COURSE DESCRIPTION CARD - SYLLABUS

Course name
Digital signal processing [S1Teleinf1>CPS]

Course

Field of study
Teleinformatics

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

prof. dr hab. inż. Ryszard Stasiński
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Lecturers

Prerequisites

Discrete systems and signals analysis, digital filter design, fast Fourier transform and its applications

Course objective

Discrete systems and signals analysis, digital filter design, fast Fourier transform and its applications.

Course-related learning outcomes

Knowledge:
Competent analysis of digital signals and systems using mathematical and programistic techniques.
Ability to design digital filters.

Skills:
Knowledge about systems and signals analysis: z transform, and Fourier transform, knowledge how to design digital filters, knowledge how to use fast Fourier transform for fast convolution computation and for spectral analysis of signals.

Social competences:

Knows how to present results of digital signals, or systems analysis.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture: final exam, 10 questions for 1 point each, passing level - 5.1 point. Exercises: correctly done lab exercises, correctly written reports, and knowledge verification, 2 colloquia.

Programme content

1. Comparison of analog and digital techniques of signal processing. Signal sampling, sampling theorem, quantization.
2. Basic properties of digital systems, linear time-invariant (LTI) systems.
3. z transform.
4. Discrete time Fourier transform and Discrete Fourier transform.
5. Recapitulation of LTI systems description methods.
6. Digital filters structures, efects of their coefficients quantization.
7. FIR filters design (window technique, equiripple filters, frequency domain design).
8. IIR filters design (impulse response invariance method, bilinear transform).
9. Fast Fourier transform.
10. Fast computation of convolution and correlation
11. Non-parametric methods of spectrum estimation.

LABORATORY
1. Sampling, interpolation and reconstruction of signal
2. Estimation of probability density, and estimation of autocorrelation function
3. Quantization error estimation
4. Difference equations
5. DFT properties
6. Transfer function - block diagrams of discrete systems
7. FIR filter design
8. IIR filter design
9. Introduction to psychoacoustics
10. Introduction to generation of acoustics effects
11. Influence of LTI systems on spectra of signals
12. Using digital signal processor to signal filtration

Course topics

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Teaching methods

Lecture - presentation, exercises using lab kits

Bibliography

Basic:
T. Zieliński "Cyfrowe Przetwarzanie sygnałów - od teorii do zastosowań", WKŁ, 2005

Additional:
1. C. Lyons "Wstęp do cyfrowego przetwarzania sygnałów", WKŁ, 2009
2. Cyfrowe Przetwarzanie Sygnałów, A.V. Openheim, R.W. Schafer, WKŁ, Warszawa, 1982
Breakdown of average student's workload
Hours ECTS
Total workload 116 4.0
Classes requiring direct contact with the teacher 60 2.0
Student’s own work (preparation for tests, preparation for laboratory 56 2.0
classes, literature studies)

Breakdown of average student's workload

	Hours	ECTS
Total workload	116	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	56	2,00