COURSE DESCRIPTION CARD - SYLLABUS

Course name
Control and management systems for installations [S1IŚrod2>SSiZi]

Course

Field of study
Environmental Engineering

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of electrical devices and their ergonomics and safety of use, electrical engineering, mathematics, physics, automation and computer science. Ability to perform mathematical analysis of simple electrical circuits and read electrical diagrams. Awareness of the need to expand one's competences, readiness to cooperate within a team.

Course objective

Learning about the operation of electrical receiving installations and their implementation. Planning an experiment, selecting measuring instruments and implementing a testing system, and performing tests and developing results. Acquiring skills in the design of simple installations controlled by means of PLC controllers and dedicated building automation systems. Acquiring skills in programming and testing simple building installations. Learning the principles and possibilities of controlling building installations, aimed at saving energy and achieving comfort of use of the facility.

Course-related learning outcomes

Knowledge:
The student knows the principles of operation and implementation of electrical installations and

building automation systems and the basic phenomena occurring in low-voltage installations. The student knows the principles of selecting installation and control equipment for selected algorithms for controlling lighting, heating and blinds.

Skills:
The student is able to develop electrical diagrams of receiving installations, perform calculations necessary for the selection of conductors and protections and select installation equipment. The student is able to critically analyze available data in order to assess the technical and non-technical aspects of the designed electrical system or system.

Social competences:
The student is aware of the need for continuous education and improvement of professional competences. The student is aware that in technology, knowledge and skills become outdated very quickly.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
- knowledge acquired during the lecture is verified by a written assessment consisting of open or test questions with different scoring. Passing threshold: 50% of points,
- ongoing assessment during each class (with activity bonuses).

Laboratories:
- ongoing checking and bonuses of knowledge necessary to complete the problems posed in a given area of laboratory tasks,
- assessment of reports on completed exercises,
- bonuses for activity related to the implementation of laboratory exercises.

Programme content

The module program includes the following topics:
1. Electrical installations - basic information.
2. Intelligent building installations.
3. PLC controllers in electrical installations.
4. Wired building automation systems.
5. Wireless building automation systems.

Course topics

The lecture program includes the following topics:
1. Classification of electrical installations, low voltage network systems, elements of electrical installations.
2. Intelligent installations in modern utility buildings. Quality requirements for intelligent buildings. Division of building automation systems.
3. Principle of construction, operation and programming of PLC controllers. Basic functions performed by PLC controllers. Examples of using PLC controllers to control building installations.
4. Wired building automation systems - KNX system - construction, topology, devices used, communication, possibilities, programming.
5. Wireless building automation systems - Fibaro system, Blebox system - construction, topology, devices used, communication, possibilities, programming.

The lab program includes the following topics:
1. Introduction to the ETS program - programming the KNX system
2. Lighting control in the KNX system - on/off control, dim/brighten, central control, control using peripheral devices
3. Control of roller shutters, blinds and awnings in the KNX system
4. Heating control in the KNX system.
5. Programming scenes in the KNX system.
6. Smart Home Fibaro system - programming the Home Center 3 Lite control unit
7. Lighting control in the Fibaro system.
8. Creating scenes in the Fibaro system.

9. Control of blinds and blinds in the Fibaro system.
10. Lighting control using the BleBox system.
11. Control of blinds and blinds using the BleBox system.
12. Creating scenes in the BleBox system.

Teaching methods

Lecture:
- multimedia or object presentations supported by illustrated examples presented on the board,
- lecture conducted in an interactive manner with asking questions and initiating discussions.
Laboratories:
- object presentations supported by illustrated examples presented on the board,
- presentations of selected experiments,
- initiating teamwork.

Bibliography

Basic:
1. E. Niezabitowska, J. Sowa, Z. Staniszewski, D. Winnicka-Jasłowska, W. Badroń, A. Niezabitowski. Budynek inteligentny. Potrzeby użytkownika a standard budynku inteligentnego. Wydawnictwo Politechniki Śląskiej, Gliwice, 2000.
2. J. Mikulik. Budynek inteligentny. Podstawowe systemy bezpieczeństwa w budynkach inteligentnych. Wydawnictwo Politechniki Śląskiej, Gliwice, 2000.
3. A. Kamińska A, L. Muszyński, Z. Boruta, R. Radajewski, Nowoczesne techniki w projektowaniu energooszczędnych instalacji budynkowych w systemie KNX, POIG.02.02.00-00-018/08-00, Warszawa 2011.

Additional:
1. J. Ciszewski, Wstęp do automatycznych systemów sygnalizacji pożaru, Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej, Józefów, 1996.
2. Dombek, G.; Nowak, K.; Książkiewicz, A.; Bochenek, B.; Nowaczyk, P.; Pluta, P. Zastosowanie przekaźników PLC do realizacji algorytmów sterowania ogrzewaniem. Poznan University of Technology Academic Journals. Electrical Enginnering, 2017, Issue 92, pp.415-425.
3. Dombek, G.; Książkiewicz, A. Automatyka budynkowa oparta na przekaźnikach programowalnych firmy Relpol. Elektronik, 2017, nr 3, pp. 44-45.
4. Dombek, G.; Książkiewicz, A. Automatyka budynkowa w oparciu o przekaźniki PLC firmy Relpol. Elektrosystemy, 2017, nr 3, pp. 43-44.
5. Standards.
6. Internet publications

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00