COURSE DESCRIPTION

COURSE NAME	SPEECH TECHNOLOGY AND ELEMENTS OF FUZY LOGIC	CODE: ML2103

STUDY YEAR	MASTER II	SEMESTER	2	COURSE STATUS (**C**-compulsory/**OP**-optional/**F**-facultative)	C

HOURS PER WEEK				TOTAL HOURS PER SEMESTER	TOTAL HOURS INDIVIDUAL ACTIVITY	CREDITS	EVALUATION (**P**-during the semester, **C**-oral examination, **E**-written examination, **M**-mixed)	TEACHING LANGUAGE
C	S	L	Pr.					
2	-	2	-	56	184	8	M	English

COURSE TEACHER	TEACHING AND SCIENTIFIC DEGREE, FIRST NAME, LAST NAME	DEPARTMENT
	PROF. HORIA-NICOLAI TEODORESCU	Computer Science

PREVIOUS COURSES REQUESTED	Natural Languages; Formal languages and Automata

OBJECTIVES	• Acquiring background knowledge in acoustics, phonetics, and signal processing as related to speech technology • Acquiring basic knowledge Introduction in general, acoustical, and articulatory phonetics • Acquiring abilities to design applications for speech processing, synthesis and recognition
GENERAL DESCRIPTION	• Elements of acoustics, phonetics, and signal processing as related to speech technology • Introduction to signal processing: signals and their temporal and frequential characteristics, sampling and sampling theorem, Fourier transform, filtering, digital filters, harmonic signals, noises • Basic design of elementary signal processing modules • Voice signal features: pitch, formants, number of zero crossings, instantaneous power • Spectrum and spectrogram – "reading" and interpreting voice sounds • Design of basic modules for elementary signal features extraction • Prosody estimation; fuzzy logic approach • Statistical characterization of voice signals; HMM models • Speech synthesis principles • Speech recognition principles; fuzzy logic approach • Applications of speech technology: robotics, appliances, communications, gaming, medicine
DESCRIPTION OF SEMINARY / LABORATORY WORKS	• Performing voice recordings with various technical parameters and analyzing spectrograms and sonograms • Use of applications like WASP, GOLDWAVE, PRAAT for voice analysis • Interpretation of the waveforms of the vowel and consonant sounds (time domain analysis) • Vowels characterization – vowel triangle for the Romanian language – mini-project • Emotional voice analysis • Speech synthesis – various methods
TEACHING METHODS	Subject exposition on the board – theoretical issues, formula; hands-on demonstrations, exercises, free discussions in class

BIBLIOGRAPHY (SELECTION)	Lawrence R. Rabiner, Biing-Hwang Juang, Fundamentals of speech recognition. PTR Prentice Hall, 1993 - 507 pages Frederick Jelinek, Statistical methods for speech recognition. MIT Press, 1997. (free at Google Books) Sadaoki Furui, Digital speech processing, synthesis, and recognition. CRC Press, 2001 Li Deng, Douglas O'Shaughnessy, Speech processing: a dynamic and optimization-oriented approach. CRC Press, 2003 - 626 pages

EVALUATION		
	conditions	- participation in seminars and classes.
	criteria	- active participation in seminars and classes. - micro-project evaluation - design results
	evaluation methods	- micro-projects (uP): 60% - active class participation (Ac): 10% - final examination: 30%
	final result - formula	NF = 0,6*uP + 0,1*Ac + 0.3 E