



## Subject card

Subject name and code	Automation and control of HVAC systems, PG_00057357						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject				2023/2024	
Education level	second-cycle studies	Subject group				Optional subject group 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				3.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Piotr Jasiński				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	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	30		8.0		37.0	75
Subject objectives	The course will discuss issues related to the processes of control of indoor microclimate. The topics of the course will include the basic issues of climate and microclimate of closed rooms, measurements of physical quantities (including humidity and air temperature, gas concentration) affecting the climate and human well-being, indicators of human comfort and discomfort. A description and issues related to microclimate control systems will be presented, both in the form of theoretical considerations, but also practical solutions actually used will be presented.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_W06] knows the extended issues of reliability of power equipment and diagnostics of defects in this equipment		Has the ability to assess damage to peripheral components of automation systems			[SW1] Assessment of factual knowledge	
	[K7_U02] is able to use known mathematical and numerical methods to analyze and design elements, systems and power transmission networks and internal installations		has the basic skills to implement and test the known automatic control systems, to correct the characteristics, to assess the stability of the systems			[SU3] Assessment of ability to use knowledge gained from the subject	
	[K7_W03] knows advanced aspects of automation and automatic control of power systems or transmission networks and internal installations		Has the ability to assess the stability of automatic control systems			[SW1] Assessment of factual knowledge	
Subject contents	Basic concepts of automation, basic principles of automatic control, classification of automation systems. Elements of automatic control systems: measuring devices, controllers, actuators. Basic members of linear automatic control systems. Analysis of linear control systems in the time domain. Open-loop and closed-loop systems. Impulse response. Step response. Frequency analysis of linear control systems. Stability of linear automatic control systems: concept and stability criteria. Automation actuators. Sensors in automation. Control systems in heating, ventilation and air conditioning.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
	Tests		50.0%			30.0%	
	Exam		50.0%			70.0%	
Recommended reading	Basic literature		Kwiatkowski W.: Wprowadzenie do Automatyki, Warszawa 2005. Craig J.: Wprowadzenie do robotyki, WNT, Warszawa 1995 Morecki A. I in.: Podstawy robotyki, WNT, Warszawa 2002 (wyd. II) Olszewski I in.: Podstawy mechatroniki, REA, Warszawa 2006.				

	Supplementary literature	Bishop H.R.: Mechatronic Systems, Sensors and Actuators, CRC Press 2008
	eResources addresses	
Example issues/ example questions/ tasks being completed	Calculate stability of regulation system	
Work placement	Not applicable	