Bialystok University of Technology									
Field of study	**Computer Science**							**Degree level and programme type**	**Engineer's degree full-time programme**
Specialization/ diploma path	**---**							**Study profile**	academic
Course name	**Introduction to Machine Audition**							**Course code**	**FCS-00096**
								Course type	obligatory
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	**Semester**	1
	15				45			**No. of ECTS credits**	**6**
Entry requirements									
Course objectives	To introduce students to modern machine audition methods. Upon completion of this module students should be able to characterize selected methods and to implement them using high-level programming environments such as MATLAB or Python.								
Course content	Lectures 1. Machine audition – Key concepts and topic overview 2. Speech and speaker recognition 3. Music information retrieval: music genre recognition, harmony, rhythm, and timbre characterization; pitch detection 4. Automatic audio classification 5. Computational audio scene analysis, blind audio signals separation 6. Auditory cognition, emotions recognition 7. Automatic audio event localization Specialization workshop 1. Implementation of algorithms for conditioning and pre-processing of speech and audio signals 2. Implementation of an algorithm for audio feature extraction 3. Implementation of a selected algorithm from the domain of speech recognition, audio classification, music information retrieval, or emotions recognition 4. Implementation of a simple real-time audio analysis method								
Teaching methods	informative lecture, programming, demonstration, project method,								
Assessment method	Lecture: a test; Specialization workshop: a written report and oral defense of the computer-based projects								

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
E1	will be able to enumerate, characterize and compare the fundamental methods used in machine audition	K_W05 K_W10
E2	will be familiar with modern trends in machine audition. They will know the capabilities and limitations of the state-of-the art algorithms.	K_W05 K_W10
E3	will acquire fundamental skills in audio signal conditioning, processing and analysis.	K_U02 K_U04 K_U05 K_U06 K_U10
E4	will be able to implement audio feature extraction algorithms.	K_U02 K_U04 K_U05 K_U10
E5	will be able to implement selected machine audition algorithms using high-level programming environments (e.g. MATLAB, Python).	K_U02 K_U04 K_U05 K_U10
E6	will be able to implement simple real-time machine audition algorithms.	K_U02 K_U04 K_U05 K_U10

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
E1	Test	L
E2	Test	L
E3	Written reports and oral defense of the computer-based projects	Sw
E4	Written reports and oral defense of the computer-based projects	Sw
E5	Written reports and oral defense of the computer-based projects	Sw
E6	Written reports and oral defense of the computer-based projects	Sw

Student workload (in hours)	**No. of hours**
Calculation	
1 - Lecture attendance - 15 x 1	15
2 - Specialization workshops - 15 x 3	45
3 - Preparation for specialization workshops -	30
4 - Writing project reports -	40
5 - Self-study and preparations for the test -	15
6 - Tutorials -	5
TOTAL:	**150**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	65 (1)+(2)+(6)	2.6
Student workload – practical activities	130 (2)+(5)+(4)+(3)	5.2

Basic references	1. V. Pulkki, M. Karjalainen, Communication Acoustics : An Introduction to Speech, Audio and Psychoacoustics, John Wiley & Sons, 2015. 2. T. Giannakopoulos, A. Pikrakis, Introduction to Audio Analysis: A MATLAB Approach. Elsevier, 2014.
Supplementary references	1. Z. Raś and A. Wieczorkowska, Advances in Music Information Retrieval. Studies in Computational Intelligence, Springer-Verlag, Berlin, 2010. 2. A. Bregman, Auditory Scene Analysis. Cambridge: MIT Press, 1990.

Organisational unit conducting the course		Date of issuing the programme
Author of the programme	dr hab. inż. Sławomir Zieliński	Feb. 17, 2022

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW – field work,S – seminar

wydrukowane w programie **Swierk** , © 2013-2021 Cezary Bołdak