



## Subject card

Subject name and code	Adjustment calculus, PG_00044802						
Field of study	Geodesy and Cartography						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Geodesy -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Daria Filipiak-Kowszyk				
	Teachers		dr inż. Daria Filipiak-Kowszyk				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	0.0	45
	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	45		6.0		49.0	100
Subject objectives	Get acquainted with the elements of matrix algebra and the basics of statistical analysis used in the alignment calculus.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W03] knows and understands the principles of mathematical statistics described in the examples of the adjustment computations		Knowledge of mathematical statistics used in the alignment calculus.		[SW2] Assessment of knowledge contained in presentation		
	[K6_U01] can apply the principles of physics and mathematics to a simple verification of measurement and computational methods and their results		The ability to verify the obtained calculation results.		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_U03] can use a adjustment calculations to analyze the results of measurements and determine their accuracy		The ability to verify the results of measurements and their analysis with the use of alignment calculus methods.		[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task		
Subject contents	<div>1. Matrix algebra:</div> <ul style="list-style-type: none"><li>• basic matrix operations;</li><li>• inverse of matrices;</li><li>• distribution of matrices into triangular factors;</li><li>• solving systems of equations using the marked and indefinite method.</li></ul> <div>2. Probabilistic basics of the equalization methods:</div> <ul style="list-style-type: none"><li>• one-dimensional random variables (discret and continuous);</li><li>• zero-one, binomial, normal distribution;</li><li>• two-dimensional random variables (step and continuous);</li><li>• uniform and normal distribution;</li><li>• descriptive parameters of a random variable.</li></ul>						

Prerequisites and co-requisites	Prerequisites: <ul style="list-style-type: none"><li>basics of matrix operations (determinant, addition, multiplication)</li><li>basics of differential and integral calculus</li></ul>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquium 2	60.0%	50.0%
	Colloquium 1	60.0%	50.0%
Recommended reading	Basic literature	Z. Wiśniewski, 2005: Rachunek wyrównawczy w geodezji (z przykładami). Wydawnictwo UWM. Olsztyn.  Z. Wiśniewski, 2000: Algebra macierzy i statystyka matematyczna w rachunku wyrównawczym (teoria i zadania), Wyd. UWM, Olsztyn	
	Supplementary literature	A. Jagielski, 2007: Geodesy II. Wydawnictwo P.W.STABILL. Wydanie 2.	
	eResources addresses	Adresy na platformie eNauczanie: Rachunek Wyrównawczy 2024 - Moodle ID: 37407 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37407">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37407</a>	
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"><li>determine the inverse of matrices</li><li>decompose a matrix into triangular factors</li><li>solve the system of equations using the marked and indefinite method</li><li>present descriptive parameters of a random variable</li></ul>		
Work placement	Not applicable		

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