GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Autonomous unmanned platforms, PG_00051489		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	English
Semester of study	3	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Marine Electronic Systems -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Łukasz Kulas	
	Teachers	dr hab. inż. Łukasz Kulas mgr inż. Piotr Cywiński	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	0.0	0.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie:						

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	0.0	0.0	45

Subject objectives	The subject covers theoretical issues related to the subject of autonomous technologies, e.g. cybersecurity, communication and navigation systems, the basics of construction, testing and the most important legal aspects.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Student knows and understands to a greater extent the structure and principles of operation of components and systems used in the construction and design of autonomous mobile platforms, as well as selected issues related to cybersecurity, testing and validation methods, components of autonomous systems (sensors, sensors, drives, power supply).	[SW1] Assessment of factual knowledge
	[K7_W04] Knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	Student knows the rules and techniques of programming and creating software for devices or controllers using microprocessors in the construction and design of autonomous mobile platforms	[SW1] Assessment of factual knowledge

Subject contents	1. Working with unmanned and autonomous systems. 2. Non-technical aspects and architecture of autonomous systems. 3. Cybersecurity. 4. Wireless communication systems - long range. 5. Wireless communication systems - short range. 6. Methods of testing and validation of autonomous systems. 7. Wireless obstacle detection sensors for decision support systems in AMP. 8. Design environment for semi-autonomous platforms. 9. Fundamentals of construction of unmanned platforms. 10. Single board control systems. 11. Positioning and spatial orientation systems. 12. Industrial sensors. 13. M2M communication interfaces and protocols. 14. Electric drives and actuators. 15. Electric power supply.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Activity in classes	60.0%	20.0%
	Multiple-choice credit test	60.0%	80.0%

Recommended reading	Basic literature	1. Gajewski S. , Gajewska M., Katulski R., Stefański J.: Wirtualne sieci NGN, 5G i następne. Radioinformatyczna metamorfoza sieci komórkowych. Przegląd Telekomunikacyjny i Wiadomości Telekomunikacyjne, 6/2019, str. 130-137, 2019. 2. CMI International Working Group Position Paper On Unmanned Ships And The International Regulatory Framework 3. Lloyds Register, 2016. Cyber-enabled Ships: Deploying Information And Communications Technology In Shipping Lloyds Register's Approach To Assurance. London: Lloyds Register. 4. Richard Crowder, Electric Drives and Electromechanical Systems, Elsevier 5. J. Kostro - Pomiary wielkości nieelektrycznych metodami elektrycznymi
	Supplementary literature	1. Dz.U. 2017 poz. 96 http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20170000096 2. Dz.U. 2015 poz. 2174 http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20150002174 3. J. Januszewski, Sources of error in satellite navigation positioning, TransNav, 2017
	eResources addresses	

Example issues/ example questions/ tasks being completed	1. Integrity understood as a safety function: 2. The range of the radio communication device in an exemplary propagation test 3. The main difference between an automatic system and an autonomous system is 4. Effects of ratifying international convention 5. Distinguishing features of individual processor families 6. Accuracy of position estimation for autonomous vehicles 7. Speed control of a permanent magnet synchronous motor PMSM 8. How to protect the battery against explosion while charging 9. What means a lossless arbitration in the CAN interface
Work placement	Not applicable