \sin(1/x)</math> in the zero point.</li> <li>4. Solve a system of equations</li> <li>5. Analyze the monotonicity of a function and find its extreme values.</li> </ol>	
Practical activities within the subject	Not applicable	

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