University of Gdańsk

Subject card

Subject name and code	Mathematics and Statistics - tutorial I, PG_00192584		
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	3.0
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	0.0	30.0	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	2.0	43.0	75

Subject objectives

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.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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

<table>
<tr><td>Subject contents</td><td>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. Felds, vector field, scalar field, operations on fields: gradient, divergence.</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>solving tasks</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>Włodarski W., Krysicki L., 2006. Analiza matematyczna w zadaniach, Wyd. Naukowe PWN, Warszawa</td></tr><tr><td>Supplementary literature</td><td>Fichtenholz G.M., 2007. Rachunek różniczkowy i całkowy, Wyd. Naukowe PWN, Warszawa</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>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.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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