



Course Specification

(Bachelor)

Course Title: **Digital Speech Processing**

Course Code: **CENX 460**

Program: **B.S. in Computer Engineering**

Department: **Department of Computer Engineering**

College: **College of Computer and Information Sciences**

Institution: **King Saud University**

Version: *Course Specification Version Number*

Last Revision Date: *Pick Revision Date.*

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A. General information about the course:

1. Course Identification

1. Credit hours: (1 hours)

2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others
B. ☐ Required ☒ Elective

3. Level/year at which this course is offered: (Level 9 and 10)

4. Course general Description:

Review of sampling theorem, filtering, and noise management; speech and language fundamentals; speech perception and production; tools for digitally processing speech signal: windowing, pre-emphasis, and framing; linear predictive coding; applications of digital speech processing such as speech recognition and synthesis.

5. Pre-requirements for this course (if any):

Digital Signal Processing, CENX 352

6. Co-requirements for this course (if any):

7. Course Main Objective(s):

The main purpose of this course is to make the students able to perform Fourier transform and z-transform in speech signal processing; identify and explain phonemes, classes of phonemes, symbols, semantic, and syllables of a language, especially for Arabic and English; illustrate hearing and auditory perception theory; analyze speech in short-time domain, especially using zero crossing and autocorrelation; perform homomorphic analysis of speech signal; extract speech features using linear predictive coding and Mel-frequency spectral coefficients; apply digital speech processing techniques to speech recognition and speech synthesis tasks.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 hours per week	100%
2	E-learning		
3	Hybrid - Traditional classroom - E-learning		
4	Distance learning		



3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe speech signal fundamentals.	1		
1.2	Apply Arabic/ English language essentials.	1		
...				
2.0	Skills			
2.1	Analyze and process speech data.	2		
2.2	Use Linear Predictive and MFCC models	2		
3.0	Values, autonomy, and responsibility			
3.1	Design and implement applications to digital speech processing	6		

C. Course Content

No	List of Topics	Contact Hours
1.	Speech signal fundamental	8
2.	Arabic/ English language essential	13
3.	Analysis of speech	13
4.	Linear Predictive Analysis and MFCC	13
5.	Application to Digital Speech Processing	8
6.	Review and evaluation	5

Total

60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Examination (1)	6	20%
2.	Midterm Examination (2)	12	20%
3.	Assignments and Quizzes	Bi-weekly	20%
4.	Final Exam	End	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- Introduction to Digital Speech Processing, NOW: The Essence of Knowledge, L. Rabiner and R. Schafer, 2007. - Digital Speech Processing, Synthesis, and Recognition, Sadaoki Furui, Marcel Dekker, Inc 2001.
Supportive References	
Electronic Materials	To be given as a state of the art handout
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with number of seats enough to accommodate enrolled students.
Technology equipment (projector, smart board, software)	Overhead projector with required software to facilitate presentations on smart board.
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Department Council	Course reports are evaluated by the Department Council.

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students assessment	Faculty-Peer Review	Final examination is moderated.
Quality of learning resources	Students	Indirect – Edu-gate survey.
The extent to which CLOs have been achieved	Students	Attainment level of every CLO is measured directly.
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

