



Subject card

Subject name and code	Mathematics, PG_00036264						
Field of study	Green Technologies						
Date of commencement of studies	October 2020	Academic year of realisation of subject				2021/2022	
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	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			5.0		
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 Anna Niewulis				
	Teachers		dr Anna Niewulis				
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		5.0		60.0	125
Subject objectives	Students obtain competence in using methods of mathematical analysis (multivariable 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_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 skillful use of basic mathematical apparatus in terms of engineering studies. Student understands the need of lifelong learning and improving their engineering knowledge. Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem.		[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice		
	[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		
	[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 evaluates the limits of sequences, radius and interval of convergence of a power series. Student is able to determine the type of convergence of a number series. Student evaluates double and triple integrals and explains the methods of change of variables.		[SW1] Assessment of factual knowledge		

Subject contents	<p>Infinite number sequences:</p> <ul style="list-style-type: none"> • arithmetic and geometric • explicit and recursive formulas • boundedness, monotonicity, limits <p>Infinite number series:</p> <ul style="list-style-type: none"> • necessary condition for convergence • criteria for convergence • absolute convergence • alternating series and conditional convergence <p>Power Series; Taylor and McLaurin</p> <p>Analytic Geometry</p> <ul style="list-style-type: none"> • vectors; dot product, cross product, mixed product, and their applications • equations of lines and planes • relative position of lines and planes <p>Multivariable functions</p> <ul style="list-style-type: none"> • double and triple integrals with applications <p>Probability and Statistics</p> <ul style="list-style-type: none"> • discrete and continuous random variable • probability distribution • expected value and variation of a random variable • distribution functions • elements of statistics. 											
Prerequisites and co-requisites	Working knowledge of the concepts of the second semester of mathematics.											
Assessment methods and criteria	<table border="1" data-bbox="448 669 1487 775"> <thead> <tr> <th data-bbox="448 669 794 703">Subject passing criteria</th> <th data-bbox="794 669 1141 703">Passing threshold</th> <th data-bbox="1141 669 1487 703">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 703 794 736">Tests</td> <td data-bbox="794 703 1141 736">50.0%</td> <td data-bbox="1141 703 1487 736">50.0%</td> </tr> <tr> <td data-bbox="448 736 794 775">Final exam</td> <td data-bbox="794 736 1141 775">50.0%</td> <td data-bbox="1141 736 1487 775">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Tests	50.0%	50.0%	Final exam	50.0%	50.0%
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Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Determine whether the sequence is bounded/monotone. 2. Evaluate the limit of a sequence. 3. Determine convergence of the series. 4. Find Taylor expansion of the given function. 5. Determine the relative position of two lines/planes. 6. Find all local extremes of the given function of two variables. 7. Evaluate the double/triple integral. 											
Work placement	Not applicable											