COURSE DESCRIPTION CARD - SYLLABUS

Course name
Power electronics and microprocessor technique

Course

Field of study
Energetics
Area of study (specialization)

Level of study
First-cycle studies
Form of study
part-time

Year/Semester
3/6
Profile of study
general academic
Course offered in
polish
Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
20	10	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Prerequisites

Knowledge - Knowledge in mathematics, computer science and electronics at the level of the second year of first-cycle studies.

Skills - The ability to effectively self-study in a field related to the chosen field of study; ability to make the right decisions when solving simple tasks and formulating problems in the field of widely understood electrical engineering.

Competences - The student is aware of expanding their competences, shows readiness to work

in a team, the ability to comply with the rules in force during lecture and laboratory classes.

Course objective

Familiarizing with the architecture and programming principles of microprocessor systems and the principles of their cooperation with external devices - at the basic level.

Course-related learning outcomes

Knowledge

1. Has advanced knowledge in mathematics, including knowledge of algebra, analysis, probability and elements of analytical geometry, including mathematical methods and numerical methods necessary to: 1) describe and analyze the operation of electrical, mechanical, analog and digital components and systems, and also basic physical phenomena occurring in them; 2) description and analysis of energy systems operation; 3) mathematical description of physical and chemical processes, including continuous and discrete energy processes [K1_W01].
2. Has knowledge of the basics of telecommunications, analog and digital data transmission in wired and wireless channels; knows the areas of their application in the field of energy [K1_W16].
3. Has ordered knowledge of the theory of electrical, electronic and power electronic circuits, as well as the theory of signals and methods of their processing; knows and understands the connections between theoretical issues and real objects [K1_W17].

Skills

1. Is able to obtain information from literature, databases and other sources; is able to integrate the information obtained, interpret it, as well as to infer and formulate and substantiate opinions [K1_U01].
2. Can work individually and in a team; knows how to estimate the time needed to complete the task; is able to develop and implement a work schedule ensuring deadlines [K1_U02].
3. Is able to use known analytical, simulation and experimental methods and mathematical models, as well as computer simulations to analyze and evaluate the operation of energy elements and systems [K1_U07].
4. Is able to plan and carry out experiments including computer measurements and simulations as well as construct an algorithm and use properly selected programming environments, simulators and tools of computer-aided design for simulation, design and verification of power elements and systems as well as simple electronic systems and automation [K1_U09].
5. Is able to design simple energy systems and systems for various applications and make a preliminary economic assessment of the proposed solutions and undertaken engineering activities [K1_U12].

Social competences

Is ready to think and act in an entrepreneurial manner [K1_K05].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

Assessment of knowledge and skills demonstrated during the written test-problem exam - based on the number of points obtained.

Laboratory

1. Continuous assessment, rewarding the increase in the ability to use known principles and methods,

2. Assessment of knowledge and skills related to the exercise, evaluation of the exercise report.

Getting extra points for activity during classes, especially for:

- proposing to discuss additional aspects of the issue,

- effectiveness of applying the acquired knowledge while solving a given problem,

- ability to work within a team that practically performs a specific task in a laboratory,

- comments related to the improvement of teaching materials,

- continuous assessment, rewarding activity and substantive content of the statement.

Programme content

Architecture and instruction list of microcomputer systems of the INTEL MCS51 family. Design and development tools for controllers of the MCS51 family. Advanced microcontrollers derived from the MCS51 family. Architecture, instruction list and microcontroller startup tools with ARM core - on the example of a selected family of systems. Support for selected I / O systems on the structure of microcomputer systems. The essence of digital analog signal processing. Types and division of digital signal processors (DSP). Signal processor architecture based on the Analog Devices Inc. family of floating-point processors ADSP-21000 family. Permanent and floating point arithmetic. Basic algorithms of signal processing in real time. Design and development tools for DSP.

Teaching methods

1. Lecture with multimedia presentation (diagrams, formulas, definitions, etc.) supplemented by the content of the board.
2. Laboratory exercises: multimedia presentation, presentation illustrated with examples given on a blackboard, and performance of tasks given by the teacher - practical exercises.

Bibliography

Basic

1. T. Starecki, Mikrokontrolery 8051 w praktyce, Wydawnictwo BTC, W-wa, 2002.

2. P. Hadam, Projektowanie systemów mikroprocesorowych, Wydawnictwo BTC, W-wa, 2004.

3. J. Doliński, Mikrokontrolery AVR w praktyce", Wyd. BTC, W-wa 2003.

4. R. G. Lyons, Wprowadzenie do cyfrowego przetwarzania sygnałów, Wyd. II, WKŁ, W-wa, 2010.

5. A. Dąbrowski, Przetwarzanie sygnałów przy użyciu procesorów sygnałowych, Wydawnictwo Politechniki Poznańskiej, Poznań, 2000.

Additional

1. T.P. Zieliński, Cyfrowe przetwarzanie sygnałów. Od teorii do zastosowań, Wyd. II, WKŁ, W-wa, 2014.

2. Technical documentation of microprocessors/microcontrollers and their application notes as well as educational materials - available on selected company websites.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	35	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation of laboratory report, preparation for exam)[1]	55	2,0

[1] delete or add other activities as appropriate