University of Gdańsk

Subject card

Subject name and code	Mathematics for Oceanographers - auditory classes, PG_00205206		
Field of study	Oceanography		
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	5.0
Learning profile	academic	Assessment form	credit
Conducting unit	Division of Geometry -> Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Bartosz Makuracki	
	Teachers	dr Krzysztof Kowitz dr Bartosz Makuracki	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	60.0	0.0	0.0	0.0	60
	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	60	4.0	61.0	125

Subject objectives	Learning and understanding the most important concepts and tools of mathematical analysis, in the field of differential and integral calculus of real functions of one real variable, as well as elements of analysis of functions of several variables and the basics of linear algebra. The exercise aims to present the knowledge, skills and mathematical competencies necessary in the further education process in a given field.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[OCEANL3-K03] is ready to exercise caution and criticism in accepting information from scientific literature, the Internet and other media relating to natural sciences	is ready to be cautious and critical in accepting mathematical knowledge contained in books of various substantive levels and in Internet sources	[SK4] test/exam - oral or written
	[OCEANL3-W01] has an advanced knowledge and understanding of the terminology used in oceanography and related exact and natural sciences (in Polish and a selected foreign language)	the student has extended and deepened knowledge of mathematics useful for formulating and solving tasks/problems appropriate in exact and natural sciences, in particular: • knows basic mathematical symbols, transformations of algebraic expressions, • understands the adopted assumptions, definitions and previously derived results and theorems, • classifies basic elementary functions and lists their properties, • lists the basic formulas of differential and integral calculus, • lists the basic formulas of matrix calculus	[SW4] test/exam - oral or written
	[OCEANL3-U05] is able to use general-purpose and specialized software, as well as mathematical and statistical methods, in data analysis and the presentation of results	uses the basic concepts of probability theory, which form the basis of the statistical description of natural phenomena	[SU4] test/exam - oral or written
	[OCEANL3-U01] is able to use the current scientific terminology in the field of oceanography in various forms of expression	can describe phenomena and processes occurring in the sea using mathematical language	[SU4] test/exam - oral or written
	[OCEANL3-W05] has an advanced knowledge of techniques, research methods, and tools (mathematical, statistical, and computational) used by oceanographers to describe and interpret processes and phenomena occurring in the marine environment	knows and understands the concepts of: derivative and integral of a function of one variable, probability, vector, matrix, partial derivative, gradient	[SW4] test/exam - oral or written
	[OCEANL3-U04] is able to independently search for information in Polish and foreign specialist literature, as well as on the Internet and in databases	is able to solve calculation and problem tasks formulated in English with mathematical symbols	[SU4] test/exam - oral or written
	[OCEANL3-K04] is willing to constantly deepen knowledge in the field of oceanography and improve professional qualifications, supported by the knowledge of experts	is ready to learn mathematical methods independently, based on effective assessment of one's own abilities	[SK4] test/exam - oral or written

<table>
<tr><td>Subject contents</td><td>

Equations and inequalities of elementary functions of one variable.
Limits and continuity of functions.
Formulas for the derivative of a function, the equation of a tangent to a graph.
Monotonicity intervals and local extrema of functions.
Integral calculus and determining areas bounded by curves.
Elements of probability calculus.
Elements of matrix calculus used in systems of equations.
Elements of analytical geometry and vector calculus.

Equations and inequalities of elementary functions of one variable.
Limits and continuity of functions.
Formulas for the derivative of a function, the equation of a tangent to a graph.
Monotonicity intervals and local extrema of functions.
Integral calculus and determining areas bounded by curves.
Operations on complex numbers, canonical and trigonometric forms.
Elements of matrix calculus used in systems of equations.
Elements of analytical geometry and vector calculus.
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<tr><td>Prerequisites and co-requisites</td><td>Basic secondary school level mathematics skills (algebra and geometry); advanced level skills are desirable but not essential.</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>Test</td><td>51.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>

1. Włodarski W., Krysicki L., Analiza matematyczna w zadaniach, Część I i II, Wyd. Naukowe PWN.
2. Gewert M., Skoczylas Z., Analiza matematyczna ; definicje, twierdzenia, wzory. Wyd. GiS
3. Gewert M., Skoczylas Z., Analiza matematyczna ; przykłady i zadania. Wyd GiS
4. Jurlewicz T., Skoczylas Z., Algebra liniowa ; definicje, twierdzenia, wzory. Wyd. GiS
5. Jurlewicz T., Skoczylas Z., Algebra liniowa ; przykłady i zadania, Wyd. GiS

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<tr><td>Supplementary literature</td><td>

G. Kwiecińska: Matematyka : kurs akademicki dla studentów nauk stosowanych. Cz. 1, Wybrane zagadnienia algebry liniowej
G. Kwiecińska: Matematyka : kurs akademicki dla studentów nauk stosowanych. Cz. 2, Analiza funkcji jednej zmiennej

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<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Calculate the limit of a function. Calculate the derivative of a function. Determine the equation of the tangent to the graph of a function at a point. Give the local extrema of a function of two variables. Solve the given system of equations using Cramer's formulas.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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