GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Sound Reinforcement, PG_00048321
Field of study	Electronics and Telecommunications

Date of commencement of studies	February 2024	Academic year of realisation of subject	2023/2024
Education level	second-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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	exam

Conducting unit	Department of Multimedia Systems -> Faculty of Electronics, Telecommunications and Informatics

Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Bożena Kostek
	Teachers	prof. dr hab. inż. Bożena Kostek dr inż. Piotr Odya

Lesson types and methods of instruction	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	4.0	16.0	50

Subject objectives	The aim of the course is to familiarize students with the room acoustics and sound reinforcement technology and knowledge transfer in the acoustic CADs.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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 issues related to the acoustic interior design (e.g. radio studios, auditoria, musical theaters, churches, etc.).	[SW1] Assessment of factual knowledge
	[K7_W02] Knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	The student knows issues related to the design of the public address systems using acoustic CADs (CATT-Acoustic and ODEON systems).	[SW1] Assessment of factual knowledge

Subject contents	1. Introduction. References. Fundamentals of Room Acoustics. 2. Sound Power, Sound Intensity, Sound Pressure, Dimensions of Sound. Sound Outdoors (Wave Propagation), Inverse Square Law. Sound Indoors (Wave Propagation) 3. Sound Reflection, Diffraction, Effects of Wind Velocity and Humidity On Sound Propagation. Absorption. Direct Path, Critical Distance, Room Constant. 4. Room Acoustics Modeling (Physical and Mathematical Models). Resonance and Room Modes. Absorption and Reflection Coefficients. 5. Reverberation Time Definitions and Formulae. Reverberation Time - Measurements. Ambient Noise. 6. Acoustic/Noise Isolation. Acoustic Isolation - Measurement. 7. Impulse Response Time-Based Parameters 8. Impulse Response Spatial Parameters 9. Speech Intelligibility (STI, RASTI), General Requirements 10. Norm Requirements In Terms of Room Acoustics. Recommendations For Background Noise. 11. Recommendations For Volume of A Room, Room Design, Volume-Per-Seat Values, etc. Recommendations For Reverberation Time and Speech Intelligibility 12. Reverberation Time Characteristics. Recommendations For Radio Studios Architecture Design and Volume 13. Recommendations For Ambient Noise, Sound Isolation For Radio Studios. Recommendations For Architectural Design and Volume of Recording Studios 14. Modeling of The Reverberation Time For Studios (Live End/Dead End). Acoustical Treatment - Diffusive, and Reflected Surfaces. Acoustical Treatment Absorbent and Soft Porous Surfaces, Absorp-tive Material 15. Sound Quality Criteria For Opera and Concert Halls 16. Objectivization of Subjective Room Quality Criteria Employing Beraneks Scale. Objectivization of Subjective Room Quality Criteria Employing Fuzzy Logic 17. Examples of Architectural Design of Interiors 18. Odeon System 19. CATT-Acoustic System 20. Exam - Part I 21. Sound Reinforcement Systems fundamentals, parameters 22. Sound Reinforcement Systems Architecture and Design 23. Ambience Systems – Conference Halls, Theaters and Auditory Halls 24. Signal Processing In Sound Reinforcement Systems 25. Design of Elements of Sound Reinforcement Systems – Large Halls 26. Design of Elements of Sound Reinforcement Systems – Small Interiors 27. Design of Elements of Sound Reinforcement Systems – Outdoors. Large Speaker Array Concept 28. Examples of Sound Reinforcement Systems - Auditory Rooms (Architecture and Design) 29. Examples of Sound Reinforcement Systems – Concert Hall (Architec-ture and Design) 30. Examples of Sound Reinforcement Systems – Classroom (Architecture and Design) 31. Modeling of Hall Room Acoustics Employing Acoustical CADs 32. Closing Remarks 33. Final Exam
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	50.0%	50.0%
	Written exam	50.0%	50.0%

Recommended reading	Basic literature	T. Hallman, New Factors in Sound for Cinema and Television, Journal AES, 39:7/8, p. 529, 1991. M. Tohyama, A. Suzuki, Reverberation Time in an Almost-Two-Dimensional Diffuse Field, J. Sound Vib., 111, 3, 391 -398 (1986). G. Davis, R. Jones, Sound Reinforcement Handbook, YAMAHA, Hal Leonard Publ. Corp., 1990. L.L. Beranek, Concert and Opera Halls. How they Sound, Acoust. Soc. Amer., (1996). Yamaha, Sound Reinforcement Application Guide, 2007 (http://www.yamaha.com/yamahavgn/Documents/News/2007_SR_APP_guide.pdf.) K. Blair Benson, Sound Engineering Handbook, McGraw Hill, New York, 1988; R. Glasgal, Ambiophonics: The Synthesis of Concert Hall Sound Fields in Home, Preprint No. 4113, 99th AES Convention, 6-9 October, New York 1995.
	Supplementary literature	No requirements
	eResources addresses	Adresy na platformie eNauczanie: Technika nagłaśniania - 2023/2024 - Moodle ID: 17196 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=17196

Example issues/ example questions/ tasks being completed	according to the lecture topics.
Work placement	Not applicable