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 2020	Academic year of realisation of subject	2022/2023
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	dr inż. Marek Zienkiewicz
	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	Presentation of issues related to the deformation analysis of geodetic network, and in particular getting acquainted with methods of identifying the reference base and basic estimation methods enabling the estimation of displacements in fixed and elastic reference frames.

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	The student has knowledge in the field of geodetic work carried out during the monitoring of the building. He knows the idea of basic measuring techniques and calculation methods related to geodetic monitoring of buildings.	[SW3] Assessment of knowledge contained in written work and projects
	[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	The student has a well-established knowledge in the field of the theory of the least squares method. He knows the theoretical foundations of methods for developing geodetic data both in fixed and flexible computing systems.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

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%	15.0%
	Final exam	60.0%	70.0%
	Exercise. Correct execution of the geodetic project.	100.0%	15.0%

| 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 |
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| | 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:
GEODEZYJNE POMIARY SPECJALNE A - 2022/2023 - Moodle ID: 26877
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26877 |

| 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. |
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Work placement	Not applicable