



## Subject card

Subject name and code	Mathematics, PG_00048601						
Field of study	Chemistry in Construction 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			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 Anita Dąbrowicz-Tlalka					
	Teachers						
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	20.0		145.0	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_U02	Student can choose the appropriate data to solve the task and is able to correctly describe solution of the problem by using charts and logically articulated reasoning.			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K6_W01] has a basic knowledge from some branches of mathematics and physics useful for formulating and solving simple problems in the field of environmental technologies and modern analytical methods	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 performs calculations on complex numbers.			[SW1] Assessment of factual knowledge		

Subject contents	<p>Functions of one variable and their properties:  The absolute value function definition, solving equations and inequalities with absolute value, graphs of functions with absolute value.  Power functions solving power and polynomial equations and inequalities.  Rational functions solving rational equations and inequalities.  Exponential function properties and graphs, solving exponential equations and inequalities.  Logarithmic functions properties and graphs, solving logarithmic equations and inequalities.  Trigonometric and cyclometric functions properties and graphs, solving trigonometric equations and inequalities.  Limits and continuity:  Infinite sequences. Fundamental definitions of limit of sequence, convergence and divergence, limit theorems. Applications to solving equations .  Differential calculus of functions with one variable and applications of differential calculus of functions with one variable:  Definition of first derivative and differential. Rolls and Lagranges theorems. Higher derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De l'Hospital's Thorem. Asymptotes. Applying differential calculus to studying the properties of functions with one variable.  Integral calculus of functions with one variable antiderivatives:  The process of finding antiderivatives and integration formulas the substitution method of integration and integration by parts. Integration of rational, trigonometric and irrational functions.  Definite integrals in Riemann's sense:  Newtona-Leibniza Thorem. Integration formulas, the substitution method of integration and integration by parts for definite integrals. Applications of integral calculus in computing areas of plane figures, lengths of arcs, volumes of solids of revolution.  Complex numbers.</p>																	
Prerequisites and co-requisites																		
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 763 794 797">Subject passing criteria</th> <th data-bbox="794 763 1141 797">Passing threshold</th> <th data-bbox="1141 763 1487 797">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 797 794 831">Midterm exams</td> <td data-bbox="794 797 1141 831">0.0%</td> <td data-bbox="1141 797 1487 831">36.0%</td> </tr> <tr> <td data-bbox="448 831 794 864">Activity during classes</td> <td data-bbox="794 831 1141 864">0.0%</td> <td data-bbox="1141 831 1487 864">8.0%</td> </tr> <tr> <td data-bbox="448 864 794 898">Tests (lecture)</td> <td data-bbox="794 864 1141 898">0.0%</td> <td data-bbox="1141 864 1487 898">6.0%</td> </tr> <tr> <td data-bbox="448 898 794 931">Written exam</td> <td data-bbox="794 898 1141 931">50.0%</td> <td data-bbox="1141 898 1487 931">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Midterm exams	0.0%	36.0%	Activity during classes	0.0%	8.0%	Tests (lecture)	0.0%	6.0%	Written exam	50.0%	50.0%
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Recommended reading	Basic literature	<ul style="list-style-type: none"> <li>- Praca zbiorowa pod redakcją Wikeł B.: Matematyka - Podstawy z elementami matematyki wyższej. PG, Gdańsk 2007;</li> <li>- M. Gewert, Z. Skoczylas : Analiza matematyczna 1, Oficyna Wydawnicza GiS 2008;</li> <li>- K. Jankowska, T. Jankowski : Zbiór zadań z matematyki, Wydawnictwo PG, 2010;</li> </ul>																
	Supplementary literature	<ul style="list-style-type: none"> <li>- G.M. Fichtenholz : Rachunek różniczkowy i całkowy I, PWN 1985;</li> <li>- R. Leitner : Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne Warszawa 1999;</li> <li>- L. Maurin, M. Maczyński, T. Traczyk : Matematyka - podręcznik dla studentów wydziałów chemicznych, PWN 1975.</li> <li>- W. Żakowski, G. Decewicz : Matematyka I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1991.</li> </ul>																
	eResources addresses	Adresy na platformie eNauczanie:																

<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> <li>1. Find the domain and the set of values of the function <math>f(x)=\dots</math> . Determine the inverse function of <math>f</math>.</li> <li>2. Check the continuity of the following function <math>f(x)=</math> .</li> <li>3. Find local extremes and intervals of monotonicity of the following function <math>f(x)=</math> .</li> <li>4. Evaluate the indefinite integral of the given rational function .</li> <li>5. Give three applications of the definite integral with appropriate rules.</li> <li>6. Compute the improper integral or prove its divergence ... .</li> <li>7. Solve the equation in a set of complex numbers ... .</li> </ol>
<p>Work placement</p>	<p>Not applicable</p>