CENTRAL UNIVERSITY OF KERALA
DEPARTMENT OF COMPUTER SCIENCE
M.Sc. COMPUTER SCIENCE

ELECTIVE COURSE					
COURSE CODE	COURSE TITLE	CONTACT HRS/WEEK			CREDITS
		LEC	LAB	TUT	
CSC5002	Digital Speech Processing	2	2	1	4

Lec = Lecture, Tut = Tutorial, Lab = Practical

This is a participatory and experimental based course.

Course Objective:
  The objective of the course is to provide theoretical and practical aspects of digital speech processing.

By completing this course, students will obtain the following course outcomes:
1. Knowledge gained:
    (i)   State of art methods and algorithms for digital speech processing
2. Skill gained:
    (ii)   Skills in applying statistical approaches in digital speech processing
    (iii) Skills to develop voice modelling using python and MATLAB
3. Competency gained:
    (iv) Expertise in developing speech processing algorithms for real world applications

Prerequisites: Basic knowledge in signal processing

Grading:
    Lab implementation   – 12%
    Participatory based group Project   – 10%
    Assignment/Quiz/presentation   – 8%
    Class Test   – 10%
    Final Exam   – 60%

CSC5002 – Digital Speech Processing

Module 1
Introduction to Speech Recognition: Introduction-The Paradigm for Speech Recognition-History of Speech Recognition Research, The Speech Signal: Speech Production Mechanism, perception-Acoustic Phonetic Characterization and classification -The Speech Production Process-Representing speech in Time Frequency Domains-Speech Sounds and Features-Approaches to Automatic Speech Recognition by Machine

Module 2
Signal Processing and Analysis Methods for Speech Recognition: Introduction-The Bank of Filters Front End Processor, Linear Predictive Coding for Speech Recognition, Vector Quantization.

Module 3
Pattern Comparisons Techniques: Speech Detection, Distortion Measures – mathematical and perceptual consideration, Spectral Distortion Measures- Log Spectral Distance, Cepstral Distances, Spectral Distortion using a Warped Frequency Scale, Alternative Spectral Representations and Distortion Measures.

Module 4
Speech Recognition System Design and Implementation Issues: Template Training Methods – Casual Training, Robust Training, Clustering, Performance Analysis and Recognition Enhancements – Choice of Distortion Measures, Choice of clustering methods and k-NN Decision Rule, Incorporation of Energy Information, Effects of signal Analysis Parameters, Performance of Isolated Word Recognition System.

Text Book:
1.   Lawrence Rabiner, Biing-Hwang Juang, B Yegnanarayana, Fundamentals of Speech Recognition, Pearson, 2009.

References
2.   L.R. Rabiner and R.E Schafer, *Digital processing of speech signals*, Prentice Hall, 1978 (Digitized 2007)
3.   John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing* Principles, Pearson, 2006.