

Subject card

	Data-transmission Code Protection, PG_00048362							
Electronics and Telecommunications, Biomedical Engineering								
February 2026		Academic year of realisation of subject			2026/2027			
second-cycle studies		Subject group			Optional subject group Specialty subject group Subject group related to scientific research in the field of study			
Full-time studies		Mode of delivery		at the university				
2		·		Polish				
3		ECTS credits			3.0			
general academic profile		Assessment form			exam			
Department Of Teleinformation Networks -> Faculty Of Electronics Telecommunications And Informatics -> Wydziały Politechniki Gdańskiej								
Subject supervisor		dr inż. Mariusz Dzwonkowski						
Teachers		dr inż. Mariusz Dzwonkowski						
Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
Number of study hours	15.0	0.0	0.0	0.0		15.0	30	
E-learning hours inclu	ided: 0.0				+			
Learning activity			Participation in consultation hours		Self-study SUI		SUM	
Number of study hours 30		3.0		42.0		75		
Knowledge of basic error control codes used in communication systems, methods of describing, construction and protection capabilities against errors in communication channels.								
Course out	come	Subject outcome			Method of verification			
extent, the basic process occurring in the life cycle equipment, objects and t systems, as well as meth supporting processes an functions, specific to the			Student classifies, identifies and describes the most important error correction codes used in telecommunications, calculates quality characteristics for data transmission systems, solves issues of matching the right error correction code for specific noise channels.			[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
extent, to analyze the operation of components and systems related to the field of study, as well as to measure their parameters and study their technical characteristics, and to plan and carry out experiments related to the field of study, including computer simulations, interpret the obtained results and draw conclusions [K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and		describes the most important error correction codes used in telecommunications, calculates quality characteristics for data transmission systems, solves issues of matching the right error correction code for specific noise channels. Student classifies, identifies and describes the most important error correction codes used in telecommunications, calculates quality characteristics for data transmission systems, solves issues of matching the right error correction code for specific noise			[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation			
	second-cycle studies Full-time studies 2 3 general academic production of Telein Wydziały Politechniki Subject supervisor Teachers Lesson type Number of study hours E-learning hours include and protection capabile Course out [K7_W10] knows and understands, to an invextent, the basic production occurring in the life cequipment, objects a systems, as well as resupporting processes functions, specific to study [K7_U12] is able, to a extent, to analyze the components and systo the field of study, a measure their param study their technical characteristics, and to carry out experiment the field of study, incomponents and systo the field of study incomponents and systo the fi	February 2026 second-cycle studies Full-time studies 2 3 general academic profile Department Of Teleinformation Netw Wydziały Politechniki Gdańskiej Subject supervisor Teachers Lesson type Lecture Number of study hours E-learning hours included: 0.0 Learning activity Participation in classes includ plan Number of study hours Knowledge of basic error control codand protection capabilities against elemant of the cycle of equipment, objects and technical systems, as well as methods of supporting processes occurring in the life cycle of equipment, to analyze the operation of components and systems related to the field of study, as well as to measure their parameters and study their technical characteristics, and to plan and carry out experiments related to the field of study, including computer simulations, interpret the obtained results and draw conclusions [K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including components and systems related to the field of study, including components and systems related to the field of study, including components and systems related to the field of study, including theories, methods and complex	February 2026 Second-cycle studies Full-time studies Full-time studies Full-time studies Assessmer Department Of Teleinformation Networks -> Facult Wydziały Politechniki Gdańskiej Subject supervisor Teachers Lesson type Lecture Number of study hours E-learning hours included: 0.0 Learning activity Participation in didactic classes included in study plan Number of study hours Knowledge of basic error control codes used in cor and protection capabilities against errors in communication of components and systems related to the field of study, including computer simulations, interpret the obtained results and draw conclusions IK7_W03 knows and understands, to an increased extent, to analyze the operation of components and systems related to the field of study, including computer simulations, interpret the obtained results and draw conclusions IK7_W03 knows and understands, to an increased extent, the construction and operating principles of components simulations, interpret the obtained results and draw conclusions IK7_W03 knows and understands, to an increased extent, the construction and operating principles of components and sudy, including computer simulations, interpret the obtained results and draw conclusions IK7_W03 knows and understands, to an increased extent, the construction and operating principles of components and sudy, including theories, methods and complex related to the field of study, including theories, methods and complex related to the field of study, including theories, methods and complex related to the field of study, including theories, methods and complex related to the field of study, including theories, methods and complex related to the field of study, including theories, methods and complex related to the field of study, including theories, methods and complex related to the field of study including theories, methods and complex related to the field of study. 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Mariusz Dzwonkowski dr inż. Mariusz Dzwonkowski Lesson type Lecture Tutorial Laboratory Project Number of study hours E-learning hours included: 0.0 Learning activity Participation in didactic classes included in study plan Number of study hours Full-time studies Mode of delivery Language of instruction Assessment form Department Of Teleinformation Networks -> Faculty Of Electronics Teleo Wydziały Politechniki Gdańskiej Subject supervisor Teachers dr inż. Mariusz Dzwonkowski dr inż. Mariusz Dzwonkowski Dzwonkowski Dzwonkowski Dzwonkowski Project Number of study hours E-learning hours included: 0.0 Learning activity Participation in didactic classes included in study plan Number of study Roweld of basic error control codes used in communication systems, and protection capabilities against errors in communication systems, and protection capabilities against errors in communication systems, and protection capabilities against errors in communication systems, as well as methods of supporting processes and functions, specific to the field of study, sa well as to measure their parameters and study their technical characteristics, and to plan and functions, specific to the field of study, including computer simulations, interpret the obtained results and draw conclusions [K7_U12] is able, to an increased extent, the construction and toperating principles of components and systems related to the field of study, including computer simulations, interpret the obtained results and draw out experiments related to the field of study, including computer simulations, interpret the obtained results and draw out experiments related to the field of study, including computer simulations,	February 2026 Second-cycle studies Subject group Option Specia Subject Full-time studies Mode of delivery Language of instruction ECTS credits Subject group Option Specia Subject Full-time studies Mode of delivery Language of instruction Polish ECTS credits Subject group Option Specia Option Specia In Subject group Option Specia Subject group Option Specia Option Subject Option Specia Option Subject Option Subject Option Specia Option Subject Option Subject	February 2026 Second-cycle studies Subject group Optional subject group Specialty subject group relate research in the field of study, including omputer simulations, interpret the obtained results and draw conculsions [KT_VU12] is able, to an increased extent, the construction sand systems related to the field of study, including computer simulations, interpret the obtained results and draw conculsions (IKT_VU3] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including computer simulations, interpret the obtained results and draw concupred interiors. Subject subject group Optional subject group Specialty subject group subject group relate research in the field of study and the university subject group relate research in the field of study. Assessment of the interior special subject group relate research in the field of study, including once and protection capabilities against errors in communication specialty and subject group or lease and subject group or flate and subject group or flate and subject group or flate research in the field of study, including once and subject group relate research in the field of study, including once and subject group relate research in the flate or the field of study, including once and subject group relate research in the flate or the field of study, including once and subject group relate research in the flate or the fla	

