

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Data processing and Transmission		Code 1010612311010612217
Field of study Transport	Profile of study (general academic, practical) general academic	Year /Semester 1 / 1
Elective path/specialty Road Transport	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 1 Classes: - Laboratory: 2 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: dr inż. Waldemar Walerjańczyk email: waldemar.walerjanczyk@put.poznan.pl tel. 61 665 2273 Maszyn Roboczych i Transportu ul. Piotrowo 3, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of computer science and information technology, as for all graduates of Transportation (first degree).
2	Skills	Student is able to effectively use basic office software and components of modern communication systems.
3	Social competencies	Student is aware of the market globalization and the intensification of the information flows and processing in social and economic life.
Assumptions and objectives of the course: Acquainting with existing IT solutions and issues in data transmission and processing. Increasing the ability for optimal use of computer technology in data processing with regards to effectiveness of developed solutions, economic aspects and design assumptions.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Knows basic criteria and methods of selecting technological solutions for data transmission - [K1A_W06, K1A_W16, K1A_W17]		
2. Knows limitations and capabilities of commercially available systems for data processing and transmission - [K1A_W06, K1A_W16, K1A_W17]		
3. Knows a wide range of simple and flexible tools for data processing - [K1A_W06, K1A_W16, K1A_W17]		
4. Knows the basic operation of transmission systems in transportation - [K1A_W06, K1A_W16, K1A_W17]		
5. Knows principles of design and coding of data processing algorithms - [K1A_W06, K1A_W16, K1A_W17]		
Skills:		
1. Solves basic computational problems with the use of a spreadsheet - [K1A_U01-02, K1A_U13, K1A_U17]		
2. Knows how to model and implement a simple database systems with the use of a spreadsheet - [K1A_U01-02, K1A_U13, K1A_U17]		
3. Knows how to design and formalize a simple data processing algorithms - [K1A_U01-02, K1A_U13, K1A_U17]		
4. Knows how to choose solutions for optimal data transmission according to the application assumptions - [K1A_U01-02, K1A_U13, K1A_U17]		
5. Knows how to analyze connectivity issues, depending on the transmission medium - [K1A_U01-02, K1A_U13, K1A_U17]		
Social competencies:		

1. Is aware of the dynamics of data processing systems development and its impact on life - [K1A_K01]
2. Is able to to develop his knowledge and adapt it to changing technology - [K1A_K03]
3. High level of mastered techniques and tools helps in interdisciplinary communication - [K1A_K04]

Assessment methods of study outcomes		
Partial evaluation: assessment of the student activity during lectures and individual assessment of the laboratory tasks based on activity and reports. Final evaluation: - average rating taking into account assessment of the student activity during lectures and a written final test - average rating taking into account student's activity in the laboratory classes and partial grades.		
Course description		
Basics of the information theory: bits and bytes, character encoding, source coding, error detection, redundancy of information and methods of its elimination based on the Huffman algorithm. The laboratory is provided for the solution of a few simple tasks based on a spreadsheet and Matlab system (with introduction to the system) to illustrate introduced concepts and algorithms. Properties of signals: basic concepts, Fourier series, filtering, communication channel. Laboratory classes illustrate introduced concepts: students synthesize required waveforms, perform spectral analysis, filtering, identify ways of encoding data and information. Bit rate and signaling rate: basic methods of modulation, hybrid modulation, multi-state signaling, noise, the idea of trellis coding, Viterbi algorithm. During laboratory classes modulation and demodulation of signals, modeling and simulation of basic logic circuits and simulations of data processing algorithms are carried. Communication protocols: asynchronous and synchronous protocols. Detection and correction of errors in transmission, data redundancy for security and reliability of transmission systems. CRC - cyclic redundancy check. Computer Networks: Local and wide area networks, open standards, basics of TCP/IP protocol, IP addressing, route selection rules. During laboratory classes students will construct a spreadsheet based system to assist local network IP parameters calculations. Verification of input data: verification algorithms, automatic data input systems based on barcodes (1D and 2D) and RFID (active and passive). During laboratory classes database system will be designed and implemented to handle and print barcodes in chosen standard. Transmission media: twisted pair, coaxial cable, fiber optics, radio transmission in different bands. Pros and cons of the various transmission media, errors in selection and implementation of transmission systems.		
Basic bibliography:		
1. Simmonds A.: Wprowadzenie do transmisji danych. WKŁ, 1999. 2. Lyons R.G.: Wprowadzenie do cyfrowego przetwarzania sygnałów. WKŁ, 1999. 3. Szapiro T. (red.), Decyzje menedżerskie z Excelem. Wydawnictwo PWE, Warszawa 2000.		
Additional bibliography:		
1. Tanenbaum A.S.: Sieci komputerowe. Helion, 2004/10. 2. Leyland V.: EDI Elektroniczna wymiana dokumentacji. WNT, Warszawa 1995. 3. Narkiewicz J. : GPS. Budowa, działanie, zastosowanie. WKŁ, Warszawa 2007.		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation for the lecture	2	
2. Participation in the lecture	15	
3. Learning of lecture content	4	
4. Consultations	2	
5. Preparation for the exam	8	
6. Participation in the exam	2	
7. Preparation for laboratory classes	5	
8. Participation for laboratory classes	30	
9. Preparation to pass the lab	10	
Student's workload		
Source of workload	hours	ECTS
Total workload	78	3
Contact hours	49	2

Practical activities	45	2
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