COURSE DESCRIPTION CARD - SYLLABUS

Course name
Internet of Things

Course

Field of study
Computing

Year/Semester
2/3

Area of study (specialization)
Artificial Intelligence

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
16

Laboratory classes
16

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
Paweł Śniatała, Ph.D., D.Sc.
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Responsible for the course/lecturer:
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Prerequisites

A student starting this course should have a basic knowledge of digital electronics, microcontrollers, and microprocessors. He should have knowledge to be able to design and implement computer programs in chosen programming languages (e.g., C, Python) He should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of a team. In the area of social competence, he must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, and respect for other people.

Course objective

To provide students with knowledge in the field of broadly understood ICT security as well as methods and tools used to estimate and control the risk of compromising confidentiality, integrity and data availability.

To acquaint students with advanced methods, techniques and tools used in solving complex engineering tasks in the area of designing and maintaining network systems responsible for the security of transmitting data.

Course-related learning outcomes

Knowledge

A student has structured and theoretically founded general knowledge related to key issues in the field of IoT including sensors and hardware platforms.

A student has advanced detailed knowledge of integrating selected sensors with hardware platforms (Raspberry Pi, Arduino, Intel Edison).

A student has knowledge of development trends and the most important new achievements of IT and telecommunications in the field of IoT systems, Wireless Sensor Networks and hardware platforms used in these systems.

Skills

A student can obtain information on the selection of sensors for the implementation of the assumed functions of IoT systems and IoT devices. The obtained information (in Polish and English), student is able to integrate and subsequently subject it to critical evaluation.

A student is able to plan and conduct tests in the field of measuring and testing IoT devices, interpret the obtained results and draw conclusions.

A student is able to use experimental methods to formulate and solve engineering tasks and simple research problems in the area of IoT.

A student is able to integrate knowledge from various areas of computer science and telecommunications when formulating and solving engineering tasks related to the design and implementation of IoT systems.

A student is able to assess usefulness of using new hardware and software solutions for solving engineering tasks, consisting in building efficient IoT systems.

Social competences

A student understands that IoT systems integrate several technologies and knowledge and skills in the field of IoT security become obsolete very quickly.

A student understands the importance of using the latest knowledge in the field of IoT in solving research and practical problems.

A student is aware of the need for a professional approach to solving IoT problems and taking responsibility for the projects she/he proposes.

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 an oral and / or written test.

Test issues, on the basis of which questions are developed, are sent to students via e-mail using the university's e-mail system.

An oral and / or written test consists of 3 to 5 questions for which a descriptive answer is expected. Each answer to the question is rated on a scale of 0 to 5 points. Each question is scored equally. Passing threshold: 50% of points.

In the case of the oral test, students draw questions from a set of 30 questions. In the case of a written test, questions are asked by a lecturer.

The skills acquired during the laboratory classes are verified on an ongoing basis. At each laboratory class, the correctness of the exercises is assessed on a scale from 2 to 5. The final grade is the average of the grades obtained from individual laboratory classes. The final grade is the average of the grades obtained from each laboratory session.

Programme content

Lecture topics:

- Internet of Things (IoT) - applications, systems, devices, sensors.

- Principles of operation of selected sensors used in IoT.

- Overview of selected IoT hardware platforms.

- Connectivity / communication of IoT devices (network technologies).

- Data processing in IoT systems (Big data / Cloud Computing / Fog processing).

- Internet of Things security.

Laboratory topics:

- Using Arduino to retrieve information about environmental parameters (temperature sensors, fororesistors, etc.)

- Emergency stop of the production process in response to environmental alarms (Raspberry PI, JSON, MongoDB).

- Using Packet Tracer to test solutions in the field of smart cities and networks (smart grids).

- Prototyping and testing of smart home installations using Packet Tracer (Python, Single Board Computer, smartphone / tablet, router, door opening sensor, etc.)

- Smile-sensitive smart camera (Raspberry PI, Raspberry PI camera, Python, machine learning)

- Intrusion Prevention System (IPS) configuration.

- Testing the vulnerability of simple IoT solutions (Sensor-Actuator System, IFTTT) in the field of ICT security

Teaching methods

Lectures: multimedia presentations, illustrated with examples given on the blackboard.

Laboratory exercises: practical exercises in groups with the use of hardware platforms.

Bibliography

Basic

1. Dominique Guinard, Vlad Trifa: Building the Web of Things, Manning Publications, June 2016. ISBN 9781617292682.

2. Jerzy Kluczewski: Internet rzeczy IoT i IoE w symulatorze Cisco Packet Tracer. Praktyczne przykłady i ćwiczenia. Seria Packet Tracer, Wydawnictwo iTstart, 2018.

Additional

1. Amita Kapoor: Hands-On Artificial Intelligence for IoT: Expert machine learning and deep learning techniques for developing smarter IoT systems, Packt Publishing, 2019.

2. Colin Dow: Mastering IoT, Packt Publishing, 2019. EAN: 9781838645434

3. Marcin Sikorski, Adam Roman: Internet Rzeczy, Wydawnictwo Naukowe PWN 2020. ISBN: 9788301208400

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	32	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	18	1,0

[1] delete or add other activities as appropriate