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Subject contents	Introduction, classification of error control coding, block structure of communication system. Noise and errors in data transmission channels: additive and multiplicative noise. The use of error control codes: ARQ and FEC systems. Basic concepts related to information theory: code gain, codeword weight, Hamming distance, information content. Decoding methods: hard and soft decision decoder. Optimal correction decoding rule: maximum a'posteriori probability MAP decoder, maximum likelihood ML decoder. Classification of error control codes: block, convolutional, linear, cyclic, binary, non-binary, systematic, and non-systematic codes. Elements of algebra for the purposes of code theory: groups, rings, fields, finite fields and their extensions, matrix and polynomial representation of field elements, division of polynomials. Block Codes. Algebraic structures used in block codes, detection and correction capability of the code. Linear codes. Standard table of linear code, matrix representation of linear code, linear dual code, coding and decoding for linear block codes, Hamming bound. Examples of linear block codes: Hamming linear codes, LDPC codes. Basic modifications of linear codes: lengthening, shortening, extending, puncturing, augmenting, expurgating. Iterated and merged codes. Fixed weight code. Cyclic codes. Polynomial representation, polynomials generating cyclic codes, cyclic dual code, cyclic coding and decoding algorithm, matrix representation of cyclic codes. Examples of cyclic block codes: cyclic Hamming codes, maximum length codes, BCH codes, Reed-Solomon codes.						
Prerequisites	No requirements.						
and co-requisites		<u> </u>					
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade				
and cinteria	Seminar presentation	50.0%	40.0%				
	Exam	50.0% Lin S., Costello D. J., Error Contro	60.0%				
Recommended reading	Supplementary literature	Applications, Prentice-Hall 1983 Wesołowski K., Podstawy cyfrowych systemów telekomunikacyjnych, WKiŁ 2006 MacKay D. J.C., Information Theory, Inference, and Learning Algorithms, Cambridge University Press (2003) Siedler J., Systemy przesyłania informacji cyfrowych, Wydawnictwo Naukowo-Techniczne (1972)					
	eResources addresses	Adresy na platformie eNauczanie): :				
Example issues/ example questions/ tasks being completed	Define the types of errors based on the noise in communication channels. Compare ARQ and FEC systems. Classify error control codes. Encode information word using selected linear and cyclic codes. Decode a received word for selected linear and cyclic codes.						
Work placement	Not applicable						

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