

Subject card

Subject name and code	Mathematics, PG_00204513						
Field of study	Nuclear safety and radiological protection						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
Education level	Bachelor's 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				5.0	
Learning profile	academic	Assessment form				exam	
Conducting unit	Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Michał Banacki				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	75.0	0.0	0.0	0.0	75
	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	75		0.0		50.0	125
Subject objectives	Introduction to the analysis of functions of one and several real variables as a fundamental tool for the analysis of physical phenomena.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BJORL3_W02] Understands the role of physical and chemical experimentation, mathematical theoretical models approximating reality, and computer simulations in scientific research methodology; is aware of technological, apparatus, and methodological limitations in scientific research.	The student is familiar with mathematical models of selected physical phenomena and with methods of their mathematical analysis.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW3] text preparation/written work
	[BJORL3_W04] Knows selected techniques of higher mathematics to the extent necessary to describe phenomena at the subatomic level and solve problems in physics and nuclear chemistry.	<p>The student</p> <p>knows and understands the concepts of convergence and limit, both in the context of sequences and functions of one and several variables,</p> <p>knows methods for studying the properties (continuity, monotonicity, local and global extrema) of functions of one and several variables using differential calculus,</p> <p>knows the concept of the Taylor series of a function of one variable,</p> <p>knows and understands the definition of the integral of a function of one and several variables and its physical and geometrical interpretations,</p> <p>knows methods of calculating integrals of functions of one and several variables (integration by parts, substitution, iterated integral, change of variables),</p> <p>knows the basic concepts of vector analysis (gradient, divergence, curl) and their physical meaning,</p> <p>knows the definitions of line and surface integrals and their physical interpretation, including Green's, Stokes', and Gauss' theorems.</p>	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW3] text preparation/written work
	[BJORL3_U04] Can use mathematical and computer apparatus to analyze and solve problems in radiological protection and nuclear safety.	<p>The student:</p> <p>is able to examine convergence and compute limits of sequences and functions of one and several real variables,</p> <p>is able to calculate derivatives and use them to study the properties of functions,</p> <p>is able to approximate functions with polynomials using the concept of the Taylor series,</p> <p>is able to compute integrals of functions of one and several variables using various techniques (including integration by parts, substitution, iterated integrals, change of variables),</p> <p>is able to compute the appropriate line and surface integrals and apply them to physical problems.</p>	[SU1] oral statement/conversation/discussion [SU3] text preparation/written work [SU4] test/exam - oral or written

Subject contents	Numeric sequences and their limits. Functions of one variable <ul style="list-style-type: none"> • Limits and continuity • Differential calculus • Taylor series • Intgration, indefinite and definite integrals • Methods of integral calculations • Applications of integral calculus Functions of many variables <ul style="list-style-type: none"> • differential calculus • extreme points, Lagrange multipliers • elements of vector analysis, gradient, rotation and divergence • multiple integrals, curve and surface integrals • Gauss and Stokes theorems 														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Subject passing criteria</th> <th style="width: 30%;">Passing threshold</th> <th style="width: 30%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Project P</td> <td>0.0%</td> <td>5.0%</td> </tr> <tr> <td>Test K</td> <td>51.0%</td> <td>50.0%</td> </tr> <tr> <td>Written exam E</td> <td>51.0%</td> <td>45.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Project P	0.0%	5.0%	Test K	51.0%	50.0%	Written exam E	51.0%	45.0%
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Recommended reading	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 50%;">Basic literature</td> <td colspan="2">not applicable</td> </tr> <tr> <td>Supplementary literature</td> <td colspan="2">not applicable</td> </tr> <tr> <td>eResources addresses</td> <td colspan="2"></td> </tr> </tbody> </table>			Basic literature	not applicable		Supplementary literature	not applicable		eResources addresses					
Basic literature	not applicable														
Supplementary literature	not applicable														
eResources addresses															
Example issues/ example questions/ tasks being completed	not applicable														
Work placement	Not applicable														

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