University of Gdańsk

Subject card

Subject name and code	Mathematics, PG_00207506						
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	6.0			
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		75.0	150
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_U10] Graduate applies mathematical and statistical methods to describe phenomena and analyze data.		
	[BJORL3_W04] Has an advanced knowledge and understanding of selected techniques in advanced mathematics to the extent necessary to describe phenomena at the subatomic level and to solve problems in nuclear physics and chemistry.	The student knows and understands the concepts of convergence and limit, both in the context of sequences and functions of one and several variables, knows methods for studying the properties (continuity, monotonicity, local and global extrema) of functions of one and several variables using differential calculus, knows the concept of the Taylor series of a function of one variable, knows and understands the definition of the integral of a function of one and several variables and its physical and geometrical interpretations, knows methods of calculating integrals of functions of one and several variables (integration by parts, substitution, iterated integral, change of variables), knows the basic concepts of vector analysis (gradient, divergence, curl) and their physical meaning, knows the definitions of line and surface integrals and their physical interpretation, including Green's, Stokes', and Gauss' theorems.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work
	[BJORL3_W02] Has an advanced understanding of the role of physical and chemical experiments, 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_U04] Can use mathematical and computer apparatus to analyze and solve problems in radiological protection and nuclear safety.	The student: is able to examine convergence and compute limits of sequences and functions of one and several real variables, is able to calculate derivatives and use them to study the properties of functions, is able to approximate functions with polynomials using the concept of the Taylor series, 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), is able to compute the appropriate line and surface integrals and apply them to physical problems.	[SU1] oral statement/conversation/ discussion [SU3] text preparation/written work [SU4] test/exam - oral or written

<table>
<tr><td>Subject contents</td><td>Numeric sequences and their limits.

Functions of one variable

• Limits and continuity
• Differential calculus
• Taylor series
• Intgration, indefinite and definite integrals
• Methods of integral calculations
• Applications of integral calculus
Functions of many variables
• differential calculus
• extreme points, Lagrange multipliers
• elements of vector analysis, gradient, rotation and divergence
• multiple integrals, curve and surface integrals
• Gauss and Stokes theorems</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><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></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>not applicable</td></tr><tr><td>Supplementary literature</td><td>not applicable</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>not applicable</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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