

Subject card

Subject name and code	Mathematics lecture, PG_00072897						
Field of study	Marine Hydrography						
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		
Semester of study	1		ECTS credits		5.0		
Learning profile	practical		Assessment form		exam		
Conducting unit	Division of Geometry -> Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Marek Halenda				
	Teachers		dr Marek Halenda				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	60.0	0.0	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		50.0	114
Subject objectives	1. Deepening the understanding of mathematics, enabling to effective solving of mathematical problems that hydrographers encounter in their professional practice. 2. Acquisition of the mathematical knowledge necessary to continue the study of hydrography.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[HML3-W04] the issue of measurements related to the exploration of sea basins and inland waters and tools allowing to describe, interpret and present the results of measurements		Describe and apply 2D transformations involved in surveying and mapping. Solve linear equations using matrix methods. Compute the gradient of a real valued function. Define a function as a series. Calculate explicit integrals of classical functions. Apply plane and spherical trigonometry to surveying problems. Estimate the mean, variance, standard deviation and the covariance between random variables. Interpret results from a least square estimation applied to survey measurements. Differentiate between 1-D and spatial interpolation methods.		[SW4] test/exam - oral or written		

Subject contents	1. Vector and affine spaces, vector and inner products, norm. Linear equations and linear operators. Matrices, determinants, operations on matrices, inversion, transposition. Basis of a space, matrix of an linear operator. Analytical geometry, line and plane equations. Translations, rotations, coordinate transformations. 2. Real and vector valued functions. Partial derivatives and gradient. Series: convergence, expanding functions into power series. Indefinite and definite integrals. 3. Plane trigonometry. Spherical angle, spherical triangle. Spherical excess. Rhumb line. 4. Random variable, mean, variance, standard deviation. Covariance and correlation. Estimators of mean, variance, covariance. Normal distribution. 5. Covariance propagation in linear model. Uncertainty of observation. 6. Least squares procedure. Covariance of estimated parameters. Use of unit variance factor estimate. Ellipses of confidence. 7. 1D polynomial interpolation. Spatial interpolation by inverse distance weighting methods.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	100.0%
Recommended reading	Basic literature	1. G. Kwiecińska, <i>Matematyka : kurs akademicki dla studentów nauk stosowanych</i>, Cz. 1-3. Wydawnictwo UG, Gdańsk, 2001. 2. N. Stiepanow, <i>Trygonometria sferyczna</i>. PWN, Warszawa, 1960. 3. J. R. Taylor, <i>An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements</i>. University Science Books, New York, 1997. 4. J. Jakubowski, R. Sztencel, <i>Rachunek prawdopodobieństwa dla (prawie) każdego</i>. Script, Warszawa, 2002.	
	Supplementary literature	None.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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