GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Control Systems in Buildings, PG_00058880		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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	5	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Andrzej Kopczyński	
	Teachers	dr inż. Andrzej Kopczyński dr inż. Ariel Dzwonkowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	20.0	0.0	0.0	50

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	50	3.0	47.0	100

Subject objectives

The aim of the course is to provide students with knowledge of current building automation systems, their types, the application, properties, methods of operation and configuration.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W07] has basic knowledge related to control and automation systems	Student knows the building automatic control systems, their principle of operation, methods of configuration and tools used for protection and safety. Student has a basic knowledge on developments in the field of construction of building automation devices and systems.	[SW3] Assessment of knowledge contained in written work and projects
[K6_K02] can work in a group taking on different roles in it	A team of students can use the specialized ETS tool program. Performs the project of electrical installation and starts this installation in laboratory condition. Student is able to design and implement a simple building automation systems based on the KNX standard.	[SK5] Assessment of ability to solve problems that arise in practice
[K6_U02] can work individually and in a team, can communicate using various techniques in a professional environment, as well as document and analyze the results of their work, can estimate the time needed to perform the entrusted task can prepare and present a presentation on the problems and results of an engineering task	Student describes the principles of design of electrical installations with KNX/ EIB system. Selects devices for KNX/EIB system and describes their operation. Students can work individually and in a team and accomplish assigned task within the specified time.	[SU1] Assessment of task fulfilment

Subject contents	LECTURE: Features of the building automation systems and the purpose of their use. Types of systems: security systems, comfort systems, telecommunication systems. The evolution of systems and the idea of their integration. Open and closed systems. The most popular standards for distributed building automation systems: KNX (EIB), LonWorks, BACnet. KNX Standard - basic features of the system and principles of operation. Sensors, actuators and system devices. Network topology and rules for addressing devices. KNX communication protocol: the telegrams, flags, typical data formats, the method of access to the bus. Bus coupling unicts and types of application modules. Creating a project in the ETS program: project management, database elements, design methodology. Booting system and system diagnostics. Basic applications: lighting control, shutter control, temperature control in the room. Integration of building automation systems: interfaces and communication gates, linking with other systems, the OPC standard. Building Management Systems (BMS / HMS). The rules of system design and asembly: the TP and the PL installation, types of cable, ways of mounting equipment. Overview of alarm systems and equipment. Detectors - types, principles of operation. Sirens and equipment for notification. Intruder alarm systems - rules for the selection of equipment, security levels, control. Access control systems - a review of equipment, rules for the selection, control the operation of equipment. Control panels - construction, principle of operation, programming and configuration using additional modules. Remote control the operation of alarm systems. Notification Devices - GSM, Ethernet. Monitoring station - construction, working principle, transmission channels, the software. Wireless systems - the principle of selection of equipment, systems configuration. Reliability of the transmission - signals distorted and undistorted. CCTV systems - an overview of solutions, equipment parameters, configuration and optimization of the system. LABORATORY: The laboratory consists of a set of exercises designed to familiarize himself with the basic KNX equipment and the ETS used for commisioning, configuration and diagnostic system. Classes include designing and launching simple applications such as lighting control, blind control, room temperature, and SCADA.
Prerequisites and co-requisites	1. Basic knowledge of electrical engineering. 2. Basic knowledge of control engineering.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Practical test	60.0%	45.0%
Writing test	60.0%	45.0%
Laboratory report	60.0%	10.0%

Recommended reading	Basic literature	1. Petykiewicz P.: Nowoczesna instalacja elektryczna w inteligentnym budynku. COSIW, Warszawa 2001. 2. Mikulik, Jerzy: Podstawowe systemy bezpieczeństwa w budynkach inteligentnych, Wydawnictwo Politechniki Śląskiej, Gliwice 2005. 3. Krzysztof Duszczyk i inni. Inteligentny budynek Poradnik projektanta, instalatora i użytkownika. Wydawnictwo Naukowe PWN Warszawa 2019. 4. Strojny j. i inni.: Instalacja elektryczna w systemie KNX/EIB. COSIW, Warszawa 2006. 5. Internet resources of KNX Association: www.knx.org.
	Supplementary literature	1. Satel company training publications.
	eResources addresses	Podstawowe https://www.knx.org/ - Internet resources of KNX Association. Adresy na platformie eNauczanie: SYSTEMY STEROWANIA W BUDYNKACH [2023/24] - Moodle ID: 32143 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32143
Example issues/ example questions/ tasks being completed	1. Configuration and diagnostics of the KNX system with the ETS application. 2. Lighting control. 3. Controling of blinds and shutters. 4. Controling the room temperature. 5. Simple visualization (SCADA + OPC).
Work placement	Not applicable

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