311 CNE Course Syllabus

Course Code	311CNE
Course Name	Digital Signal Processing
Credit Hours	3
Contact Hours	4
Instructor Name	Dr. Mohammad Alshamri

Text Book (title, author, and year)
• Digital Signal Processing, Principles, Algorithms and Applications, J. Proakis, D Manolakis, 3rd Edition, Prentice Hall, 1996. • Digital Signal Processing, M. Hayes, McGraw-Hill, 1999.

Specific Course Information	
Catalog Description	This course introduces the students into discrete-time signal, their types and amplitude and time operations. Signal transformation from time domain to frequency domain is given using Fourier transforms and Z-transform. A brief introduction to digital filters is provided.
Prerequisites	Signals and Systems, CNE210.
Co-requisites	NIL
Required/Elective	required

Course Learning Outcomes	
1	To outline the mathematical skills for implementing basic DSP operations.
2	To characterize analytically and graphically a discrete-time sequence and explain the basic magnitude and time sequence handling methods.
3	To analyze a discrete-time sequence using the standard transformations DFS, DTFT, DFT, FFT and Z-Transform.
4	To conduct experiments for many standard transformations, and select the most effective one.
5	To explain the importance of DSP algorithms for many social and real life problems.
6	To operate DSP kit and simulation tools such as MATLAB in order to perform required analysis of discrete-time signal.
7	To demonstrate the team-work and ethical behavior of the students through small group assignments.
8	To develop professional and ethical skills for effectively handling DSP kit to solve specific discrete- time signal problems.

Mapping course LOs to the SLO.												
Course LOs #	Student Learning Outcomes											
	a1	a2	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
1	√											
2			√	√								
3			√	√								
4					√							
5						√						
6							√					
7								√				
8									√			

List of Theory Topics

Discrete Signals and their Operations Continuous and Discrete Time Signals, periodic signals, even and odd signals. Some important sequences: Sinusoidal sequences, unit step sequence, unit impulse sequence, real and complex exponential sequence. Amplitude scaling, shifting and inversion, time scaling, shifting and inversion,

Convolution and Correlation: discrete-time convolution and correlation.

Z-Transform: Introduction to Z-Transform and some of its properties. Discrete system representations and realizations

Fourier Transformation: Discrete Fourier Series representation for periodic sequences, Discrete Time Fourier Transform, Discrete Fourier Transform, Some properties of Discrete Fourier Transform, and Fast Fourier Transform

Digital Filters: Introduction to Digital filters, Finite Impulse Response Digital Filters

List of Lab Experiments

1. Generating basic digital signals using MATLAB signal processing toolbox.
2. Implementing amplitude and time operations on digital signals using MATLAB.
3. Implementing digital convolution and digital correlation using MATLAB.
4. Implementing z-transform and inverse z-transform using MATLAB
5. Implementing discrete Fourier series and inverse discrete Fourier series using MATLAB
6. Implementing discrete Fourier transform using and inverse DFT using MATLAB
7. Generating FIR impulse response using MATLAB