

Subject card

Subject name and code	Mathematics, PG_00167193						
Field of study	Matematyka						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
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 If there is a foreign student in the group, the classes will be conducted in English.		
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		dr Danuta Jaruszevska-Walczak dr Michał Banacki				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	60.0	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_W04] knows the basic techniques of higher mathematics to the extent necessary to describe phenomena at the subatomic level and solve problems in physics and nuclear 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/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW3] opracowanie tekstowe/ praca pisemna
	[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] wypowiedź ustna/rozmowa/ dyskusja [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny
	[BJORL3_U02] Has the ability to perform measurements of basic quantities used in physics and chemistry; can develop, describe and present the results of simple experiments and computer simulations; can perform quantitative analyses and formulate qualitative conclusions on this basis; can estimate measurement uncertainties	Student is able to analyse results of real experiments using mathematical analysis methods	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny

	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/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW3] opracowanie tekstowe/ praca pisemna
	[BJORL3_K07] has a sense of responsibility for jointly implemented tasks; is able to interact and work in a group, taking on different roles in it	The student is able to take part in a discussion on solving a mathematical problem.	[SK1] wypowiedź ustna/rozmowa/ dyskusja
Subject contents	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		
Prerequisites and co-requisites			
Assessment methods and criteria	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%
Recommended reading	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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