COURSE DESCRIPTION CARD - SYLLABUS

Course name
Data processing and transmission [N2Trans1-TrD>PiTD]

Course

Field of study
Transport

Year/Semester
1/1

Area of study (specialization)
Road Transport

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
9

Laboratory classes
18

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

KNOWLEDGE: The student has basic knowledge of information technology provided in the program of the first-cycle studies. SKILLS: The student is able to use modern electronic communication tools at a basic level, uses office applications. SOCIAL COMPETENCES: The student is aware of the globalization and intensification of information processing and exchange in social and economic life

Course objective

Acquainting with the problems and existing IT solutions in the field of data transmission and processing. Developing the ability to optimize the use of technology and computer tools, taking into account the effectiveness of the created solutions, economic aspects and design assumptions.

Course-related learning outcomes

Knowledge:
Knows advanced methods, techniques and tools used in solving complex engineering tasks and conducting research in a selected area of transport
Has advanced detailed knowledge of selected issues in the field of transport engineering
Has a knowledge of the codes of ethics related to scientific and research work in the field of transport

engineering

Skills:
Is able to use information and communication techniques used in the implementation of projects in the field of transport
Is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems
Is able to - using, among others conceptually new methods - solve complex tasks in the field of transport engineering, including atypical tasks and tasks with a research component

Social competences:
Is aware of and understands that in the field of transport engineering, knowledge and skills very quickly become obsolete
Is aware of and understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems
Is aware of and understands the importance of popularizing the latest achievements in the field of transport engineering

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Assessment of student activity during laboratory classes; assessment of the degree of implementation of laboratory tasks on the basis of the submitted reports and generated result files.
Assessment taking into account the activity of students during lectures and a test of the material studied (checking the understanding of basic concepts and knowledge of the issues covered by the program of the course).

Programme content

Basic concepts of information theory: byte structure, character coding, source coding, error detection, information redundancy and methods of its elimination based on the Huffman algorithm; the laboratory exercises include the implementation of a few simple tasks on the basis of a spreadsheet and Matlab system (including familiarization with the system) illustrating the concepts and algorithms presented.
Signal properties: basic concepts, Fourier series, filtration, communication channel; laboratory classes illustrate the concepts introduced: students identify ways of coding data and information.
Speed of transmission and signaling: basic modulation methods, hybrid modulations, multi-state signaling, noise, the idea of trellis coding, Viterbi algorithm; During the laboratory classes, test modulations and demodulations of signals are carried out, the basics of modeling and simulation of logic systems as well as the construction and simulation of data processing algorithms are introduced.
Communication protocols: asynchronous and synchronous protocols. detection and correction of errors in transmission, levels of data redundancy versus the security and reliability of transmission systems, cyclic redundancy CRC.
Computer networks: wide area networks and local networks, open standards, the basics of TCP / IP protocol operation, IP address, netmask, gateway, broadcast addresses, rules of route selection; As part of the laboratory classes, a model will be constructed to facilitate the understanding of the essence of the concepts introduced during the lecture for the end user of network systems.
Input data correctness: algorithms for ensuring input data correctness. Automatic data input systems based on barcodes (1D and 2D) and RFID technology (active and passive); As part of the laboratory classes, a database system will be constructed to handle and print barcodes in the Code 39 standard.
Automation of data processing based on macro commands and VBA language. Integration of your own algorithm designs with websites such as Google API. As part of the laboratory classes, a simple system will be built to integrate the selected API with its own spreadsheet.

Course topics

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Teaching methods

Lecture with multimedia presentation
Laboratories - creating solutions to illustrate the issues discussed during lectures using simple (spreadsheet) and advanced data processing systems (Matlab)

Bibliography

Basic
1. Simmonds A.: Wprowadzenie do transmisji danych. WKŁ, 1999.
2. Lyons R.G.: Wprowadzenie do cyfrowego przetwarzania sygnałów. WKŁ, 2010.
3. Szapiro T. (red.), Decyzje menedżerskie z Excelem. Wydawnictwo PWE, Warszawa 2000
Additional
1. Tanenbaum A.S.: Sieci komputerowe. Helion, 2004/10.
2. Leyland V.: EDI Elektroniczna wymiana dokumentacji. WNT, Warszawa 1995.

Breakdown of average student's workload

	Hours	ECTS
Total workload	57	3,00
Classes requiring direct contact with the teacher	27	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00