GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Unmanned vehicles , PG_00050050
Field of study	Space and Satellite Technologies

Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam

Conducting unit	Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology

Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Mirosław Gerigk
	Teachers	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	30.0	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	10.0	30.0	100

Subject objectives	The aim of the course is to familiarize students with the basic issues related to the research, design and operation of unmanned vehicles: air, land, sea, including underwater.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K7_U07	The student has the ability to solve basic problems related to the research, design and operation of unmanned vehicles, in terms of assessing the functionality, performance and safety of unmanned vehicles, including performing simple engineering tasks.	[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task [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
	K7_W03	The student has the ability to analyze basic research problems related to the mechanics, construction and mechatronics of unmanned vehicles. These problems relate in particular to: Critical assessment of the knowledge of unmanned vehicles. Maritime unmanned vehicles. Unmanned ground vehicles - UGV. Unmanned aerial vehicles - UAV. Unmanned vehicles - research issues (phenomena, parameters, characteristics, features). Unmanned vehicles - design. Unmanned vehicles - construction and construction. Unmanned vehicles - operation, operational environment, missions, tasks. Unmanned vehicles - Challenges: structures of the near future. Unmanned vehicles - Challenges: interoperability and PB clouds. Unmanned vehicles - Challenges: PB intelligent. Unmanned vehicles - Overview of the concept of selected PB vehicles - air, land, sea.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	[K7_K03] Can analyse and implement assigned tasks while maintaining high technical standards. Is able to work and interact in a group, taking on different roles. Adheres to the principles of professional ethics and respects the diversity of views and cultures.	The student has the ability to analyze basic issues related to the research, design and operation of unmanned vehicles in the field of theory and solving simple tasks and practical problems. This includes the topics listed in the objective and item sheet. The student is able to work in a group observing all the rules that determine professionalism.	[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work [SK1] Assessment of group work skills [SK2] Assessment of progress of work
	K7_U08	The student has the ability to analyze the basic issues related to the research, design and operation of unmanned objects in the field of theory and solving practical problems, including the selection of methods and tools. This includes the topics listed in the objective and item sheet.	[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

| Subject contents | The lectures concern in turn:

Critical assessment of the state of knowledge about unmanned vehicles. Maritime unmanned vehicles. Unmanned ground vehicles - UGV. Unmanned aerial vehicles - UAV. Unmanned vehicles - research issues (phenomena, parameters, characteristics, features). Unmanned vehicles - design. Unmanned vehicles - construction and construction. Unmanned vehicles - operation, operational environment, missions, tasks. Unmanned vehicles - Challenges: structures of the near future. Unmanned vehicles - Challenges: interoperability and PB clouds. Unmanned vehicles - Challenges: PB intelligent. Unmanned vehicles - Overview of the concept of selected PB vehicles - air, land, sea. |
|---|---|
| Prerequisites and co-requisites | The student should have basic information in the field of physics and applied mathematics, mathematical analysis, numerical methods, solid state mechanics, including kinetics and dynamics, construction and construction of complex technical objects, technical drawing and the basics of programming as well as mechatronics and automation. |

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Zaliczenie kolokwium i egzaminu	56.0%	100.0%

Recommended reading	Basic literature	Brzezina J. M. Atak dronów. Wojskowy Instytut Wydawniczy, Warszawa 2013.
		Cwojdziński L. Bezzałogowe Systemy Walki - charakterystyka, wybrane probelmy użycia i eksploatacji. Wojskowa Akademia Techniczna, Warszawa 2014.
		Dougherty M.J. Drony - ilustrowany przewodnik po bezzałogowych pojazdach powietrznych i podwodnych (Drones. An illustrated Guide to the Unmanned Aircraft That Filling Our Skies). Wydawnictwo BELLONAS.A., © 2015 Amber Books Ltd.
		Gerigk M.K. Modeling of performance and safety of a multi-task unmanned autonomous maritime vehicles (in Polish: Modelowanie ruchu i bezpieczeństwa wielozadaniowego bezzałogowego autonomicznego pojazdu wodnego). Journal of KONBIN, Safety and Reliability Systems, No. 1 (33), Warsaw 2015.
		Gerigk M.K., Wójtowicz S. An Integrated Model of Motion, Steering, Positioning and Stabilization of an Unmanned Autonomous Maritime Vehicle. TRANSNAV the International Journal on Marine Navigation and Safety of Sea Transportation. Volume 9, Number 4, December 2015, DOI: 10.12716/1001.09.04.18.
		Gerigk M.K. Challenges associated with the design of a small unmanned autonomous maritime vehicle. Scientific Journals of the Maritime University of Szczecin, No. 46 (118) 2016, DOI: 10.17402/113, Published: 27.06.2016.
		Gerigk M.K. Modeling of combined phenomena affecting an AUV stealth vehicle. TRANSNAV the International Journal on Marine Navigation and Safety of Sea Transportation, Vol. 10, No. 4, December 2016, DOI: 10.12716/1001.10.04.18.
		Gerigk M.K. Modeling of performance of a AUV vehicle towards limiting the hydro-acoustic field. TRANSNAV the International Journal on Marine Navigation and Safety of Sea Transportation, Volume 12, Number 4, December 2018, DOI: 10.12716/1001.12.04.06.
		Gerigk M.K. Modeling of performance of an AUV stealth vehicle. Design for operation. Proceedings of IMAM 2017, 17th International Congress of the International Maritime Association of the Mediterranean, Lisbon, Portugal, 9-11 October 2017. Volume 1, @ 2018 Taylor & Francis Group, London. A Balkema Book, ISBN 978-0-8153-7993-5, pp. 365-369.
		Kalicka R. Podstawy automatyki i robotyki. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2016.
		Ty Audronis. Drony- wprowadzenie, Technologia i rozwiazania (Building Multicopter Video Drones). Wydawnictwo HELION, © 2015 Helion S.A.
	Supplementary literature	AUVSI/ONR,2007. Engineering Primer Document for the Autonomous Underwater Vehicle (AUV) Team Competition Association for Unmanned Vehicle Systems International (AUVSI) US Navy Office of Naval Research (ONR), Version 01 - July 2007.
		Szulist N., Gerigk M.K., 2015. Metodyka nadawania cech stealth małym bezzałogowym pojazdom wodnym. Logistyka, nr 4, Poznań 2015.
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Please provide the definition of unmanned vehicle (air, land, sea).
	2. Please divide the unmanned vehicles: - air - land - marine
	3. Please briefly describe the key technologies for the development (research), design and construction of unmanned objects.
Work placement	Not applicable