COURSE DESCRIPTION CARD - SYLLABUS

Course name
Intelligent management of an energy-saving building [N1Energ2>IZBE]

Course

Field of study
Power Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
10

Laboratory classes
10

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in the field of electrical engineering, electronics and computer science, including in building installations. 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. Is aware of the need to expand their competences, readiness to cooperate within a team.

Course objective

Extended knowledge of theoretical and practical problems related to the construction of elements, sub-assemblies and systems of modern "intelligent" buildings and alarm systems in the aspect of energy efficiency.

Course-related learning outcomes

Knowledge:
1. has structured and theoretically founded knowledge of the design of electrical devices and systems, taking into account their impact on the environment,
2. is able to characterize the construction and operating principles of basic systems and devices in buildings and prepare a methodology for the design of selected installations,

3. has knowledge about the impact of intelligent building management on energy saving.

Skills:
1. is able to apply knowledge of the cooperation of electrical and IT systems in buildings with other installations in order to prepare technical documentation,
2. knows how to obtain information from literature and the Internet, work individually, solve problems in the theory of analysis and design of systems and devices in construction,
3. can estimate the investment and operating costs of various solutions in the field of intelligent management of energy acquisition and consumption.

Social competences:
1. is able to think and act in an entrepreneurial manner in the field of analyzing systems and systems in buildings.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified by a credit lasting about 45-60 minutes, consisting of 10-15 questions (test and open), variously scored. Passing threshold: 50% of points. The issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.
Skills acquired as part of the laboratory are verified on the basis of: grades from reports on exercises performed. 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, rewarding the increase in the ability to use known principles and methods, assessment of knowledge and skills related to the implementation of the exercise task.
In addition, the student can earn extra points for activity during classes, especially for: proposing discussion of additional aspects of the problem, effectiveness of applying the acquired knowledge when solving a given problem, ability to work within a team practically performing a specific task in the laboratory, comments related to improving teaching materials, diligence aesthetic of the developed tasks within self-study.

Programme content

The module program covers issues related to electrical engineering, computer science, telecommunications, electromagnetic compatibility in an energy-saving intelligent building and alarm systems.

Course topics

The lecture program covers the following topics:
1. Standards for electrical engineering, computer science, telecommunications and electromagnetic compatibility in
intelligent building and alarm systems.
2, Principles of control and design of systems in
intelligent buildings.
3. Development trends in information transmission and control in buildings
intelligent.
4. Issues of alarm systems. Energy efficiency aspect of buildings
intelligent. Presenting innovative solutions in the field of the subject, used in
the latest intelligent building solutions.
5. Design of systems, including installations and devices of an intelligent energy-saving building. Implementation examples.
6. Calculation of energy demand in buildings
intelligent.
7. Cooperation of various types of control panels with modern components (e.g. touch panel, system alarm, remote access) expanding the functionality of building systems in terms of
building energy efficiency.
8. Encouraging students to discuss and solve independently
design problems.

The laboratory program covers the following topics:
1. The TELETASK wired system is implemented on the basis of two central units (Nanos and Micros+) in cooperation with the Satel system, the DIVUS visualization panel (KNX), a palmtop/smartphone and other devices and sensors. Each station is equipped with actuating elements such as switchable and dimmable light sources, diodes, RGB LED strip, buttons/touch panels, etc.
2. ZAMEL ExtaFree wireless building automation system.
3. GRENTON wired building automation system.

Teaching methods

Lecture: multimedia presentations containing drawings, diagrams, photos, supplemented with practical examples on the board, slides and computer programs, which makes it easy to link theory and practice. The lecture supplemented with additional materials provided to students for independent study. Utilizing students 'knowledge of other subjects, initiating discussions, asking questions to increase students' activity and independence.
Laboratories: The use of computer equipment with a dedicated programming environment to learn the design and programming of installations and their functionality in energy-saving intelligent buildings. Teamwork on various design tasks.

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 Naukowo-Techniczne, Kraków-Warszawa, 2010
6. Pilich 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	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00