

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Communications and Information Technologies - Communications and Information Processing		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Speech communications		
Lecturer (for lectures)		Ćirić G. Dejan, Nikolić R. Jelena		
Lecturer/associate (for exercises)		Nikolić R. Jelena, Ćirić G. Dejan		
Lecturer/associate (for OFE)		Nikolić R. Jelena, Ćirić G. Dejan		
Number of ECTS	6	Course status (obligatory/elective)	Elective	
Prerequisites				
Introduction to basic speech communication elements and speech technologies, which includes speech generating, speech characteristics, analysis and processing of speech signals in time and frequency domain as well as perception and modelling of speech. Mastering software tools application for processing and analysis of speech signals. Speech signal characterization. Understanding algorithms for speech signal processing.				
Course objectives				
Theoretical knowledge in the field of speech generating, perception and processing. Skills of software tools application for analysis and processing of speech signals. Practical application of theoretical knowledge of speech technologies in speech and speaker recognition on an elementary level.				
Course outcomes				
Course outline				
Theoretical teaching				
Articulation, transmission and perception of speech, the nature and characteristics of speech (acoustical aspects, modelling of speech production and listening - linguistic modelling of speech,, acoustical modelling of speech). Articulatory and acoustical phonetics. Speech perception. Pre-processing of speech signals and extraction of relevant characteristics (features). Prosodical speech features. Time and frequency analysis of speech signals. Spectrogram analysis and LPC analysis. Acoustical and statistical characteristics of speech signals (vocals and consonants). Formant field application for identification of vocals. Speech intelligibility (objective measurements and subjective evaluations of acoustical characteristics of voice). Speech technologies: the chronology of development, terminology, perspectives. Speech technology applications.				
Practical teaching (exercises, OFE, study and research)				
The use of standard software tools for handling speech signals (Praat, Sound Forge, Adobe Audition). Modelling of speech generation. Speech acquisition in diverse environments, and analysis of environment effects. Pre-processing and processing of speech signals. Speech signal analysis and extraction of fundamental features. Speech features applications, for instance in speech recognition. Practical work with speech automated devices.				
Textbooks/references				
1	G. Fant: Speech acoustics and phonetics, Kluwer Academic Publishers, Dordrecht, Netherlands, 2004.			
2	J. Benesty, M. M. Sondhi, Y. Huang: Springer handbook of speech processing, Springer, Berlin, 2008.			
3	I. McLoughlin: Speech and audio processing: A Matlab based approach, Cambridge University Press, Cambridge, 2016.			
4	D. Yu, L. Deng: Automatic speech recognition: A deep learning approach, Springer, London, 2015.			
5	L. R. Rabiner, R. W. Schafer: Introduction to digital speech processing, Now Publishers Inc, Hanover, USA, 2007.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	2	0	0
Teaching methods				
Lectures; PowerPoint presentations; Calculation exercises; Laboratory exercises; Consultations.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures		5	Written exam	20
Exercises		30	Oral exam	30
Colloquia				
Projects		15		