POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Internet of Things, Industry 4.0 [S1Elmob1>PO3-IRZ]

Course

Field of study	Year/Semester
Electromobility	3/5
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
full-time	elective

Number of hours

Lecture	Laboratory classes	Other
15	15	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

A student starting this course should have basic knowledge in the field of electrical engineering, electronics and computer science, as well as the ability to effectively self-study, as well as work in a laboratory group.

Course objective

Discussion of the concept of the Internet of Things as a new dimension of the reality that surrounds us, ubiquitous access to computers and the Internet, familiarization with the methods and technologies of connecting devices to the Internet, and communication between people and devices and devices, the concept of "intelligent things" in everyday use.

Course-related learning outcomes

Knowledge:
1. The student has a structured and theoretically founded general knowledge in the field of computer science key issues for the electromobility area, including programming and the use of IT tools in

modeling, simulation and design
2. The student knows and understands the fundamental dilemmas of modern civilization related to the mass use of electromobility; The student is aware of the latest development trends related to the field of study

Skills:
1. The student is able to use properly selected methods and tools, including advanced information and communication techniques, as well as to develop simple applications in order to simulate, analyze and design systems appropriate for the field of study
2. The student is able to independently plan and implement his / her own lifelong learning (e.g. second and third cycle studies, postgraduate studies, courses provided by companies and professional organizations) in order to improve professional and social competences

Social competences:
1. The student understands the importance of improving professional, personal and social competences; The student is aware that knowledge and skills in the field of electromobility are evolving rapidly.

Methods for verifying learning outcomes and assessment criteria
Learning outcomes presented above are verified as follows:

Lecture: The knowledge and skills acquired during the lecture are verified in a written test, as well as partial grades during each class as part of the activity.
Laboratory: The skills acquired during laboratory exercises are verified on the basis of projects / tasks performed by students. Before starting a given series of laboratory exercises, students take a test on the Moodle platform that allows them to verify their knowledge and skills. In class, continuous assessment takes place - activity and verification of social competences related to team work. Passing the overall laboratory exercises requires completion of all exercises, completion of the reports indicated by the teacher and passing the tests.

Programme content
Internet of Things definition, properties, security issues. Sensors and sensor networks used in IoT, selected sensors. Devices and actuators. Modes of communication with IoT devices. IT tools in Industry 4.0.

Course topics
Lecture:
Introduction. Internet of Things (IoT) - definition, properties, security problems. Platforms used in IoT, selected microcomputers and microcontrollers available on the market for the Internet of Things. Sensors and sensor networks used in IoT, selected sensors used in the Internet of Things to measure selected environmental parameters. Devices and actuators - types and basic application solutions, smart materials in transducers, devices: smart home (smart meters), wearables (smartband, smartwatch). Means of communication with IoT devices, data processing and presentation. Data transmission protocols. IT tools in Industry 4.0.
Lab:
Implementation of laboratory exercises in the field of:
- Configuration and tests of a Bluetooth network node working as an intelligent sensor or actuator
- Integration of a wireless sensor network with a computing server operating in the cloud
- Development of a mobile application to control the selected "wear" device

Teaching methods
Lecture: presentation of issues with the use of multimedia, examples (e.g. computational) given on the blackboard, discussion on problem issues
Laboratory: performing laboratory exercises in teams under the supervision of the teacher

Bibliography
Basic:
1. Sikorski M.: Internet rzeczy, Wydawnictwo Naukowe PWN, 2020.
2. Sułkowski Ł.: Internet of things, nowy paradygmat rynku, Wydawca Difin, 2018.

3. Dominique D. Guinard, Vlad M. Trifa:Internet rzeczy, budowa sieci z wykorzystaniem technologii webowych i Raspberry Pi, Wydawnictwo Helion, 2017.
4. Alasdair Gilchrist: Industry 4.0, APress, 2016.

Additional:
1. Scientific articles and publications in the field of IoT and Industry 4.0
4. Technical and operational documentation of systems used in the classroom.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00