



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Smart building: building services and automation [S2Bud1E-IOB>SB:SlAB]

Course

Field of study

Civil Engineering

Year/Semester

1/1

Area of study (specialization)

Smart and resilient buildings

Profile of study

general academic

Level of study

second-cycle

Course offered in

English

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

10

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of electrical engineering, electronics, computer science, automation and control, including in building installations. The ability to understand and interpret knowledge provided in class. The ability to effectively self-study in a field related to the chosen field of study. The awareness of the need to expand their competences, readiness to cooperate within a team.

Course objective

Understanding the theoretical and practical problems associated with the construction of elements, sub-assemblies and systems of modern intelligent buildings and the technologies of information transmission used in them. Presentation of the latest solutions in the field of building automation, the possibilities of their application to reduce the exploitation costs of building as well as resource and media management.

Course-related learning outcomes

Knowledge:

Have extended and detailed knowledge of mathematics, physics and chemistry, forming theoretical principles appropriate to formulate and solve tasks related to building engineering.

Skills:

Utilizing the obtained knowledge, they can select appropriate (analytical, numerical, simulation, experimental) methods and tools to solve technical problems.

Are able to obtain information from literature, databases and other properly selected information sources; can integrate the obtained information, interpret and evaluate it as well as draw conclusions, formulate, justify, discuss and present opinions.

Social competences:

Are responsible for the safety of own work and team work.

Are ready to autonomously complete and broaden (extend) knowledge in the field of modern processes and technologies of building engineering.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified by passing the lecture lasting about 45-60 minutes, consisting of test and open questions, variously scored. Passing threshold: 50% of points. The issues on the basis of which questions are prepared will be successively indicated in classes. Skills acquired as part of the laboratory are verified on the basis of: grades for carrying out design tasks of selected building automation control issues and descriptions of completed exercises. In addition, the following are taken into account for the final evaluation of the laboratories: rewarding the knowledge necessary to implement the problems posed in a given area of laboratory tasks, activity during each class, assessment of knowledge and skills related to the implementation of the exercise task. In addition, students can get extra points for activity during classes, especially for: offering to discuss additional aspects of an issue, the effectiveness of applying the acquired knowledge when solving a given problem, the ability to cooperate within a team that practically performs a specific task in a laboratory, and aesthetic care of developed tasks.

Programme content

International building automation standards. Methods of sending information in intelligent buildings - EIB (European Installation Bus) / KNX, operating philosophy, components, commissioning, alternative ways of sending information in intelligent buildings. Installation structure - BMCS (Building Management and Control System). Economics of building installations. Methods and modes of temperature control and control based on building automation; Z-Wave technology.

Acquaintance with selected building automation systems (wired and wireless), Implementation of integration of various systems and visualization of system work.

Course topics

Lecture:

International building automation standards. Methods of sending information in intelligent buildings - EIB (European Installation Bus) / KNX, operating philosophy, components, commissioning, alternative ways of sending information in intelligent buildings. Installation structure - BMCS (Building Management and Control System). Economics of building installations. Methods and modes of temperature control and control based on building automation; Z-Wave technology.

Laboratories:

Acquaintance with selected building automation systems (wired and wireless), control of various elements and installations in the building, such as: lighting, motors, multimedia, HVAC and alarm systems. Support of analog and digital sensors, automation actuators. Implementation of integration of various systems and visualization of system work.

Teaching methods

Lecture: multimedia presentations (including drawings, photos, diagrams), theory presented in close connection with practice. Utilizing students "knowledge of other subjects, initiating discussions, asking questions to increase students" activity and independence.

Laboratories: Implementation of the set project tasks on mock-ups of the actual selected system in the

laboratory. Analysis / discussion of various methods (including unconventional) to solve the problem; work in groups.

Bibliography

Basic:

1. Niezabitowska E., Budynek Inteligentny, t. I-II, Potrzeby użytkownika a standard budynku inteligentnego, Wydawnictwo Politechniki Śląskiej, Gliwice, 2010.
2. Kamińska A., Muszyński L., Boruta Z., Radajewski R., Nowoczesne techniki w projektowaniu energooszczędnych instalacji budynkowych w systemie KNX, Wyd. Politechniki Poznańskiej, Poznań, 2011.
3. Nawrocki W., Sensory i systemy pomiarowe, Wydawnictwo Politechniki Poznańskiej, Poznań, 2006.
4. Niezabitowska E., Budynek Inteligentny, t. II, Podstawowe systemy bezpieczeństwa w budynkach inteligentnych, Wydawnictwo Politechniki Śląskiej, Gliwice, 2010.
5. Patykiewicz P., Nowoczesna instalacja elektryczna w inteligentnym budynku, COSiW SEP, Warszawa 2001.
6. Stanisławek R., Integracja systemów bezpieczeństwa w obiekcie, Systemy Alarmowe, 2002

Additional:

1. Petykiewicz P., Nowoczesna instalacja elektryczna w inteligentnym budynku, COSiW SEP, Warszawa, 2001.
2. Markiewicz H., Instalacje elektryczne, Wydawnictwo Naukowo-Techniczne, Warszawa, 2006.
3. Borkowski P. i inni, Podstawy integracji systemów zarządzania zasobami w obrębie obiektu, Wydawnictwo Naukowo-Techniczne Sp.z.o.o, Warszawa, 2009
4. Wang S., Intelligent Buildings and Building Automation, Spon Press, Nowy Jork, 2010
5. Zimny J., Odnawialne źródła energii w budownictwie niskoenergetycznym, Wydawnictwa NaukowoTechniczne, Kraków-Warszawa, 2010
6. Pillich B, Engineering Smart Houses, Lyngby, 2004.
7. Głuchy D., Kurz D., Trzmiel G., Aspekty projektowania i eksploatacji systemów przeciwpożarowych w obiektach przemysłowych, Computer applications in electrical engineering vol. 79/2014, Poznan University of Technology Academic Journals - Electrical Engineering, Poznań, 2014, str. 149 - 156.
8. Internet: specialist subject literature, datasheets, standards

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	1,00
Classes requiring direct contact with the teacher	25	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	0,50