COURSE DESCRIPTION CARD - SYLLABUS

Course name
Smart Buildings

Course

Field of study
Automation and Robotics

Year/Semester
3/7

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
8	18	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
dr hab. inż. Tomasz Pajchrowski

email: tomasz.pajchrowski@put.poznan.pl

tel. 61 6652385

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ul. Piotrowo 3A 60-965 Poznań

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Prerequisites

He/she knows and understands at an advanced level selected facts, objects and phenomena and the methods and theories concerning them, explaining the complex relationships between them, understanding the basic physical phenomena occurring in and around elements and systems of automation and robotics. Can obtain information from literature, databases and other sources; has the ability to self-learn in order to improve and update professional skills.

Course objective

The aim of the course is to acquaint students with current IT systems used in control and technical equipment management systems for buildings and intelligent buildings, to become acquainted with

current building automation controllers for building facility management, to acquire the ability to program them using intelligent control algorithms.

Course-related learning outcomes

Knowledge

K1_W18 has advanced organized knowledge in the field of construction, application and control of automation and robotics executive systems;

K1_W21 is familiar with the current status and the latest development trends in the field of automatic control and robotics;

K1_W28 knows and understands the fundamental dilemmas of modern civilization related to the development of automation and robotics;

Skills

K1_U10 potrafi zaplanować, przygotować i przeprowadzić symulację działania prostych układów automatyki i robotyki;

K1_U22 potrafi dobrać rodzaj i parametry układu pomiarowego, jednostki sterującej oraz modułów peryferyjnych i komunikacyjnych dla wybranego zastosowania oraz dokonać ich integracji w postaci wynikowego systemu pomiarowo-sterującego;

Social competences

K1_K2 is aware of the importance of and understands the non-technical aspects and effects of engineering activities, including their impact on the environment and the related responsibility for making decisions;is willing to take care of the achievements and traditions of the profession;

K1_K5 is aware of the necessity of professional approach to technical issues, scrupulous acquaintance with documentation and environmental conditions in which devices and their elements may operate;is ready to observe the principles of professional ethics and require it from others, respect the diversity of views and cultures;

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

-Lectures: an exam or a pass/fail, consists of a test in the form of a written response to the given question and a conversation (optional) on the selected issue(s) with the explanation of the written answers from the range of program content.

-Laboratory: a check of practical skills in programming intelligent building automation systems, evaluation of the tests and reports.

Programme content

Course contents: Basic building automation interfaces: wired: RS232/422/485 and wireless: Z-Wave, ZigBee, Ocean Data. KNX, LCN, LonWorks, BACnet communication protocols. Integration of building

systems (BMS - building management system). Intelligent building HVAC systems. Automatic management systems for intelligent and energy efficient buildings.

Lab.

Work in teams and team programming.

Getting to know with construction and programming of basic building automation interfaces (RS-232, RS-232/422/485), starting and programming specialized building automation protocols LCN and KNX. Programming specialized Trend controllers.

Teaching methods

Lecture

Lecture with multimedia presentation (including: drawings, photos, animations, sound, films) supplemented by examples given on the board. Initiating discussion during the lecture.

Laboratory.

Working in teams and team programming, carrying out tasks given by the teacher - practical exercises.

Bibliography

Basic

1. Niezabitowska E. (pod redakcją) Budynek Inteligentny - potrzeby użytkownika a standard budynku Inteligentnego?, WPŚ, Gliwice, 2010

2. Mikulik J. Europejska Magistrala Instalacyjna?, Merten, Warszawa 2008

3. Mikulik J., red. Niezabitowska E., „Budynek inteligentny" t. II – „Podstawowe systemy bezpieczeństwa w budynkach inteligentnych" , Wydawnictwo Politechniki Śląskiej, Gliwice, 2005

4. Clements-Croome D., "Intelligent Buildings: design, management and operation", Thomas Telford LTD, 2004

5. Shengwei Wang, Intelligent Buildings and Building Automation, Routledge 2009

6. John T. Wen, Sandipan Mishra Intelligent Building Control Systems, A Survey of Modern Building, Springer 2018

Additional

1. Mielczarek W. Lokalne interfejsy szeregowe w systemach cyfrowych?, BTC, Legionowo 2008.

2. Mikulik J., „Wybrane zagadnienia zapewnienia bezpieczeństwa i komfortu w budynkach", Akademia Górniczo-Hutnicza w Krakowie, Kraków, 2008

3. Boroń W., „Bezpieczeństwo zdalnego dostępu do sieci sterowania LonWorks z wykorzystaniem Internetu; Bezpieczeństwo Systemów Komputerowych i Telekomunikacyjnych", Praca zbiorowa, Wydawnictwo Sotel, Katowice, 1999

Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	26	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	44	2

[1] delete or add other activities as appropriate