COURSE DESCRIPTION CARD - SYLLABUS

Course name
Applications for mobile devices [S1Elmob1>PO3-AnUM]

Course

Field of study
Electromobility

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

A student starting this course should have basic knowledge of mathematics, computer science and programming languages, as well as the ability to work in a laboratory group.

Course objective

Expanding knowledge on the systems of the Internet of Things. Learning the basics of programming mobile devices. Understanding the classification and detailed requirements for Industry 4.0. Getting to know the basics of building base stations and measuring and measuring systems. Acquiring practical skills in designing and programming of things and mobile internet devices.

Course-related learning outcomes

Knowledge:
1. The student knows about the newest trends in programming mobile devices.
2. The student has knowledge of the Internet of Things devices.
3. The student has knowledge of the industry 4.0.
4. The student has knowledge of the synthesis of mobile devices and the Internet of Things.

Skills:
1. The student is able to use the appropriate methods and tools, including advanced information and communication techniques, in order to program a mobile device.
2. The student knows how to develop simple applications for the Internet of Things.
3. The student is able to carry out simple simulations and analyzes of Industry 4.0 systems.

Social competences:
1. The student understands that the knowledge of programming, Internet of Things devices and industry 4.0 is necessary in the work of an engineer.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
the knowledge acquired during the lecture is verified during the written exam during the exam session and the partial test on the Moodle platform. The exam consists of open questions, scored depending on the difficulty level. Points from the partial test are added to the points obtained in the exam. Passing threshold: 50% of the total number of points. Exam issues are sent to the head of the year by e-mail using the university e-mail system 2-3 weeks before the exam date and discussed during the last lecture.
Laboratory:
The skills acquired during the laboratory exercises are verified on the basis of reports made by students at home after the exercises. Exercises are held in 4 cycles. Each cycle ends with a final test which checks the knowledge of students acquired during the exercises. During the laboratory classes, verbal preparation of students for the exercise is verified. Passing the laboratory classes requires the completion of all exercises, individual completion of the reports indicated by the teacher and passing tests.

Programme content

Principles of programming mobile devices. Permissions in mobile systems, access to data, access to peripherals. Basic security for mobile devices.

Course topics

Lecture:
Principles of programming mobile devices, concepts of processes and concurrency. Permissions in mobile systems, access to data, access to peripherals. Construction of the Internet of Things system: components, sensors, gates, etc. Real-time systems. Communication methods in the Internet of Things systems. Proven security for mobile devices and the Internet of Things
Laboratory:
The issues covered are related to:
- UI programming techniques in the Android SDK
- processes in the Android system
- data storage and access
- access to the Internet and network services
- support for device functions, notifications and alarms in Android
- real-time system and IoT
- IoT components (sensors, gates, microcontrollers, embedded systems, etc. - the principles of operation, construction of these devices will be discussed)
- examples of ways to communicate with IoT devices
- IoT network communication protocols (MQTT, Rabbit)
- data acquisition and processing and dockers
- processing and presentation of results - user interfaces
- IoT security (encryption, data confidentiality, data integrity, vulnerability to network attacks)
- Internet of Things and cloud services.

Teaching methods

Lecture: multimedia presentation (including: drawings, photos, animations, films) supplemented with examples given on the board, especially computational ones. Taking into account various aspects of the issues presented, including: economic, ecological, legal and social. Presenting a new topic preceded by a

reminder of related content, known to students from other subjects,
Laboratory: performing laboratory exercises in teams (preparation of the stand, building measuring systems, performing experiments) with the help and supervision of the teacher.

Bibliography

Basic:
1. Building the Internet of Things, Maciej Kranz, John Wiley & Sons, 2016.
2. Precision - Principles, Practices and Solutions for the Internet of Thing, Timothy Chou, 2016
3. Designing Connected Products: UX for the Consumer Internet of Things, Claire Rowland, Martin Charlier, Alfred Lui, Elizabeth Goodman, Ann Light, O'REILLY, 2016.
4. Learning Internet of Things, Peter Waher, PACKT, 2015.
5. Android Programming for Beginners, John Horton, PACKT, 2015.
6. Android Cookbook: Problems and Solutions for Android Developers, Ian Darwin, John Wiley & Sons, 2011.
7. Programming Android: Java Programming for the New Generation of Mobile Devices, Zigurd R. Mednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura, 2011.

Additional:
1. Internet of Things A to Z: Technologies and Applications, Qusay F. Hassan, Wiley, 2018.
2. Android 9 Development Cookbook: Over 100 Recipes and Solutions to Solve the Most Common Problems Faced by Android Developers, 3rd Edition, Rick Boyer, 2018.
3. Digital distributed controller operating within the Internet of Things, Michał Krystkowiak, Mariusz Świderski, Poznan University of Technology Academic Journals, Electrical Engineering, 2016, Issue 88, pp. 165-174.

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