COURSE DESCRIPTION CARD - SYLLABUS

Course name
Internet of things

Course

Field of study
Electrical Engineering

Year/Semester
2/3

Area of study (specialization)
Microprocessor Control Systems in Electrical Engineering

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	0
Tutorials	**Projects/seminars**	
0	0	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
dr hab. inż. Michał Gwóźdź

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Responsible for the course/lecturer:
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Prerequisites

The student starting this course should have basic knowledge of the basics of programming, telecommunications and mathematics. He should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of the team.

Course objective

Provide students with basic knowledge and principles of the functioning of the Internet of Things systems. Acquainting popular systems available on the market.

Course-related learning outcomes

Knowledge

1. Has in-depth, structured and theoretically founded knowledge in the field of analysis of electrical circuits; has advanced knowledge of discrete circuits and methods of synthesizing electric double points.

2. Has extended and deepened knowledge in the field of modelling, analysis and synthesis of electronic and power electronic components and systems.

3. Has extended knowledge of computer-aided design in electrical engineering.

Skills

1. Can use the known methods and mathematical models - if necessary modifying them appropriately - to analyze and design processes, devices and electrical systems.

2. Can make a critical analysis of complex electrical systems using appropriate tools, modifying the methods of their analysis if necessary.

Social competences

1. Is aware of the need to develop professional achievements and observe the rules of professional ethics, fulfil sfulfilbligations, and inspire and organize activities for the benefit of the social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lecture is verified by one 45-minute test carried out during the last lecture. The test consists of 15-20 questions (test and open-ended), with different scores. Passing threshold: 50% of points. Final issues, on the basis of which the questions are developed, will be sent to students by e-mail using the university's e-mail system.

The skills acquired during the laboratory classes are verified on the basis of a final test, consisting of 7-10 tasks with different scores depending on the degree of their difficulty, and on the basis of reports from the laboratory classes. Passing threshold: 50% of points.

Programme content

Issues carried out during the lecture: discussion of the Internet of Things (IoT), real-time systems and IoT, IoT components (sensors, gateways, microcontrollers, embedded systems, methods of communication with IoT devices, IoT network communication protocols (including MQTT, Rabbit), data acquisition and processing and dockers, presentation of results - user interfaces, IoT security (encryption, data confidentiality, data integrity, vulnerability to network attacks), Internet of Things and cloud services.

Issues carried out during the laboratory: preparation of the server application for the IoT System, preparation of the component application of the IoT system (electrical and programming design).

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the blackboard.

2. Laboratory exercises: a multimedia presentation, a presentation illustrated with examples given on the blackboard and carrying out the tasks given by the teacher - practical exercises.

Bibliography

Basic

Marcin Sikorski, Internet rzeczy, Wydawnictwo Naukowe PWN 2020

Samuel Greengard, The Internet of Things, The MIT Press, 2015

Andrew Minteer, Analytics for the Internet of Things (IoT): Intelligent analytics for your intelligent devices, Packt, ISBN-10: 1787120732, 2017

Dominique Guinard, Vlad Trifa, Internet rzeczy. Budowa sieci z wykorzystaniem technologii webowych i Raspberry Pi, Helion, 2017

Michael R. Miller, Internet of Things, The: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World, Que Publishing, 2015

Anand Tamboli, Build Your Own IoT Platform: Develop a Fully Flexible and Scalable Internet of Things Platform in 24 Hours, ISBN: 1484244974, 2019

Dirk Slama, Frank Puhlmann, Jim Morrish, Rishi Bhatnagar, Enterprise IoT: Strategies and Best Practices for Connected Products and Services, ISBN: 1491924837, O'Reilly Media 2015

Tomasz Francuz, Język C dla mikrokontrolerów AVR. Od podstaw do zaawansowanych aplikacji. Wydanie II, Helion, 2015

Filip Sala, Marzena Sala-Tefelska, Wprowadzenie do mikrokontrolerów AVR. Od elektroniki do programowania, Helion, 2021

Paweł Borkowski, AVR i ARM7. Programowanie mikrokontrolerów dla każdego, Helion, 2010

Additional

Giancarlo Fortino, Antonio Liotta, Internet of Things, Springer ISSN 2199-1073

M. Krystkowiak, M. Świderski, Cyfrowy sterownik rozproszony funkcjonujący w ramach Internet of Things, Poznan University of Technology Academic Journals. Electrical Engineering - 2016, Issue 88, s. 165-174

M. Świderski, D. Matecki, Autonomous power source using photovoltaic panels and supercapacitors, Elektronika : konstrukcje, technologie, zastosowania - 2017, nr 11, s. 23-28

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for tests) [1]	25	1,0

[1] delete or add other activities as appropriate