

Speech & Voice Intelligent Processing

Teaching mode: Lectures and Lab works (Exercises)

Weekly hours: 4 (Lecture 2 hours, Laboratory 2 hours)

Credit points: 3

Prerequisites: 3rd year, Python programming

Instructors: Dr. Nava Shaked, Yury Yurchenko

Course Goals:

“**Speech & Voice Intelligent Processing**” is an advanced course which offers a practical and theoretical understanding of how human speech can be processed by computers. In this course, the students will be familiarized with modern tools, research and development and innovative technologies that used in the field of speech and voice intelligent processing nowadays.

Speech & Voice Intelligent Processing is a smart digital assistant to one of the basic disciplines, which today dominates in the IoT systems based on artificial intelligence (AI). In recent years it is also an essential component of any Human Machine interface as part of applications, IoT products, wearable and Robots. The new area called Conversational Interaction is growing demanding knowledge of Voice enabled software.

Course Description:

This course is designed for students wishing to understand how to process real data for real applications, applying statistical and machine learning techniques as well as working with limitations in the technology. This work will based on existing toolkits and SDK's.

In this course will teach modern algorithms of speech and audio coding and speech recognition. Lecture subjects will reinforced by computer tasks, using modern tools.

The areas we introduce are:

Speech recognition	Speech Synthesis	Speech Biometrics	Emotion	detection
Speech Analytics	Language Identification	Conversational Interaction		

The course covers:

1. Essential terms and definitions as well as theoretical issues such as Acoustics Phonetics and Linguistic levels.

2. Practical issues of processing and automations and implementation using processing and design tools such as PRAAT, TOBI, MATLAB,

3. Implementations with real companies SDK's developing speech products (in cooperation with startup companies). Google API's, API.AI, Watson, AWS

The final grade will be determined according to the following criteria

Course requirements	Requirements	Grade [%]
Laboratory exercises	Submission 4 Lab exercises during the semester	50 %
Final Project	Submission of a final project and oral presentation	50 %

Passing grade - 60

Mandatory attendance Lab exercises and presentations: 80%,

Comment: It includes automatic algorithms and methodologies for speech production, annotation and processing. This is part of the necessary education of any software designer ad CS graduate. In the current CS program it can be given as a basis for NLP course for 3rd year students. It will help facilitate to promote projects that require algorithms and software development with used the programming languages Java, Python, working with API's and Open source coding.

Bibliography:

1. Lawrence R. Rabiner and Ronald W. Schafer (2007), "[Introduction to Digital Speech Processing](#)", Foundations and Trends® in Signal Processing: Vol. 1: No. 1–2, 213 p
2. Benesty, J. Sondhi, M. Huang, Y. Eds. (2008) Handbook of Speech Processing, Springer Publishing.
3. Jurafsky, D. (2000). *Speech & language processing*. Pearson Education India.
4. Pieraccini, R. (2012). The Voice in the machine: Building Computers that understand Speech. MIT Press.
5. [List of relevant articles](#)