COURSE DESCRIPTION CARD - SYLLABUS

Course name
Signal processors

Course

Field of study
Electrical engineering

Year/Semester
2/3

Area of study (specialization)
Microprocessor Control Systems in Electrical Engineering

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	
Tutorials	Projects/seminars	
	15	

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
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Prerequisites

Knowledge in the field of analogue and digital electronics and the ability to design numerical algorithms and program microprocessor systems at the first-cycle level.

Course objective

Familiarization with the architecture and applications of digital signal processors. Acquiring skills to design algorithms of digital signal processing in real time. The acquisition of programming skills of digital signal processors based on a selected runtime environment.

Course-related learning outcomes

Knowledge

1. Has in-depth, ordered and theoretically founded knowledge in the field of electrical circuit analysis; has advanced knowledge about discrete circuits and methods of electric binary synthesis [K2_W06].

2. Has expanded knowledge in the field of high-level programming using elements of object-oriented programming [K2_W07].

3. Has in-depth knowledge of the construction and design of complex electrical systems, in particular measuring and control systems, knows the basic processes occurring in the life cycle of technical systems [K2_W08].

Skills

1. Is able to design and manufacture electrical systems and systems for various applications [K2_U13].

2. Is able - when formulating and solving unusual engineering tasks and simple research problems - apply a system approach, take into account non-technical aspects, use information and communication methods and tools [K2_U15].

Social competences

Recognizes the importance of knowledge in solving cognitive and practical problems and understands that in technology knowledge and skills are quickly becoming obsolete, and therefore require continuous replenishment [K2_K01].

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.

Project

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

2. Assessment of knowledge and skills related to the implementation of the project.

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.

Common methods for projects and the laboratory

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.

Programme content

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. Fixed and floating point arithmetic. Z transformation and its applications. Designing of digital filtration algorithms (FIR, IIR) and signal spectrum analysis (DFT, FFT). Cooperation of the signal processor with external systems. Process of initializing the processor. List of orders. DSP applications for real-time signal processing. Design and startup tools. Construction of a microcomputer system based on DSP.

Teaching methods

1. Lecture with multimedia presentation (diagrams, formulas, definitions, etc.) supplemented by the content of the board.

2. Projects and laboratory exercises: multimedia presentation, presentation illustrated with examples given on the board and performance of tasks given by the teacher - practical exercises.

Bibliography

Basic

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

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

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

4. P. Barański, Przekształcenie Z. Zastosowania w filtracji cyfrowej sygnałów. Zbiór zadań., Wydawnictwo Politechniki Łódzkiej, 2014.

Additional

1. W. Kester, The Data Conversion Handbook, Elsevier, 2005.

2. Technical documentation of signal processors and their application notes as well as educational materials - available on company websites: Analog Devices/Linear Technology, Texas Instruments.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	70	3,0
Student's own work (literature studies, preparation for laboratories and project, report preparation, project preparation, preparation for exam) [1]	55	2,0

[1] delete or add other activities as appropriate