GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	SPECIAL GEODETIC MEASUREMENTS A, PG_00044850
Field of study	Geodesy and Cartography

Date of commencement of studies	October 2023	**Academic year of realisation of subject**	2025/2026
Education level	first-cycle studies	**Subject group**	Optional subject group 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	3	**Language of instruction**	Polish
Semester of study	5	**ECTS credits**	6.0
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
	Teachers

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	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	9.0	81.0	150

Subject objectives	Teaching students issues related to the deformation analysis of geodetic network.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W11] understands the concepts and has in-depth knowledge in the field of geodetic building monitoring, extended with basic knowledge in the field of statics and dynamics of engineering structures	[K6_W11] Performs geodetic measurements and carries out appropriate calculations related to geodetic monitoring of buildings,	
	[K6_W07] has a well-established knowledge and understands concepts in the field of engineering geodesy including the use of calculations and measurements methods carried out with the use of geodetic instruments and photogrammetric and remote sensing technologies related to geodetic support for investment, surveying and inventory measurements and photogrammetry with remote sensing	[K6_W07] The student performs calculations by using the least squares method,	

Subject contents	Lecture topics
	1. Development of geodetic observations by using the least squares method,
	2. Free adjustment of geodetic networks,
	3. Geodetic measurements of displacements - introduction to the issue,
	4. Designing of a control network,
	5. Selected measurement methods used in determining displacements,
	6. Selected issues in the field of the reliability theory of geodetic networks,
	7. Adjustment of geodetic networks in constrained datums,
	8. Initial adjustment of observations,
	9. Identification of stable reference points,
	10. Estimation of displacements of controlled points,
	11. Assessment of the significance of the designated displacements,
	12. Modern methods of deformation analysis of geodetic network - introduction to the issue,
	13. The method of the global congruency test (GCT),
	14. Weighted iterative S-transformation method,
	15. Geometric interpretation of determined displacements.
	Laboratory topics
	Performing geodetic calculations regarding:
	- adjustment of geodetic observations by using the least squares method,
	- free adjustment of observations by using the least squares method,
	- preliminary development of geodetic observations in the context of diagnostics and the location of potential outliers,
	- identification of stable reference points by using the Fredericton approach,
	- calculation of displacements of controlled points with an assessment of the significance of the determinations made.
	Exercise topics
	Performing the deformation analysis of the angular-linear network designed in the area of the water dam in Montsalvenes (Switzerland).

Prerequisites and co-requisites	Independent use of traditional and modern geodetic instruments, ability to work in a team, mastered basics of matrix calculus and methods of developing of geodetic observations.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratories. Passing all exercises.	100.0%	0.0%
	Exercise. Correct execution of the geodetic project.	100.0%	0.0%
	Final exam	60.0%	100.0%

Recommended reading	Basic literature	Wiśniewski Z. 2016. Rachunek wyrównawczy w geodezji z przykładami,
		Wiśniewski Z. 2013. Zaawansowane metody opracowania obserwacji geodezyjnych z przykładami,
		Prószyński W., Kwaśniak M. 2015. Podstawy geodezyjnego wyznaczania przemieszczeń
	Supplementary literature	Koch K.R. 1999. Parameter estimation and hypothesis testing in linear models,
		Caspary W. F. 2000. Concepts of network and deformation analysis
		Prószyński W., Kwaśniak M. 2002. Niezawodność sieci geodezyjnych
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. The geodetic control network design,
	2. Testing of the stability of potential reference points,
	3. Determination of displacements of controlled points,
	4. Diagnostics of observational material and localization of potential outliers.

Work placement	Not applicable

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