

Subject card

Subject name and code	Mathematics and Statistics - lecture I, PG_00183915						
Field of study	Water Management and Protection of Water Resources						
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 Subject group related to practical vocational preparation		
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		2.0		
Learning profile	practical		Assessment form		credit		
Conducting unit	Department of Geophysics -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Marcin Paszkuta				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	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	30		1.0		19.0	50
Subject objectives	To acquire the knowledge, skills and competences necessary for further education in the field of water management and water resources protection. The lectures will impart the basic knowledge of higher mathematics to a degree that will enable the student to understand the content of the lectures given in the further course of study and to perform the calculations necessary for the tasks of a specialist in water management and water protection.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GWOZW3-W02] The student knows and understands the importance of advanced knowledge in the sciences allowing to understand the processes and phenomena occurring in the hydrosphere, as well as knowledge of the social sciences and of the Earth's geographic environment - as a system of interrelated and interacting components.	W_2 [K_W04] Use basic statistical tools to describe and interpret data on phenomena and processes (Content 1-7)	[SW4] test/exam - oral or written
	[GWOZW3-W04] The student is familiar with advanced research techniques, methods and tools currently used in water management and the protection of water resources, in both the natural and social sciences, including advanced statistical and IT tools enabling the description, modelling and interpretation of data concerning phenomena and processes occurring in the aquatic environment, as well as tools for describing relationships within socio-ecological systems.	W_1 [K_W02] Understands the importance of mathematical knowledge in order to understand processes and phenomena in water (Content 1-7)	[SW4] test/exam - oral or written
Subject contents	1. Basic functions of one and many variables and their properties, 2. The limit of a function, 3. The extremum of a function, 4. Elements of differential and integral calculus, 5. Complex numbers, 6. Elements of analytic geometry, 7. Elements of matrix calculus,Fundamentals of field theory.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Obtain a minimum of 51% of the marks for the written examination in accordance with the Regulations of the of Studies of UG	51.0%	100.0%
Recommended reading	Basic literature	Fichtenholz G.M., 2007. Rachunek różniczkowy i całkowy, Wyd. Naukowe PWN, Warszawa	
	Supplementary literature	Włodarski W., Krywicki L., 2006. Analiza matematyczna w zadaniach, Wyd. Naukowe PWN, Warszawa	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. The limit of a function of one variable, conditions for the existence of a limit, continuity of a function of one variable, asymptotes of a function of one variable, 2. Derivative of a function of one variable, geometric sense, physical sense, operations on derivatives, 3 Functions of many variables, higher order derivatives, 4 Ordinary and partial differential equations, directional derivative, 5 Existence of the derivative versus continuity and differentiability, monotonicity conditions, 6 Extremes of functions, convex functions, 7 Indeterminate integrals, integral calculus, concept of a prime function, basic rules for calculating integrals, 8. Integration of measurable functions, examples of calculating indeterminate integrals, integration of trigonometric functions, recursive formula, 9. The definite integral, definitions and examples, geometrical and physical meaning of the integral 10. Complex numbers, geometric interpretation 11. Basic definitions, operations on matrices, 12. Determinants, properties, 13. Vectors, addition and subtraction of vectors, multiplication of a vector by a number, linear combination of vectors, decomposition of a vector into its components, versors, scalar product, vector product, mixed product, 14. Fields, vector field, scalar field, field operations: gradient, divergence.		
Work placement	Not applicable		

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