GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Geodesy and satelite navigation in transport , PG_00044578		
Field of study	Transport		
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	3.0
Learning profile	general academic profile	Assessment form	exam
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	0.0	15.0	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	5.0	25.0	75

Subject objectives

To familiarize with geodetic and satellite navigation techniques used in transport.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U09] able to, when formulating and solving engineering problems in transport, use the right methods and devices to carry out measurements of basic values and parameters used in transport, carry out stress tests of structures, select the right materials, select elements of devices	The student uses reference systems and coordinate systems used in geodesy and satellite navigation. Selects the appropriate method of GNSS measurements as a function of the performed transport task.	[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K6_U06] able to plan and conduct simple laboratory and operational experiments and simulations in the area of transport; able to interpret the results and formulate conclusions	The student is able to plan and carry out an experiment consisting in monitoring the movement of a vehicle with the use of a GNSS receiver and a cellular data transmission system. He can interpret the obtained result in terms of availability and accuracy of satellite positioning.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task
[K6_W04] has basic knowledge of informatics, electronics, telecommunications, automation and control, information technologies, computer graphics, geodesy and satellite navigation which is useful for understanding how it can be applied in transport	The student is able to indicate the areas of application of geodetic systems and satellite navigation in transport and define the technical and IT conditions of such applications.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation

Subject contents	LECTURES: Basic concepts of geodesy and navigation. Earth as a reference surface for measurements. Reference and coordinate systems used in navigation and geodesy. Geodetic instruments - purpose, functions and structure. The genesis of geodesy and satellite navigation systems. The movement of artificial satellites of the Earth. Global Positioning Systems: GPS (Global Positioning System), GLONASS (GLObal NAvigation Satellite System), Galileo. GNSS code receivers, their purpose, structure and functions. GNSS augmentation systems: EGNOS, WAAS and DGPS. Phase GNSS measurements. Active geodetic networks. Applications of global navigation satellite systems (GNSS) in transport. LABORATORIES: Planning a GPS measurement campaign with the use of GNSS constellation simulation software. Measurement evaluation of the availability and errors of satellite positioning. Monitoring a moving vehicle using a GNSS receiver.
Prerequisites and co-requisites	Basic knowledge of physics and mathematics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory exercises	90.0%	50.0%
Colloquium	60.0%	50.0%

Recommended reading

Basic literature	1. Łyszkowicz A., Geodesy, or the art of measuring the Earth, Wydawnictwo UWM w Olsztynie, 2006. 2. Lamparski J., Świątek K., GPS in surveying practice, Wydawnictwo Gall, Olsztyn 2007. 3. Specht C., GPS System, Biblioteka Nawigacji nr 1, Wydawnictwo “Bernardinum”, Pelplin, 2007. 4. Zieliński J., i in. Galileo Navigation System, WKiŁ, Warszawa, 2006.
Supplementary literature	1. ICD - GPS – 200, NAVSTAR GPS Joint Program Office, Navtech, February 1995. 2. ICD-GALILEO, Galileo Open Service Signal In Space, Interface Control Document (OS SIS ICD), Draft 0, European Space Agency / Galileo Joint Undertaking, 2006. 3. ICD-GLONASS, Global Navigation Satellite System GLONASS – Interface Control Document, Moscow, 2002. 4. SPS, Global Positioning System (GPS), Standard Positioning Service, Signal Specification, Department of Defence, Positioning/Navigation Executive Commitee, November 5. 1993 5. SPS, Global Positioning System Standard Positioning Service, Performance Standard, Assistant Secretary of Defense, 2001. 6. SPS, Global Positioning System Standard Positioning Service, Performance Standard, 5h edition, April 2020.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Discuss the architecture and functions of individual segments of GPS, Glonass, Galileo, BeiDou systems. 2. Describe the idea of code and phase pseudorange measurements. 3. Present the idea of fixing the position in satellite navigation systems and discuss the factors influencing the accuracy of determinations. 4. Present the idea of differential measurements and describe the selected DGNSS system.
Work placement	Not applicable