COURSE DESCRIPTION CARD - SYLLABUS

Course name

PO4: Advanced control systems in electromobility - Programmable Logic Devices

Course

Field of study

Electromobility

Year/Semester

3/5

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Basic knowledge of programming in high-level languages. Basic knowledge of digital electronics and techniques with signal processing introduction.

Course objective

The aim of the course is to learn about the construction, programming methods and typical applications of programmable logic circuits in fast control field.

The aim of the classes conducted as part of the lecture is to teach the student how to use the device description language, on the example of the VHDL language, for designing digital circuits. The basics of the language as well as complex digital systems are presented. In the laboratory, students get acquainted with the commercial Intel Quartus and Xilinx Vivado packages, which allow to create a digital

control system design, perform its behavioral and time simulation, as well as synthesis, implementation into a programmable structure. After completing education, the student should be able to design and program fast control systems with digital procesing.

Course-related learning outcomes

Knowledge

Student has a structured and theoretically underpinned general knowledge in the field of computer science key issues for electromobility, including programming and the use of IT tools in modeling, simulation and design.

Skills

Student is able to use literature sources, integrate the obtained information, evaluate it and interpret it and draw conclusions in order to solve complex and unusual problems in the field of electromobility.

Can use properly selected methods and tools, including advanced information and communication techniques, as well as develop simple applications in order to simulate, analyze and design systems appropriate for the field of study.

On the basis of technical documentation, using the appropriate methods, tools and materials, is able to make and start up typical systems and electrical and electronic devices used in electromobility.

Social competences

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

Understands the importance of knowledge in solving problems in the field of electromobility; is aware of the necessity to use the knowledge of experts when solving engineering tasks beyond their own competences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: A written/oral exam of a problem-design character is the pass of the lecture.

Laboratory: Passing laboratory exercises requires the implementation of the indicated exercises and ongoing evaluation of the progress and result of their implementation.

Programme content

Classification and area of application of electronic programmable systems.

Selected programmable elements from such manufacturers as Altera, Xilinx.

Components functional elements of PAL, GAL, PLD, CPLD, FPGA circuits.

Methods of programming digital circuits.

Subtwork of programming digital circuits in VHDL language.

Complex elements of the VHDL language and libraries.

Construction of own microprocessor with a specific architecture and list of operations.

Laboratory and project exercises illustrate the issues discussed in the lectures, and focus mainly on solving programming problems.

Teaching methods

Lecture: blackboard examples and multimedia presentations with elements of hardware experiments

Laboratory: Experiments on laboratory stands, final study of the selected problem

Bibliography

Basic

M. Zwoliński: Projektowanie układów cyfrowych z wykorzystaniem języka VHDL.

K.L.Short, VHDL for engineers

Additional

T . Łuba, B . Zbierzchowski: Komputerowe projektowanie układów cyfrowych.

K.Skahill, VHDL language

J. Kalisz (red.): Język VHDL w praktyce.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	20	0,5

[1] delete or add other activities as appropriate