GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electronic Musical Instruments, PG_00048141		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2028/2029
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	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department Of Multimedia Systems -> Faculty Of Electronics Telecommunications And Informatics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Grzegorz Szwoch	
	Teachers	dr hab. inż. Grzegorz Szwoch	

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	2.0	18.0	50

Subject objectives

This course teaches students about hardware and software electronic musical instruments. Various sound synthesis algorithms, used in commercial instruments, as well as sampling, are presented. Additional, related topics presented during the course are: MIDI standard, computer music tools and sound effects.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W03] knows and understands, to an advanced 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 how the algorithms for sound synthesis and sampling work.	[SW1] Assessment of factual knowledge
[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	The student is able to perform a digital sound synthesis process based on the learned synthesis algorithms. The student can build a virtual instrument based on sampling.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_U07] can apply methods of process and function support, specific to the field of study	The student knows how to modify a synthetic sound by choosing the right synthesis algorithm and by tuning its parameters.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>1. History of electronic musical instruments, basic ideas
2. Properties of musical signals, analysis and additive synthesis
3. Subtractive synthesis - modular analog synthesis
4. Hybrid wavetable synthesis, digital signal generators
5. Digital synthesis by frequency modulation (FM) and phase distortion (PD)
6. Sampling, samples and samplers
7. Physical instrument modellinh, waveguide synthesis.
8. MIDI in electronic musical instruments
9. Computer music software
10. Sound effects in electronic musical instruments</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Colloquium (final)</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Practical exercise</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Lecture presentations and other supplementary materials: http://sound.eti.pg.gda.pl/student/materialy.html

Instructions for laboratory classes: http://sound.eti.pg.gda.pl/student/laboratoria.html</td></tr>
<tr><td>Supplementary literature</td><td>Syntezatory. Poradnik dla każdego. Wydanie specjalne magazynu Estrada i Studio, AVT 2013.

Peter Kirn: Real World Digital Audio. Edycja polska. Helion 2007, ISBN: 83-246-0448-0

M. Russ: Sound Synthesis and Sampling. Focal Press, Oxford 1996.

Piotr Kołodziej: Komputerowe studio muzyczne i nie tylko. Przewodnik. Helion 2007, ISBN: 978-83-246-0727-3</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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