

**Subject card**

<b>Subject name and code</b>	Mathematics and Statistics - tutorial I, PG_00192584						
<b>Field of study</b>	Water Management and Protection of Water Resources						
<b>Date of commencement of studies</b>	October 2026	<b>Academic year of realisation of subject</b>				2026/2027	
<b>Education level</b>	Bachelor's studies	<b>Subject group</b>				Obligatory subject group in the field of study Subject group related to practical vocational preparation	
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>				at the university	
<b>Year of study</b>	1	<b>Language of instruction</b>				Polish	
<b>Semester of study</b>	1	<b>ECTS credits</b>				3.0	
<b>Learning profile</b>	practical	<b>Assessment form</b>				credit	
<b>Conducting unit</b>	Department of Geophysics -> Faculty of Oceanography and Geography -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr hab. Marcin Paszkuta				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	0.0	30.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM		
	<b>Number of study hours</b>	30	2.0	43.0	75		
<b>Subject objectives</b>	Mastering the ability to calculate derivatives and integrals of functions of one and more variables; studying the course of functions; perceiving, interpreting and using relationships and functional relations expressed by formulae, graphs, diagrams, schematics, tables; applying the acquired knowledge to solve both theoretical questions and practical problems in other fields, e.g. physics; using numerical methods to solve selected problems of differential and integral calculus. Mastery of basic algebra and field theory.						
<b>Learning outcomes</b>	<b>Course outcome</b>	<b>Subject outcome</b>			<b>Method of verification</b>		
	[GWOZWL3-U08] The student can use basic mathematical and statistical methods to analyze data and describe phenomena and processes occurring in the environment, as well as methods of information technology to assess the risk of threats to the of the environment, especially the hydrosphere.	K_U08 - know how to use basic mathematical and statistical methods to analyse data and describe phenomena and processes in the environment (Curriculum content B.1-18)			[SU3] text preparation/written work [SU8] observation of student's independent or team work		
	[GWOZWL3-K03] The student has the ability systematic further education and professional development, updating and expand their knowledge and skills, understands the limitations of his own knowledge in the context of civilization progress and recognizes authorities in the professional and scientific environment.	K_K03 - Systematically develops and improves his/her professional skills, extends his/her knowledge and knowledge and skills, understands the limits of one's own knowledge in the context of the progress of civilisation, and recognises authorities in the professional and scientific environment (curricular content B.1-18).			[SK3] text preparation/written work [SK8] observation of student's independent or team work		

Subject contents	1. Derivative of a function of one variable, geometric sense, physical sense, operations on derivatives, 2. Functions of many variables, higher order derivatives, 3. Ordinary and partial differential equations, directional derivative, 4. existence of derivatives vs. continuity and differentiability, conditions of monotonicity 5. Extremes of functions, convex functions, 6. indeterminate integral, integral calculus, concept of prime function, basic rules of integral calculus, 7. Integration of measurable functions, examples of calculating indeterminate integrals, integration of trigonometric functions, recursive formula, 8. The definite integral, definitions and examples, geometric and physical sense of the integral, 9. Complex numbers, geometric interpretation, 10. Basic concepts, operations on matrices, 11. Determinants, properties, 12. Vectors, addition and subtraction of vectors, multiplication of a vector by a number, linear combination of vectors, decomposition of a vector into its components, vertices, scalar product, vector product, mixed product, 13. Fields, vector field, scalar field, operations on fields: gradient, divergence.											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1" data-bbox="448 808 1487 880"> <thead> <tr> <th data-bbox="448 808 794 846">Subject passing criteria</th> <th data-bbox="794 808 1141 846">Passing threshold</th> <th data-bbox="1141 808 1487 846">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 846 794 880">solving tasks</td> <td data-bbox="794 846 1141 880">51.0%</td> <td data-bbox="1141 846 1487 880">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	solving tasks	51.0%	100.0%			
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Example issues/ example questions/ tasks being completed	1. Derivative of functions of one variable, geometric sense, physical sense, operations on derivatives, 2. Functions of many variables, derivatives of higher orders, 3. Ordinary and partial differential equations, directional derivative, 4. Existence of derivative vs. continuity and differentiability, monotonicity conditions, 5. Extremes of functions, convex functions, 6. Indeterminate integrals, integral calculus, concept of a prime function, basic rules for calculating integrals, 7. Integration of measurable functions, examples of calculating indeterminate integrals, integration of trigonometric functions, recursive formula, 8. The definite integral, definitions and examples, geometrical and physical sense of the integral, 9. Complex numbers, geometric interpretation, 10. Basic terms, operations on matrices, 11. Determinants, properties, 12. Vectors, addition and subtraction of vectors, multiplication of a vector by a number, linear combination of vectors, decomposition of a vector into its components, vertices, scalar product, vector product, mixed product, 13. Fields, vector field, scalar field, field operations: gradient, divergence.											
Work placement	Not applicable											

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