POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Intelligent buildings and building automation

Course

Field of study	Year/Semester
Automation and Robotics	3/5
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	English
Form of study	Requirements
full-time	elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	30	
Tutorials	Projects/seminars	

Number of credit points

5

Lecturers

Responsible for the course/lecturer:	Responsible for the course/lecturer:
dr hab. inż. Tomasz Pajchrowski	dr hab. inż. Tomasz Pajchrowski
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ul. Piotrowo 3A 60-965 Poznań	ul. Piotrowo 3A 60-965 Poznań

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

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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_W20 knows and understands typical engineering technologies, principles and techniques of designing simple automation and robotics systems; knows and understands the principles of selecting execution systems, computational units and measurement and control elements and devices;

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

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

Skills

K1_U10 is able to plan, prepare and carry out simulation of operation of simple automation and robotics systems;

K1_U22 is able to select the type and parameters of a measuring system, control unit and peripheral and communication modules for a selected application, and to integrate them in the form of a resulting measuring and control system;

K1_U26 is able to develop a solution for a simple engineering task and implement, test and run it in a selected programming environment on a PC for selected operating systems;

Social competences

K1_K2 is aware of the importance of and understands the non-technical aspects and effects of engineering activity, including its influence on the environment and the related responsibility for the decisions taken;is willing to take care of the achievements and traditions of the profession;

K1_K5 is aware of the necessity to have a professional approach to technical issues, to be scrupulously familiar with documentation and environmental conditions in which devices and their components may operate;is willing to observe the principles of professional ethics and to require this from others, to respect the diversity of views and cultures;

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

-LECTURE: written credit (theoretical knowledge test) in the field of programme content.

Laboratories: practical skills in programming intelligent building automation systems, assessment from tests and reports.

Programme content

Programme content: Getting acquainted with the construction, principle of operation of basic building automation interfaces: wired: RS232/422/485 and wireless Z-Wave, ZigBee, Ocean Data. KNX, LCN,

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LonWorks, BACnet communication protocols. Building Systems Integration (BMS). HVAC intelligent building installations. Development of intelligent building. Energy-efficient construction.

Laboratory.

Team work and team programming.

Familiarisation with the construction and programming of basic building automation interfaces (RS-232, RS-232/422/485), commissioning and programming of specialised building automation protocols LCN and KNX. Programming of specialized controllers Trend.

Introduction to the parameterization of KNX devices

Parameterization of safety devices

Parameterization of heating devices

Parameterization of lighting control devices

Parameterization of roller shutter control devices

KNX "Home Server" support

KNX bus operation

Introduction to the programming of TREND controllers

Room modelling with TREND controllers

Temperature control with TREND controllers

TREND drivers - web interface

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

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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	110	5,0
Classes requiring direct contact with the teacher	60	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	50	2,0

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[1] delete or add other activities as appropriate