



Subject card

Subject name and code	Geomatics B, PG_00039998						
Field of study	Geodesy and Cartography						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jerzy Pyrchla				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	25.0	10.0	0.0	15.0	0.0	50
	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	50		10.0		40.0	100
Subject objectives	To acquaint students with the issues of obtaining, analyzing, interpreting and practical application of geoinformation through the interconnection of geometric and physical aspects from global to regional problems.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U08] can use echoprobes and sonars to measure depth, interpret, calculate the hotfixes and evaluate the accuracy of the depth measurements; use automated systems to carry out hydrographic measurements, plan, prepare the data, materials and equipment for Hydrographic work;	Has the ability to use knowledge about hydrographic data processing to get reliable results and match them with the height system.	[SU2] Assessment of ability to analyse information
	[K7_W10] has knowledge of the physical fundamentals in geodesy, geodetic geometry, earth's gravity field and its properties, geodetic gravimetry, gravimetric and astronomical-surveying methods, geodetic networks, precision leveling networks, integrated networks	Knows the rules of defining of the geometric and geophysical issues connected with terrain geodetic infrastructure.	[SW1] Assessment of factual knowledge
	[K7_W11] knows the basics of hydrography theory and practice, construction and operation of echosonars and sonars, methods of information recording and displaying; principles of depth measurement and conducting marine measurements; knows the theory and practice of bathymetric measurements	Has a knowledge about importance of the bathymetric and gravimetric data for the geodetic works in coastal zone.	[SW1] Assessment of factual knowledge
[K7_U07] can calculate equipotential surfaces, obtain information from the official websites, created for the needs of geodesy and geodynamics, knows how to use the properties of the actual vector field the force of gravity of the Earth to carry out precise geometric levelling and levelling satellite	Is able to acquire and interpret the global and regional gravimetric data from existing databases.	[SU4] Assessment of ability to use methods and tools	
Subject contents	Introduction; Basics of potential theory; Expression on the potential of the equipotential ellipsoid; Surface spherical harmonics; Height system; Altimetry; gravimetry; Instruments for gravimetric measurements; Noise reduction of the gravimetric signal; Gravimetric anomalies. Reductions and corrections; Deviation of the vertical; The tides of the earth's crust.		
Prerequisites and co-requisites	Knows problems of higher Geodesy.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	raport	80.0%	30.0%
	test	60.0%	70.0%
Recommended reading	Basic literature	Kazimierz Czarnecki, Geodezja współczesna. Wyd. PWN 2014; Adam Łyszkwicz, Geodezja fizyczna. Wyd. Uniwersytetu Warmińsko-Mazurskiego w Olsztynie 2012; Marcin Barlik, Andrzej Pachuta, Geodezja fizyczna i gravimetria geodezyjna. Teoria i praktyka. Oficyna Wydawnicza Politechniki Warszawskiej 2007; Martin Vermeer, Physical Geodesy. https://users.aalto.fi/~mvermeer/mpk-en.pdf ; Hofmann-Wellenhof B., Moritz H., Physical Geodesy, Institut für Navigation und Satellitengeodäsie Technische Universität Graz, Graz, Austria, 2006; Barlik M., Pomiar gravimetryczne w geodezji. OWPW 2001; Barlik M., Wstęp do teorii figury Ziemi, 1995; Stefan Przewłocki, Geomatyka. Wyd.: naukowe PWN, Warszawa 2009.	
	Supplementary literature	Articles in scientific journals. Eg. Journal of Geodesy; Marine Geophysical Research; Journal of Geodynamics; Journal of the Geodetic Society of Japan	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Characterize the measurements made at the LIGO Laser Interferometer Gravitational Wave Observatory. Characterize the potential of the body as Newton's integral. Characterize the Poisson and Laplace equations related to the potential of a solid. Introduce functions called solid spherical harmonics and functions called surface harmonics (Laplace). Give Dirichlet's boundary problem and their solutions to the sphere. Please, write down the radial derivative of the harmonic function. Present the solution of the Laplace equation in ellipsoidal coordinates		
Work placement	Not applicable		