POZNAN UNIVERSITY OF TECHNOLOGY

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Signals and Systems [S1Teleinf1>SiS]

Course

Field of study	Year/Semester
Teleinformatics	2/3
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	30	0
Tutorials	Projects/seminars	
15	0	

Number of credit points
6,00

Coordinators

dr hab. inż. Damian Karwowski
damian.karwowski@put.poznan.pl

Lecturers

Prerequisites

A student has knowledge in the field of mathematics, in particular, demonstrate knowledge of differential and integral calculus. In addition, student must have the ability to acquire knowledge from the indicated sources and understand the need to expand their competences.

Course objective

1. Give students basic knowledge in the field of: theory of one-dimensional signals, description of linear systems in the field of time and frequency. 2. Developing students with the ability to solve basic problems of analysis of deterministic signals and signal transmission problems by LTI systems. 3. Developing students in the skills of acquiring knowledge in the field of signals and transmission of signals in LTI systems.

Course-related learning outcomes

Knowledge:
As a result of the conducted classes, the student:
1. Can solve typical problems related to the analysis of deterministic signals.
2. Can solve typical tasks related to signal transmission through LTI circuits.

Skills:
As a result of the conducted classes, the student:
1. Has knowledge of the theory of one-dimensional signals. Can determine and interpret selected parameters of deterministic signals.
2. Knows and understands the concepts of the description of linear systems in the time and frequency domains.

Social competences:
The student knows the limitations of his own knowledge and understands the need to update it. It is open to the possibility of continuous training and improvement of professional, personal and social competences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Final exam grade:
In the field of lectures, verification of the assumed learning outcomes is carried out by an exam. The exam concerns the content presented in the lecture. During the exam, students answer the questions posed. In order to receive a grade of 3.0, it is necessary to obtain at least half of the possible points.
Final grade from the classes:
In terms of exercises, verification of the assumed learning outcomes is carried out through tests. In order to receive a grade of 3.0, it is necessary to obtain at least half of the possible points.
Final grade from laboratory classes:
In the field of laboratory classes, verification of the assumed learning outcomes is carried out through tests and / or reports. In order to receive a grade of 3.0, it is necessary to obtain at least half of the possible points.

Programme content

Classes within the module are conducted in the form of lectures, exercises and laboratory exercises.
PROGRAM CONTENT
1. The concept of a signal. Classification of signals (deterministic, stochastic, continuous, discrete, quantized signals).
2. Selected properties and parameters of signals (constant and variable components of the signal, mean value of the signal, energy and signal power, RMS value).
3. Analysis of periodic signals (the concept of orthogonal series, trigonometric Fourier series, complex Fourier series, spectrum of a periodic signal, selected features of the signal spectrum, Gibbs effect, Parseval theorem).
4. Analysis of non-periodic signals (Fourier transform and its properties, selected theorems on Fourier transform, Parseval theorem for Fourier transform).
5. Linear circuits (LTI) and signal transmission through LTI circuits (impulse response of a linear system, linear convolution and convolution theorems, transfer function of the LTI system, response of the LTI system to an input signal).
6. Frequency characteristics of LTI circuits. Ideal filters (amplitude and phase characteristics of a linear system, characteristics of ideal filters: low-pass, high-pass, bandpass filters).
7. Description of systems in the operator space.
8. Stability of linear systems (zeros and poles of transmittance of the system, BIBO stability and minimal phase of the systems).
9. Automatic control systems and nonlinear systems.
10. Discrete signals (signal definition, frequency representation of a discrete signal, signal sampling and its reconstruction from a series of samples, Shannon's sampling theorem).

Course topics

Teaching methods

1. Lecture: Content presented on a board/multimedia projector complemented by examples of

accounting tasks.
2. Auditory exercises: Solving accounting tasks.
3. Laboratory exercises: Solving technical problems using a computer.

Bibliography

Basic:
1. J. Szabatin, Podstawy teorii sygnałów, WKiŁ, 2007.

Additional:
1. J. Wojciechowski, Sygnały i Systemy, WKiŁ, 2008.
2. K. Snopek, J. Wojciechowski, Sygnały i systemy. Zbiór zadań, O.Wyd. PW, 2009.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	79	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	71	3,00