COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of signal, systems and information theory

Course

Field of study	Year/Semester
Management Engineering	3/5
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	Polish
Form of study	Requirements
full-time	elective

Number of hours

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

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Knowledge: Basic issues of algebra, probability theory, computer science, information technologies.

Skills: Basic ability to conduct computer calculations and simulations.

Social competences: Student is aware of the importance of the engineer's knowledge of digital signal processing algorithms in modern ICT systems.

Course objective

Introduction to the basics of recording, conversion and analysis of digital signals.

Course-related learning outcomes

Knowledge

1. Student knows the analog-to-digital conversion process [P6S_WG_16]

2. interprets the frequency characteristics of signals [P6S_WG_16]

3. knows the ideas of lossless and lossy compression [P6S_WG_17]

4. knows what is the process of data encryption and correction [P6S_WG_17].

Skills

1. is able to make a critical analysis of the representation of signals and their parameterization [P6S_UW_13]

2. can identify the design requirements of digital signal processing systems [P6S_UW_14]

3. is able to apply typical methods of information processing in compression, encryption and data correction [P6S_UW_15].

Social competences

1. consciously explains the advisability of using digital techniques [P6S_KO_02]

2. is aware of the need to choose the right coding techniques [P6S_KR_01].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Final test (45 min). The test consists of 8 test questions and 3 calculation tasks. Passing threshold 50%.

Laboratory: Class reports. Passing threshold 50%.

Programme content

Lecture: parameters of deterministic and random signals, discretization of analog signals, frequency analysis of signals, DFT and FFT algorithms, linear systems, information theory, entropy coding, dictionary coding, DCT transformation, lossy compression, encryption and data correction.

Laboratory: introduction to Matlab environment, sampling and quantization process, signal filtering, lossless coding, lossy coding, data encryption.

Teaching methods

1. Lecture: multimedia presentation

2. Laboratory classes: simulation experiments in the Matlab / Simulink environment.

Bibliography

Basic

1. T. P. Zieliński, Cyfrowe przetwarzanie sygnałów - Od teorii do zastosowań, WKŁ, Warszawa, wydanie 2, 2009

2. S. W. Smith, Cyfrowe przetwarzanie sygnałów - Praktyczny poradnik dla inżynierów i naukowców, Wydawnictwo BTC, Warszawa, 2007

3. T. Marciniak, Przetwarzanie sygnałów i informacji -taskbook, available on-line from the author's website, 2020

4. A. Dąbrowski, P. Figlak, R. Gołębiewski, T. Marciniak, Przetwarzanie sygnałów przy użyciu procesorów sygnałowych, Wydawnictwo PP, Poznań, wydanie 3, 2000.

Additional

1. MitOpenCourseWare, Massachusetts Institute of Technology, http://ocw.mit.edu/ (courses: 6.011 "Introduction to Communication, Control, and Signal Processing", 6.003 "Signals and Systems").

2. A. Przelaskowski, Kompresja danych. Podstawy. Metody bezstratne. Kodery obrazów, Wydawnictwo BTC, 2005.

Breakdown of average student's workload

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

[1] delete or add other activities as appropriate