



Subject card

Subject name and code	, PG_00057763						
Field of study	Green Technologies						
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			English		
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 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_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 the basic operations on complex numbers. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future.		[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
	[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.		[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	[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.		[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills [SK2] Assessment of progress of work		

Subject contents	<p>The sets of numbers and set notation. Basic mathematics symbols.</p> <p>Functions of one variable: definitions, graphs, properties, continuity, limits, absolute value, equations and inequalities with absolute value, polynomials, rational functions, power functions, trigonometric and inverse trigonometric functions, exponential and logarithmic functions, equations and inequalities involving these functions, applications to mathematical modeling.</p> <p>Sequences of numbers: arithmetic and geometric, explicit and recurrence form, boundedness and monotonicity, limits of sequences.</p> <p>Single variable calculus: definition of the derivative and differential, Rolle's and Lagrange's theorems and their applications, L'Hospital's Rule, monotonicity and local/global extrema (optimization problems), higher order derivatives, concavity, inflection points, applications of single variable differential calculus to curve sketching, related rates and approximation problems.</p> <p>Definite and indefinite integral: Fundamental Theorem of Calculus, basic integration formulas (integration by substitution, by parts, by partial fractions), improper integrals, geometrical applications of definite integral and applications to other fields</p> <p>Complex Numbers: algebraic and trigonometric form, complex conjugate, modulus, arithmetic operations, roots of complex numbers, solving equations.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 893 794 920">Subject passing criteria</th> <th data-bbox="801 893 1139 920">Passing threshold</th> <th data-bbox="1145 893 1482 920">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 929 794 956">Final written and/or oral exam</td> <td data-bbox="801 929 1139 956">40.0%</td> <td data-bbox="1145 929 1482 956">50.0%</td> </tr> <tr> <td data-bbox="456 965 794 992">Tests and activity during classes</td> <td data-bbox="801 965 1139 992">50.0%</td> <td data-bbox="1145 965 1482 992">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Final written and/or oral exam	40.0%	50.0%	Tests and activity during classes	50.0%	50.0%
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<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> 1. Find the domain and the range of the function $f(x) = \dots$. Calculate the inverse of the function. 2. Find the derivative of $f(x) = \dots$. Find the intervals on which the function is convex and decreasing. 3. Sketch the graph of the function $f(x) = \dots$. Identify any local extrema and points of inflection. 4. Find the limit of the sequence/function. 5. Find the indefinite integral of the function $f(x)$. 6. Find the volume of a solid of revolution obtained by rotating the graph of the function $f(x) = \dots$ about the OX-axis. 7. Find the roots of the given complex number.
<p>Work placement</p>	<p>Not applicable</p>