

Course Code	CSE/ECE-3xx/5xx		
Course Name	Speech Recognition and Understanding		
Credits	2		
Course Offered to	UG/PG		
Course Description	<p>This is an introductory course on Speech Recognition and Understanding offered to undergraduate and graduate students. The goal is to develop understanding of traditional as well as contemporary speech processing techniques and enable students to develop applications using existing tools. Students will be given theory and programming assignments targeted towards solving real-world speech recognition problems. Groups of two or three will do a course project and show a demonstration at the end of the semester.</p>		
Pre-requisites			
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)	
Signals & Systems	Digital Signal Processing	Python/Matlab programming	
	Machine Learning/Statistical Machine Learning (co-requisite)		
Post Conditions*(For suggestions on verbs please refer the second sheet)			
CO1	CO2	CO3	CO4
Describe fundamentals of speech production, distinguish between speaker dependent and independent components of speech and develop appropriate representations.	Model recognition problems using traditional (HMM+GMM) and advanced techniques (DNN) for automatic speech recognition (ASR).	Integrate language models with speech recognizers to develop specific and generic speech recognition applications.	Build Speech and Speaker Recognition Systems
Weekly Lecture Plan			
Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial
1	Introduction to speech processing		
	Review - DSP, Probability and Classification	CO1	HW-0 (ungraded - review)
2	Speech production fundamentals	CO1	
	Filter Banks, Spectrograms, Cepstrum and the Mel Scale	CO1	
3	Filter Banks, Spectrograms, Cepstrum and the Mel Scale	CO1	(Quiz 1), HW-1 (MFCC from scratch)
	MFCC feature representations of Speech	CO1	
4	GMM based acoustic modeling	CO1,CO2	Project Proposal
	Fundamentals of Speech Recognition	CO2, CO3	
5	Hidden Markov Models for Automatic Speech Recognition (ASR)	CO2, CO3	
	Language Models N-Gram	CO2, CO3	(Quiz 2), HW-2 (DTW/HMM based Recognition)
6	Deep Learning Models for ASR	CO2, CO3, CO4	
	End-to-End Speech Recognition	CO2, CO3, CO4	
7	Speaker Recognition	CO1, CO2, CO4	HW-3
	Overflow		
8	Exam		
Assessment Plan			
Type of Evaluation	% Contribution in Grade		
Assignment	40		
Quiz	20		
Mid-sem	20		
Project	20		
*Please insert more row for other type of Evaluation			
Resource Material			
Type	Title		
Textbook	Rabiner and Schafer, "Digital Processing of Speech Signals"		
Reference	Jurafsky, Martin, "Speech and Language Processing"		
Notes and references posted on course page			