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 2026	Academic year of realisation of subject	2026/2027
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 -> Wydziały Politechniki Gdańskiej

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_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
	[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.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[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_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

Subject contents	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.

Prerequisites and co-requisites			

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

Recommended reading	Basic literature	P. Sweeney ERROR CONTROL CODING From Theory to Practice, Wiley 2002.
	Supplementary literature	No reqiurements
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Viterbi algorithm.

Work placement	Not applicable

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