



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Intelligent building management systems [N2Eltech2-UilE>ISZB]

### Course

Field of study

Electrical Engineering

Year/Semester

2/4

Area of study (specialization)

Distribution Devices and Electrical Installations

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

### Number of hours

Lecture

10

Laboratory classes

20

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

dr inż. Grzegorz Dombek

grzegorz.dombek@put.poznan.pl

### Lecturers

### Prerequisites

Basic knowledge of control algorithms, automation, computer science, electrical devices and installations. Ability to analyze the operation of simple electrical systems and read electrical diagrams. Awareness of the need to expand their competences, readiness to cooperate within a team.

### Course objective

Understanding the principles and possibilities of controlling building installations, aimed at saving energy and increasing the comfort of using the facility. The acquisition of basic skills in the development of Building Automation Systems BAS, security systems SMS and their integration BMS. The acquisition of software skills and testing of simple building installations.

### Course-related learning outcomes

Knowledge:

Student knows the basic principles of operation, implementation and software of selected building automation systems. Student knows the principles of operation and design of building security systems: Intrusion Alarm System, Fire Alarm System, Access Control, CCTV. The student knows the general principles of integration of BAS and SMS systems.

#### Skills:

Student is able to develop ways of controlling selected installations and devices, and properly select controllers that allow the implementation of this control. Student is able to choose security systems and their configuration depending on specific features of the object. Student is able to program and test the operation of a fragment of the building automation system installation and develop integration with the selected building protection system.

#### Social competences:

Student is aware of the need to use and develop building automation systems for energy saving purposes and to increase the comfort and safety of using the facility. Student is able to work in a team that comprehensively develops controlled electrical installations.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lecture:

- knowledge acquired as part of the lecture is verified by a written final test consisting of open or test questions with different points. Passing threshold: 50% of points,
- current grading in each lecture (rewarding activities).

#### Laboratory classes:

- current check and rewarding knowledge necessary for the accomplishment of the problems in the area of laboratory tasks,
- evaluation of reports performed on laboratory classes,
- rewarding activities related to the implementation of laboratory classes.

### Programme content

Intelligent installations in modern commercial buildings, with particular emphasis on building automation, security, fire alarm, access control and emergency power supply systems.

### Course topics

#### Lecture:

- Quality requirements for intelligent buildings,
- Intelligent installations in modern utility buildings,
- Intelligent building automation systems - basic information, capabilities and functions based on selected building automation systems,
- Programming intelligent buildings,
- Security of intelligent buildings,
- Fire alarm systems,
- Intruder and hold-up alarm systems,
- Access control systems,
- CCTV systems,
- Evacuation sound system,
- Emergency power supply system,
- Integration of security systems.

#### Laboratories:

- Discussion of classes: topics, literature, requirements, reports, health and safety,
- Connecting, programming and operating the Fibaro building automation system,
- Connecting, programming and operating the BleBox building automation system,
- Connecting, programming and operating the Satel alarm system,
- Connecting, programming and operating the KNX system,
- Summary of classes, reports and assessment.

### Teaching methods

#### Lecture:

- multimedia or object-oriented presentations supported by illustrated examples presented on the board,

- interactive lecture with questions and initiating discussions.

Laboratory classes:

- object-oriented presentations supported by illustrated examples presented on the board,
- presentations of selected experiments,
- initiating teamwork.

## Bibliography

Basic:

1. 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.
2. PN-EN 15193-1:2017-08. Efektywność energetyczna budynków. Wymagania energetyczne dotyczące oświetlenia. Część 1
3. 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.
4. J. Mikulik. Budynek inteligentny. Podstawowe systemy bezpieczeństwa w budynkach inteligentnych. Wydawnictwo Politechniki Śląskiej, Gliwice, 2000.
5. Code of practice. Building Automation and Control Systems. The Institution of Engineering of Technology. 2020.
6. Dombek, G.; Nowak, K.; Książkiewicz, A.; Bochenek, B.; Nowaczyk, P.; Pluta, P. Zastosowanie przekładników PLC do realizacji algorytmów sterowania ogrzewaniem. Poznan University of Technology Academic Journals. Electrical Engineering, 2017, Issue 92, pp.415-425.

Additional:

1. PN-EN 50131-1:2009. Systemy alarmowe -- Systemy sygnalizacji włamania i napadu -- Część 1: Wymagania systemowe.
2. J. Ciszewski, Wstęp do automatycznych systemów sygnalizacji pożaru, Centrum Naukowo -Badawcze Ochrony Przeciwpowodziowej, Józefów, 1996.

## Breakdown of average student's workload

|                                                                                                                                         | Hours | ECTS |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Total workload                                                                                                                          | 82    | 3,00 |
| Classes requiring direct contact with the teacher                                                                                       | 32    | 1,50 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 50    | 1,50 |