



## Subject card

Subject name and code	Mathematics, PG_00057665						
Field of study	Green Technologies						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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				
Lesson types and methods of instruction	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		10.0		125.0	240
Subject objectives	Students obtain competence in using methods of mathematical analysis (single variable calculus) and knowledge how to solve simple problems that are found in the field of engineering, in particular connected to green technologies and environment protection.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_U03] is able to use information and communication technologies relevant to the common tasks of engineering, is able to use known methods and mathematical-physical models to describe and explain phenomena and chemical processes		Student combines knowledge of mathematics with knowledge from other fields. Student uses methods of mathematical description of phenomena in the physical and chemical processes.			[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyze information	
	[K6_K01] understands the need for learning throughout life, can inspire and organize the learning process of others. Is aware of his/her own limitations and knows when to ask the experts, can properly identify priorities for implementation, critically evaluate his knowledge		Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student is able to process the acquired information, analyze and interpret it, is able to draw conclusions and reason opinions.			[SK2] Assessment of progress of work [SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice	
	[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 explains the concept of limit and continuity of functions and gives a graphic interpretation of discontinuity points. Student uses the first and second derivative of a function to analyze its properties. Student uses definite integral to solve geometrical problems. Student uses complex numbers as an extension of the solutions of selected analyzed problems. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future.			[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge	

Subject contents	<p>The sets of numbers and set notation. Basic mathematics symbols.</p> <p>Functions of one variable:</p> <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> <p>Infinite number sequences, limits and continuity of functions:</p> <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> <p>Single variable calculus:</p> <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> <p>Complex numbers</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 1070 794 1099">Subject passing criteria</th> <th data-bbox="799 1070 1137 1099">Passing threshold</th> <th data-bbox="1142 1070 1481 1099">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1106 794 1135">Midterm colloquium</td> <td data-bbox="799 1106 1137 1135">0.0%</td> <td data-bbox="1142 1106 1481 1135">40.0%</td> </tr> <tr> <td data-bbox="456 1142 794 1171">Tests and Activity</td> <td data-bbox="799 1142 1137 1171">0.0%</td> <td data-bbox="1142 1142 1481 1171">10.0%</td> </tr> <tr> <td data-bbox="456 1178 794 1207">Written exam</td> <td data-bbox="799 1178 1137 1207">50.0%</td> <td data-bbox="1142 1178 1481 1207">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Midterm colloquium	0.0%	40.0%	Tests and Activity	0.0%	10.0%	Written exam	50.0%	50.0%
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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														