

Subject card

Subject name and code	Applied Acoustics, PG_00210518						
Field of study	Informatics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Master's studies		Subject group				
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Stanisław Pogorzelski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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		0.0		20.0	50
Subject objectives	Gaining knowledge of the physical fundamentals of acoustic wave propagation, attenuation, and scattering in gaseous, liquid, and solid media. Understanding the operation of acoustic wave emission sources and acoustic systems for measuring physical environmental conditions. Gaining the ability to assemble and operate acoustic systems used in molecular acoustics, hydrogeoacoustics, room acoustics, ultrasonic flaw detection, medical ultrasonography, as well as clinical audiometry and phoniatrics. Gaining experience with modern methods of shaping the acoustic climate of rooms and the natural environment.						

Learning outcomes	Course outcome		
	Subject outcome		Method of verification
	[INFMU2_K02] knows the limits of his own knowledge and understands the need for further learning	Students can plan experimental studies in acoustics and ultrasound, select appropriate measurement methods and research equipment, and formulate and verify hypotheses regarding acoustic wave propagation processes and their applications in medical diagnostics, defectoscopy, materials science, and environmental research. Students will have a thorough understanding of the theoretical fundamentals of measurement equipment and systems used in acoustics and ultrasound, including electroacoustic transducers, acoustic field measurement systems, ultrasonic defectoscopy equipment, medical diagnostics, audiometry, phoniatrics, and hydro- and geoacoustic research. They will understand the principles of selecting measurement parameters, the limitations of the methods used, and the impact of experimental conditions on the quality and reliability of obtained results.	[SK4] test/exam - oral or written
	[INFMU2_K03] is ready to critically evaluate the knowledge and content received	Students will understand advanced concepts in acoustics and ultrasound, including the mechanisms of acoustic wave propagation in various media, their interactions with matter, and their applications in medical diagnostics, audiometry, phoniatrics, defectoscopy, and environmental research. They will understand the relationships between physical and biological processes used in modern acoustic techniques and will be familiar with current trends in the development of measurement and diagnostic methods based on acoustic waves.	[SK4] test/exam - oral or written
Subject contents	Sound Sources and Their Characteristics Equipment and Methods in Ultrasonic Sound Field Measurement Studying Physicochemical Properties of Mediums Using Acoustic Methods, Molecular Acoustics Ultrasonic Flaw Detection and Future Methods in Flaw Detection (Acoustic Emission, Sonoholography) Ultrasonic Diagnostics in Medicine Acoustic Phonetics in Speech Phoniatrics and Hearing Audiometry Other Applications of Ultrasonic Waves (Meters, Acousto-Optics) Active Applications of Ultrasound (Coagulation, Dispersion, Physico-Chemical Effects) Interior Acoustics (Modifying the Acoustic Properties of Interiors, Sound-Absorbing Materials and Structures) Ultrasound in Geophysical Research (Depth Profiling of Water Depth, Characteristics of Underwater Noise, Meteorological Probing of the Lower Atmosphere – Sodars)		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	100.0%

Recommended reading	Basic literature	1. J.Eysymont, M. Górka, A. Piotrowska, J. Bieniuk, Ultradźwięki w chemii, PWN, Warszawa, 1968. 2. J.Wehr, Pomiary Prędkości i Tłumienia Fal Ultradźwiękowych, PWN, Warszawa, 1972. 3. J.Obraz, Ultradźwięki w Technice Pomiarowej, WNT, Warszawa, 1983. 4. A.Matheson, Molecular Acoustics, Wiley, N.Y., 1973. 5. W.Mason, Physical Acoustics, tom I-XIV, Academic Press, N.Y., 1956-1979. 6. I.Malecki, Teoria Fal i Układów Akustycznych, PWN, Warszawa, 1964. 7. W.Nozdriew, N.Fedoriszczenko, Molekularna Akustika, Izdat. Wysszaja Szkoła, Moskwa, 1974. 8. J.Blitz, Fundamentals of Ultrasonics, Butterworths, London, 1963. 9. W.Schaaffs, Molekularakustik, Springer-Verlag, Berlin, 1963. 10. J.Matauszek, Technika Ultradźwięków, WNT, Warszawa, 1961. 11. Encyklopedia Fizyki Współczesnej, PWN, 1983, Akustyka, s. 639-678. 12. K. Ilmuszyńska, Diagnostyka Ultrasonograficzna, PZWL, Warszawa, 1980.
	Supplementary literature	1. L.Filipczyński, Z.Pawłowski, J.Wehr, Ultradźwiękowe metody badania materiałów, WNT, Warszawa, 1963. 2. H.Medwin, C.Clay, Acoustical Oceanography. Principles and Applications, Wiley, N.Y., 1976. 3. J.Sadowski, Akustyka Architektoniczna, PWN, Warszawa, 1976. 4. J.Fortuna, E.Kozaczka, Review of acoustical methods of probing the atmospheric boundary layer, Archives of Acoustics, 17, 453-510 (1992). 5. A.Kopel, Acousto-Optics, Marcel Dekker, NY, 1988. 6. Ł.M. Bekhovskich, Akustika Okieana, Nauka, Moscow, 1974. 7. B. Szczepankowski, Fonetyka akustyczna, audytywna i wizualna: wybrane zagadnienia, Wydawnictwo Uniwersytetu Warszawskiego, W-wa, 1985. 8. R. Tadeusiewicz, Sygnał mowy, WK i Ł, W-wa, 1988. 9. D. Ostaszewska, J. Tambor, Fonetyka i fonologia współczesnego języka polskiego, PWN, W-wa, 2001. 10. W. Jassem, Podstawy fonetyki akustycznej, W-wa, 1973.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Characteristics of the generation and reception of acoustic waves in media, acoustic methods for testing physicochemical properties, methods for acoustic detection of material defects, diagnostic ultrasonic methods in medicine, acoustic methods in testing the speech and hearing organs, active applications of ultrasonic sounds, shaping the acoustic climate of rooms and noise hazards, acoustics of natural environmental conditions.	
Work placement	Not applicable	

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