



Subject card

Subject name and code	Mathematics, PG_00069037						
Field of study	Chemical Technology						
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			9.0		
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 Hanna Guze				
	Teachers						
Lesson types	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	15.0		105.0	225	
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_U01] Is able to independently plan the learning process and acquire, analyse and interpret information from various sources, also in English.	Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future. Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions.			[SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
	[K6_W01] Possesses knowledge of mathematics and physics necessary to analyze and describe technological processes, including differential and integral calculus, numerical methods, statistics and elements of vector analysis.	Student mentions basic properties of elementary functions. Student solves equations and inequalities with elementary functions. Student gives the definition of basic notions of differential calculus. Student uses basic notions and formulas of differential calculus. Student determines intervals of monotonicity of a given functions and its extrema. Students calculates antiderivatives using the substitution method of integration and integration by parts. Student applies definite integrals to solving geometrical problems. Student uses the basic operations on complex numbers.			[SW1] Assessment of factual knowledge		

Subject contents	<p>Course content – lecture The sets of numbers and set notation. Basic mathematics symbols.</p> <p>Functions of one variable:</p> <ul style="list-style-type: none"> • definitions, graphs, properties, continuity, limits • definition of absolute value • polynomials, rational functions, power functions, trigonometric and inverse trigonometric functions, exponential and logarithmic functions • definition of inverse function <p>Infinite number sequences, limits and continuity of functions</p> <ul style="list-style-type: none"> • definition of sequence, boundedness and monotonicity • definition of limits of sequence, definitions of limits of function of one variable • continuity of functions, types of discontinuities <p>Single variable calculus:</p> <ul style="list-style-type: none"> • definition of the derivative and differential • Rolle's and Lagrange's theorems and their applications • L'Hospital's Rule • monotonicity, necessary and sufficient condition for local extrema • higher order derivatives • concavity, inflection points • applications of differential calculus to other fields (e.g. chemistry, physics, biology) <p>Integral calculus</p> <ul style="list-style-type: none"> • definite and indefinite integral, Fundamental Theorem of Calculus • basic integration formulas and methods • geometric interpretation of the definite integral • applications of integral calculus to other fields <p>Complex numbers.</p>											
	<p>Course content – exercises Functions of one variable:</p> <ul style="list-style-type: none"> • definitions and graphs, • graphs of functions, equations and inequalities with absolute value • equations and inequalities with polynomials, rational functions, power functions, exponential and logarithmic functions, trigonometric and inverse trigonometric functions • inverse function and its properties <p>Infinite number sequences, limits and continuity of functions</p> <ul style="list-style-type: none"> • limits of sequence • limits and continuity of functions, types of discontinuities and their interpretation <p>Single variable calculus:</p> <ul style="list-style-type: none"> • differentiation rules • tangent and normal line • L'Hospital's Rule • monotonicity and local/global extrema (optimization problems) • applications of single variable differential calculus to curve sketching, <p>Integral calculus:</p> <ul style="list-style-type: none"> • integration by substitution, by parts, by partial fractions, integration of trigonometric functions • applications of definite integral in geometry <p>Complex numbers.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th>Subject passing criteria</th> <th>Passing threshold</th> <th>Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Tests and activity during the classes</td> <td>0.0%</td> <td>50.0%</td> </tr> <tr> <td>Written and/or oral exam</td> <td>50.0%</td> <td>50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Tests and activity during the classes	0.0%	50.0%	Written and/or oral exam	50.0%	50.0%
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Recommended reading	Basic literature	<p>- Praca zbiorowa pod redakcją Wikeł B.: Matematyka - Podstawy z elementami matematyki wyższej. PG, Gdańsk 2007;</p> <p>- M. Gewert, Z. Skoczylas : Analiza matematyczna 1, Oficyna Wydawnicza GiS 2008;</p> <p>- K. Jankowska, T. Jankowski : Zbiór zadań z matematyki, Wydawnictwo PG, 2010.</p> <p>- J.Topp : Matematyka. Funkcje jednej zmiennej, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2016.</p>
	Supplementary literature	<p>- G.M. Fichtenholz : Rachunek różniczkowy i całkowy I, PWN 1985;</p> <p>- R. Leitner : Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne Warszawa 1999;</p> <p>- L. Maurin, M. Maczyński, T. Traczyk : Matematyka - podręcznik dla studentów wydziałów chemicznych, PWN 1975.</p> <p>- W. Żakowski, G. Decewicz : Matematyka I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1991.</p> <p>- W.Krysicki, L.Włodarski : Analiza matematyczna w zadaniach. cz1, Wydawnictwo Naukowe PWN.</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Find the domain and the set of values of the function $f(x) = \dots$ 2. Find the derivative of $f(x) = \dots$ 3. Sketch the graph of the function $f(x) = \dots$. Identify any local extrema and points of inflection. 4. Use the definite integral to find the area of the region bounded by \dots. 5. Use the definite integral to determine the volume of the solid formed by the rotation of the curve \dots around the axis oX. 	
Practical activities within the subject	Not applicable	

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