

Subject card

	DC 00050420							
Subject name and code	, PG_00056130							
Field of study	Mechatronics							
Date of commencement of studies	October 2023		Academic year of realisation of subject			2025/2026		
Education level	first-cycle studies		Subject group					
Mode of study	Full-time studies		Mode of delivery			at the university		
Year of study	3		Language of instruction			Polish		
Semester of study	6		ECTS credits			2.0		
Learning profile	general academic profile		Assessment form			assessment		
Conducting unit	Department of Microv Informatics	wave and Ante	Antenna Engineering -> Faculty of Electronics, Telecommunications and					
Name and surname	Subject supervisor		dr hab. inż. Ł	ukasz Kulas				
of lecturer (lecturers)	Teachers							
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	ect Seminar		SUM
of instruction	Number of study hours	15.0	0.0	15.0	0.0		0.0	30
	E-learning hours incl	 	.0					
Learning activity and number of study hours	Learning activity	Participation i classes include plan		Participation consultation h		Self-study		SUM
	Number of study hours	30	0.0			0.0		30
	signals propagation effects in different environments and information about the most p systems used in unmanned applications together with their functional blocks, paramete important for high-quality data transfer. Additionally, practical installation and maintena wireless systems will be covered during the course.							d configurations
Learning outcomes	Course outcome		Subject outcome			Method of verification		
	[K6_W11] has knowledge about the life cycle of mechatronic systems and objects					[SW1] Assessment of factual knowledge		
	[K6_W10] has knowledge about development trends in the field of engineering and technology sciences and scientific disciplines: Mechanical Engineering, Automation, Electronics, Electrical Engineering and Space Technologies, adequate for Mechatronics curse					[SW1] Assessment of factual knowledge		
	[K6_U05] is able to use properly chosen tools to compare design solutions of elements and mechatronics systems according to given application and economic criteria (e.g. power demand, speed, costs)					[SU1] Assessment of task fulfilment		
	[K6_W08] knows and understands design and production processes of elements and simple mechatronic devices					[SW1] knowle	Assessment edge	of factual
	[K6_U06] is able to identify and formulate specification of simple, practical engineering tasks, distinctive for mechatronics					[SU1] . fulfilme	Assessment ent	of task

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Cubicat contents	LECTURE:						
Subject contents	LLGTORL.						
	Introduction to wireless data transmission						
	 Introduction to high frequency radio signals propagation Radio signals propagation - propagation effects Radio signals propagation - different operational environments The most popular wireless systems used in unmanned applications - introduction and examples The most popular wireless systems used in unmanned applications - key parameters and application areas Wireless data transmission system functional blocks Antennas - basic electrical and radio parameters Antennas - basic concepts and configurations Wireless data transmission system - design principles Wireless data transmission system - verification and configuration Wireless data transmission system - verification and testing methods Cybersecurity in wireless data transmission systems New development trends - wireless systems of the future Case study - summary of course topics LABORATORY: Deployment and analysis of simple low frequency wireless data transmission system Deployment and installation methods methods of advanced wireless data transmission system Deployment and analysis of advanced wireless data transmission system Deployment and analysis of advanced wireless data transmission system Case study - performance verification of an unmanned unit wireless system, reliability and resistance to cyberattacks assessment in close to operational conditions 						
Prerequisites	Basic electronics knowledge.						
and co-requisites							
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	l can just passing amount	50.0%	50.0%				
		50.0%	50.0%				
Recommended reading	Basic literature	Simon R. Saunders, "Antennas and Propagation for Wireless					
Recommended reading		Communication Systems", Wiley, 2007					
	David Tse, "Fundamentals of Wireless Communication", Cambridge University Press 2005						
		K. Daniel Wong, "Fundamentals of Wireless Communication Engineering Technologies", Wiley, 2012					
	Supplementary literature	Andrea Goldsmith, "Wireless Comr					
		Press 2005	, , , , , , , , , , , , , , , , , , , ,				
		Charles J. Brooks, "Cybersecurity Essentials", Wiley, 2018					
			ies o. Diouns, Cybersecurity Essertitidis, Wiley, 2010				
	Walid Saad, "Wireless Communications and Networking for Unmanne Aerial Vehicles", Cambridge University Press, 2020						
	eResources addresses	·					
	enesources addresses	Adresy na platformie eNauczanie:	a piatiorrille elvauczanie:				
Example issues/							
example questions/							
tasks being completed							
Work placement	Not applicable						

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