هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Digital Signal Processing
Course Code:	CENX 352
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.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 hours)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 7)					
4. Course general Description:					
History and overview; sampling theorem, aliasing; sampled signals, periodic signals, non-periodic signals; impulse response and convolution; digital spectra analysis; discrete Fourier transform, fast Fourier transform; z-transform; digital filters, FIR and IIR filter design; windowing; effect of finite word length in digital signal processors; application in audio and image processing					
5. Pre-requirements for this course (if any)**:**					
CENX 351, Signals and Systems					
6. Co-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The course aims at providing an understanding of digital signal processing, the ability to understand and apply sampling theory and periodicity, the application of basic Fourier Transform (Discrete Fourier Transform DFT and Fast Fourier Transform FFT) and z-Transform, the ability to distinguish between, analyze, and design different types of digital filters including Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters, the application of digital signal processing methods to simple applications including audio and image signals.					

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 the sampling theorem and the spectra of a periodic signal.	**1**	**Lectures and Tutorials**	**Exams and Homework**
1.2	Describe a system in z-transform domain.	**1**	**Lectures and Tutorials**	**Exams and Homework**
2.0	**Skills**			
2.1	Determine the spectrum of a signal using the discrete Fourier transform (DFT) and the fast Fourier transform (FFT).	**2**	**Lectures and Tutorials**	**Exams and Homework**
2.2	Design and analyze digital filters that have specified frequency characteristics.	**2**	**Lectures and Tutorials**	**Exams and Homework**
3.0	**Values, autonomy, and responsibility**			
3.1	Design and implement applications of digital signal processing.	**6**	**Lectures and Tutorials**	**Exams and Homework**

C. Course Content

No	List of Topics	Contact Hours
1.	Sampling theory, quantization, and periodicity	**8**

2.	Fourier transform (DFT and FFT)	12
3.	z-Transform	8
4.	Digital filters	16
5.	Applications	12
6.	Review and evaluation	4
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.	Homework 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	L. Tan, Digital Signal Processing Fundamentals and Applications, 2008, Elsevier.
Supportive References	Oppenheim A. and Willsky A. with S. Nawab, Signals and Systems, 2nd Ed., 1997, Prentice Hall. John G. Proakis and Dimitries G. Manolakis, Digital Signal Processing - Principles, algorithms and applications, 4th Edition, 2007, Prentice Hall.
Electronic Materials	https://lms.ksu.edu.sa http://dspcourse.wordpress.com http://www.mathworks.com/help/pdf_doc/matlab/getstart.pdf http://www.mathworks.com/academia/student_center/tutorials/launchpad.html
Other Learning Materials	MATLAB Basics

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.

Items	Resources
Other equipment (depending on the nature of the specialty)	MATLAB installed on the presentation machine.

F. Assessment of Course Quality

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