



Subject card

Subject name and code	Basics of Electroacoustics, PG_00048142						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2025/2026		
Education level	first-cycle studies		Subject group		Optional 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	4		Language of instruction		Polish		
Semester of study	7		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Signals and Systems -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Roman Salamon				
	Teachers		prof. dr hab. inż. Roman Salamon				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	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		3.0		42.0	75
Subject objectives	The aim of the course is to acquire by students the skills of vibration analysis of simple mechanical systems and knowledge of the working principles and parameters of speakers and microphones.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U03] can design, according to required specifications, and make a simple 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		Student describes and analyzes simple mechanical vibrating systems with lumped and distributed elements. He describes sound waves in air and gives their parameters. He classifies sources of acoustic wave and describes their radiation. He clarifies general principle of work of electro-acoustic transducers and performs their classification. He presents working principles and properties of sets of loudspeakers, and working principles and properties of microphones.		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W35] Knows the concepts of the technique of signal transmission, operation of telecommunications networks and multimedia services and the rules for providing them		Student learns the principles of operation and parameters of loudspeakers and microphones as elements of multimedia systems. Student performs measurements of parameters and characteristics of electroacoustic transducers and interprets the results.		[SW1] Assessment of factual knowledge		

Subject contents	1. Introduction 2. Elements of discrete mechanical circuits 3. Parallel and series connections of mechanical elements. 4. Differential equation of resonance mechanical circuit 5. Free vibrations of resonance circuits. 6. Electromechanical analogies 7. Forced vibrations, mechanical impedance 8. Differential equations of string and bar vibration 9. General solutions of differential equations of string and bar 10. Initial and boundary conditions. 11. Acoustic wave equation. 12. Acoustic pressure, particle velocity, impedance and intensity 13. Plane, cylindrical and spherical waves. 14. Logarithmic quantities in acoustics. 15. Reflection of acoustic plane and spherical waves on the planar boundary. 16. Absorption, scattering and refraction of sound. 17. Sources of sound, monopoles and dipoles. 18. Rayleigh integral. 19. Sound radiation of piston membrane, directivity function. 20. Directivity function of multiple sources, directivity index. 21. Radiation and mutual impedances.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	60.0%	35.0%
	Written exam	60.0%	65.0%
Recommended reading	Basic literature	A, Dobrucki: Przetworniki elektroakustyczne. WNT Warszawa 2007 R. Makarewicz: Dźwięk w środowisku. Ośrodek wydawnictw Naukowych. Poznań 1994	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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