GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer-aided Simulation of Systems, PG_00048384		
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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Signals and Systems -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Roman Salamon	
	Teachers	prof. dr hab. inż. Roman Salamon	

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	4.0	16.0	50

Subject objectives	The aim of the course is to acquire by students the skills of computer simulation of the basic methods of signal processing in telecommunication and echolocation systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W04] knows and understands, to an increased extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or other elements or programmable devices specific to the field of study, and organization of work of systems using computers or such devices	He aggravates his programming skills in MATLAB environment performing simulation of the operation of selected telecommunications and echolocation systems, and examines their properties. He compares results of numerical calculations and theoretical predictions.	[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	Student describes methodology of computer simulation of systems. He examines functional schemes of systems and extracts their essential elements. He translates analogue mathematical description of system components into numerical algorithms.	[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	Is able to write a program in MATLAB environment performing simulates of the basic elements of the telecommunications system	[SU4] Assessment of ability to use methods and tools
[K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	Using the written program that simulates the functioning of the system can interpret the impact of individual technical parameters of the system on its operational parameters.	[SU1] Assessment of task fulfilment

Subject contents

Course content – lecture
1. Introduction.
2. Goals and techniques of CASS.
3. MATLAB environment as a tool of systems simulation.
4. Computer simulation methodology.
5. System functional model.
6. Algorithmization of system functions.
7. Presentation techniques of simulation results.
8. Generation of analog and digital signals.
9. Generation of noise.
10. Digital modeling of transmission losses in the channel.
11. Numeric determination of wave propagation trajectories.
12. Simulation of reverberation.
13. Numerical simulation of analog filters.
14. Sampling and a/d conversion.
15. Quadrature sampling of narrowband signals.
16. Digital filters design.
17. Filtration of signals used in real-time systems.
18. Simulation of detection in echolocation systems; correlation reception
19. Matched filtration in frequency domain.
20. Envelope detection.
21. Detection of sinusoidal signals with unknown frequency.
22. Demodulation of digital signals.
23. Demodulation of AM, FM, SSB and QAM signals

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm colloquium	60.0%	40.0%
Project	60.0%	60.0%

Recommended reading

Basic literature

1. Haykin S. Systemy telekominikacyjne, WKŁ Warszawa 1998
2. Skolnik M. Radar Handbook, McGraw-Hill, New York 1990
3. Salamon R. Systemy hydrolokacyjne, GTN Gdańsk 2006

	Supplementary literature	1. Oppenhiem A.V., Schafer R.W. Digital Signal Processing, Prentice Hall, Englewood Clifs 1975 2. Szabatin J. Podstawy teorii sygnałów, WKŁ Warszawa 1982
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Practical activites within the subject	Not applicable	

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