

ENG BE/EC 519. Speech Processing by Humans and Machines

Oded Ghitza, Biomedical Engineering

The goal of this course is to provide the basic concepts and theories of speech production, speech perception and speech signal processing, and their applications to contemporary speech technology. The course is organized in a manner that builds a strong foundation of basics, followed by a range of signal processing methods for representing and processing the speech signal.

Prerequisites:

General: A familiarity with signals and systems, including continuous-time and discrete-time frequency analysis, sampling and filtering theory. A basic familiarity with probability, including Bayes theory. A fluency with MATLAB.

Courses:

ENG BE 401 or ENG EC 401 (or equivalent)

ENG BE 200 or ENG EC 381 (or equivalent)

Course Schedule: Lecture, 4hrs/week

Textbook:

Theory and Applications of Digital Speech Processing (Rabiner and Schafer, 2011)

References:

Speech and Audio Signal Processing (Gold, Morgan and Ellis, 2011)

Acoustics of American English Speech (Olive, Greenwood and Coleman, 1993)

Course Topics:

<u>Week</u>	<u>Class</u>
01	Introduction to Speech Processing by Humans and Machines
02	Fundamentals of Digital Signal Processing
03	Fundamentals of Human Speech Production
04	Acoustic Properties of American English Speech
05	The Auditory Pathway
06	Fundamentals of Psychophysics
07	Speech Perception and Intelligibility
08	Time-Domain Methods for Speech Processing
09	Frequency-Domain Representations
10	The Cepstrum, Homomorphic and Linear Predictive Analysis of Speech
11	Speech Coding
12	Automatic Speech Recognition
13	Text-to-Speech Synthesis
14	Fundamentals of Natural Language Understanding