GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Channel Coding in Radio Communication Systems, PG_00064028						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	February 2025		Academic year of realisation of subject	2025/2026			
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	Polish			
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						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Andrzej Marczak					
	Teachers	dr inż. Andrzej Marczak					
Lesson types and methods of instruction	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 channel coding methods.						

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 the role of individual functional blocks in encoders.	[SW1] Assessment of factual knowledge
	[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 is able to perform software simulating the work of channel coders.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	[K7_U07] can apply advanced methods of process and function support, specific to the field of study	The student is able to use the acquired knowledge of the basic methods of channel coding to understand the methods of operation of practically used coders.	[SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>Application of cyclic codes in radio communication systems. Examples of cyclic codes.

Convolutional encoding, encoder representation by generating function and trellis.

Correction capability of convolutional codes (CCs), free Hamming distance.

Soft and hard decoding of convolutional codes.

Viterbi algorithm. Computational complexity of Viterbi algorithm.

MAP decoding algorithm.

Systematic and nonsystematic CCs.

Application of CCs in radio communication systems

Interleaving for CCs.

Puncturing of CCs and their decoding, influence of puncturing on correction capabilities.

Turbocodes, principles of operation, correction capabilities.

Turbocodes in radio communication systems.

Turbo decoding.

Low density parity check (LDPC) codes.

Decoding of LDPC codes.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>channel coding lecture</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>project</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>P. Sweeney ERROR CONTROL CODING From Theory to Practice, Wiley 2002.</td></tr>
<tr><td>Supplementary literature</td><td>No reqiurements</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Viterbi algorithm.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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