



## Subject card

Subject name and code	Mathematics, PG_00054682						
Field of study	Biotechnology						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
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-Tlałka				
	Teachers		dr Anita Dąbrowicz-Tlałka				
			dr Ewa Kozłowska-Walania				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	45.0	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		10.0		125.0	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_W01		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		
	K6_U01		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.		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		

Subject contents	The sets of numbers and set notation. Basic mathematics symbols.		
	Functions of one variable:		
	<ul style="list-style-type: none"><li>• definitions, graphs, properties, continuity, limits</li><li>• absolute value, equations and inequalities</li><li>• polynomials, rational functions, power functions, trigonometric and inverse trigonometric functions, exponential and logarithmic functions</li><li>• equations and inequalities involving these functions</li><li>• applications to mathematical modeling</li></ul>		
	Infinite number sequences, limits and continuity of functions		
	<ul style="list-style-type: none"><li>• boundedness and monotonicity</li><li>• limits</li><li>• continuity of functions, types of discontinuities and their interpretation</li></ul>		
	Single variable calculus:		
	<ul style="list-style-type: none"><li>• definition of the derivative</li><li>• Rolle's and Lagrange's theorems and their applications</li><li>• L'Hospital's Rule</li><li>• monotonicity and local/global extrema (optimization problems)</li><li>• higher order derivatives</li><li>• concavity, inflection points</li><li>• applications of single variable differential calculus to curve sketching, related rates and approximation problems</li><li>• applications of differential calculus to other fields (e.g. chemistry, physics, biology)</li><li>• definite and indefinite integral, Fundamental Theorem of Calculus</li><li>• basic integration formulas</li><li>• integration by substitution, by parts, by partial fractions</li><li>• applications of integral calculus to other fields</li></ul>		
	Complex numbers		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	50.0%
	Midterm exams	0.0%	40.0%
	Activity during classes	0.0%	10.0%
Recommended reading	Basic literature	<ul style="list-style-type: none"><li>- Praca zbiorowa pod redakcją Wikipedii 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:	
	Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"><li>1. Find the domain and the set of values of the function <math>f(x) = \dots</math></li><li>2. Find the derivative of <math>f(x) = \dots</math></li><li>3. Sketch the graph of the function <math>f(x) = \dots</math>. Identify any local extrema and points of inflection.</li><li>4. Find solutions of the equation <math>\dots</math> in the set of complex numbers.</li><li>5. Use the definite integral to determine the volume of the solid formed by the rotation of the curve <math>\dots</math> around the axis <math>OX</math>.</li></ol>	

Work placement	Not applicable
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