

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Information and coding theory		Code 1010802111010812261
Field of study Electronics and Telecommunications	Profile of study (general academic, practical) general academic	Year /Semester 1 / 1
Elective path/specialty -	Subject offered in: English	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: 2 Laboratory: - Project/seminars: -		No. of credits 5
Status of the course in the study program (Basic, major, other) major		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 5 100% 5 100%
Responsible for subject / lecturer: prof. dr hab. inż. Krzysztof Wesolowski email: wesolows@et.put.poznan.pl tel. 0616653812 Wydział Elektroniki i Telekomunikacji ul. Piotrowo 3A 60-965 Poznań		Responsible for subject / lecturer: prof. dr hab. inż. Krzysztof Wesolowski email: wesolows@et.put.poznan.pl tel. 0616653812 Wydział Elektroniki i Telekomunikacji ul. Piotrowo 3A 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	K1_W15 (partially) - Knows the principle of operation of digital transmission systems K1_W17 - Has a detailed, systematic knowledge, together with necessary mathematical background, of the fundamentals of the telecommunication theory, which is necessary to understand, analyze and evaluate the operation of digital telecommunications systems. K1_W01 Has a systematic knowledge of mathematical analysis, algebra and theory of probability
2	Skills	K1_U01 - Is able to extract information from Polish or English language literature, databases and other sources. Is able to synthesize gathered information, draw conclusions, and justify opinions K1_U07 (partially) - Is able to use known mathematical analysis, algebra and theory of probability concepts to solve basic problems in electronics and telecommunication
3	Social competencies	K1_K01 - Is aware of the limitations of his/her current knowledge and skills; is committed to further self-study K1_K02 (partially) - Demonstrates responsibility and professionalism in solving technical problems. Is able to participate in collaborative projects;
Assumptions and objectives of the course: Learning of theoretical foundations of functioning of information systems, determining limits of particular functional blocks of information systems: source coding, channel coding, channel capacity; learning of basic detection rules and methods of protecting digital symbols blocks against errors		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has a systematic knowledge, together with the necessary mathematical background, related to information and coding theory - [K2_W05]		
2. Has in-depth knowledge of construction and operation of communication systems - [K2_W01]		
3. Has a systematic knowledge, with the necessary theoretical background, of optimization methods used in solving engineering problems in communication systems - [K2_W03]		
Skills:		
1. Is able to evaluate digital communication systems and compare it with theoretical limits - [K2_U15]		
2. Knows basic issues in channel coding - [K2_U15]		
3. Is aware of technical background of functioning of selected blocks in data transmission systems - [K2_U15]		
Social competencies:		

1. Is aware of necessity of professional approach to solving technical problems in telecommunications and of responsibility for the proposed technical solutions - [K2_K02]
2. Is aware of his/her responsibility for design of information systems and is aware of existing limitations - [K2_K06]
3. Is aware of the main challenges facing electronics and telecommunication in the 21st century. Is aware of the impact electronics and ICT systems and networks will have on the development of the information society - [K2_K07]

Assessment methods of study outcomes		
Egzamination from the course material, written completion of the excercises		
Course description		
<p>Model of information transmission, models of message sources, characterization of message sources, idea of entropy and its application in source characterization, source coding, limits of source coding, Huffman, Shannon-Faco and Lempel-Ziv coding, arithmetic coding, reliable information transfer through unreliable channels, channel models, notion of channel capacity, capacity calculations, idea of mutual information, meaning of channel coding in reaching the transmission rate close to the Shannon limit, Shannon theorem on reliable information transmission over unreliable channels, capacity of several kinds of channels.</p> <p>Basics in channel coding: code classification, parity check equations, parity check matrix, generation matrix, syndrome, generation polynomials, basic methods of block code decoding, description methods of convolutional codes, trellis diagram, Viterbi algorithm, convolutional code decoding, information on turbo-codes and LDPC codes</p>		
Basic bibliography:		
1. K. Wesolowski, Introduction to digital communication systems, Wiley, Chichester, 2009		
Additional bibliography:		
1. J. G. Proakis, Digital Communications, 4th or 5th edition, McGraw-Hill, 2000, 2008 2. T. M. Cover, J. A. Thomas, Elements of Information Theory, Wiley, 1991 3. D. MacKay, Information Theory, Inference and Learning Algorithms, Cambridge University Press, 2003		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	30	
2. Participation in problem excercises	30	
3. Literature studies of the given bibliography	20	
4. Self solving of problems related to information theory and channel coding	20	
5. Preparation to completion of the excercises	15	
6. Preparation for passing the examination	15	
7. Consulting with teachers	5	
8. Participation in exam and exercise test	5	
Student's workload		
Source of workload	hours	ECTS
Total workload	125	5
Contact hours	70	2
Practical activities	70	2