

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Cyfrowe przetwarzanie sygnałów 2**
 Name in English: **Digital signal processing 2**
 Main field of study (if applicable): **Industrial Control Engineering**
 Specialization (if applicable):
 Level and form of studies: **1st level, full-time**
 Kind of subject: **obligatory**
 Subject code: **APR011311**
 Group of courses: **NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|--|---------|---------|------------|----------------------|---------|
| Number of hours of organized classes in University (ZZU): | | | | 30 | |
| Number of hours of total student workload (CNPS): | | | | 60 | |
| Form of crediting: | | | | crediting with grade | |
| For group of courses mark (X) final course: | | | | | |
| Number of ECTS points: | | | | 2 | |
| including number of ECTS points for practical (P) classes : | | | | 2 | |
| including number of ECTS points for direct teacher-student contact (BK) classes: | | | | 1.40 | |

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Mathematical knowledge of Laplace and Fourier transforms.
2. The basic ability to programming in C

SUBJECT OBJECTIVES

- C1. Project and implementation of simple digital systems.
 C2. Signal processors programming.
 C3. Effective working in groups, focused on creativity and collaboration.

SUBJECT LEARNING OUTCOMES*relating to knowledge:**relating to skills:*

- PEU_U01 Able to be used mathematical tools in programming environments for the description and analysis of digital signal processing problems.
 PEU_U02 Able to design and implement the correct algorithms for digital signal processor.

relating to social competences:

- PEU_K01 Has a aware of the responsibility for their own work in a group, realizes the rules teamwork.

PROGRAMME CONTENT

| Form of classes - project | | Number of hours: |
|---------------------------|---|------------------|
| Proj 1 | Students on the following classes, perform preparatory projects in the introductory digital signal processing topics. The purpose of these projects is an introduction to programming in a digital signal processor environment, and practical implementation issues presented during the lecture. These include: sampling methods, signal processing in real-time, generation of discrete signals, spectral analysis using the fast Fourier transform and digital filtering. | 14 |
| Proj 2 | Students using the skills developed during the preparatory projects, implement a complex application for digital signal processor. Work is to design the application, its implementation, and verification of digital signal processor operation in real conditions. | 14 |
| Proj 3 | Summary and evaluation of project work. | 2 |
| Total hours: | | 30 |

TEACHING TOOLS USED

- N1. Project works using computer equipment.
N2. Project work in laboratory on stands with signal processors and measuring equipment.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

| Evaluation <i>F - forming (during semester)</i> <i>P - concluding (at semester end)</i> | Educational effect number | Way of evaluating educational effect achievement |
|--|----------------------------------|---|
| F1(P) | PEU_U01 | Evaluation for preparatory projects. |
| F2(P) | PEU_U02 PEU_K01 | Evaluation for final project. |
| P(P) | $1/3 \cdot F1 + 2/3 \cdot F2$ | |

PRIMARY AND SECONDARY LITERATURE**PRIMARY LITERATURE:**

- [1] T. P. Zieliński „Cyfrowe przetwarzanie sygnałów”, 2005
- [2] A. V. Oppenheim, R. W. Schaffer „Cyfrowe przetwarzanie sygnałów” 1989
- [3] R. G. Lyons „Wprowadzenie do cyfrowego przetwarzania sygnałów” 1999

SECONDARY LITERATURE:

- [1] G. Marven, G. Ewers „Zarys cyfrowego przetwarzania sygnałów” 1999
- [2] W. Brodziewicz, K. Jaszcak „Cyfrowe przetwarzanie sygnałów” 1987
- [3] R. Gabel, R. Roberts „Sygnały i systemy liniowe” 1978
- [4] K. Steiglitz „Wstęp do systemów dyskretnych” 1977

SUBJECT SUPERVISOR

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