GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Channel Coding in Radio Communication Systems, PG_00064099		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
Education level	second-cycle studies	Subject group	Optional subject group Specialty subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	English
Semester of study	3	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Radiocommunication Systems and Networks -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Andrzej Marczak	
	Teachers	dr inż. Andrzej Marczak	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	6.0	39.0	75

Subject objectives

The aim of the course is to familiarize students with the methods of channel coding.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W10] knows and understands, to an increased extent, the basic processes occurring in the life cycle of equipment, objects and technical systems, as well as methods of supporting processes and functions, specific to the field of study	The student knows the methods used in channel coding and channel decoding and basic assessment methods quality of data transmission.	[SW1] Assessment of factual knowledge
[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 selected specific issues - appropriate for the curriculum	The student knows and understands what role play individual blocks functional in encoders.	[SW1] Assessment of factual knowledge
[K7_U07] can apply advanced methods of process and function support, specific to the field of study	The student can use acquired knowledge regarding basic channel coding methods to understanding of operating methods practically used encoders	[SU1] Assessment of task fulfilment
[K7_U03] can design, according to required specifications, and make a complex device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	The student can perform simulation software work of channel coder.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

Subject contents

Course content – lecture
Application of cyclic codes in radiocommunication systems, examples of encoders and decoders. Convolutional coding, code description using generating functions and lattice graph. Correction ability of convolutional codes, free Hamming distance. Soft and hard-coding decoding of convolutional codes. Viterbi's algorithm. Computational complexity of the Viterbi algorithm. MAP decoding algorithm. Systematic and unsystematic convolutional codes. The use of convolutional codes in radiocommunication systems. Interleaving of code strings of convolutional codes. Excluding bits from convolutional code strings and their decoding, the impact of exclusion on correction capabilities. Turbocodes, work principle, correction abilities. Turbocodes in radiocommunication systems. Turbocode decoding. LDPC codes. Decoding LDPC codes.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
channel coding lecture	50.0%	50.0%
project	50.0%	50.0%

Recommended reading

Basic literature	P. Sweeney ERROR CONTROL CODING From Theory to Practice, Wiley 2002.
Supplementary literature	No requirements
eResources addresses	

Example issues/ example questions/ tasks being completed

Viterbi's algorithm.

Practical activites within the subject

Not applicable

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