

Course Number and Title:	EE- 415 Digital Signal Processing		
Credit Hours:	3+1		
Pre Requisite	Signals and Systems		
Instructor (s):	Prof.Dr. Ahmad Khalil Khan		
Lab Engineer:			
Compulsory/Elective:	Elective		
If Elective:Depth Core/Breadth Core:	Depth Core		
Course Schedule:	Lecture:	3 hours/week	
	Lab:	3 hours/week	
	Office hours:	4 hours/week	
Course Assessment:	Assignments:	3	
	Quizzes:	3	
	Course project:	1	
	Lab work:	14 experiments	
	Exams:	Mid-semester and Final	
Grading Policy:	Quizzes:	10%	
	Assignments:	10%	
	Lab work:	20%	
	Mid-Semester:	20%	
	End-Semester:	40%	
Text Book:	A. V. Oppenheim and R. W. Schaffer, "Discrete-Time Signal Processing", 3rd Edition, Prentice Hall		
Reference Book(s):	John G. Proakis and Dimitris K. Manolakis, "Digital Signal Processing – Principles, Algorithms and Applications," 4th Edition, Prentice Hall. Sanjit K. Mitra, "Digital Signal Processing - A computer Based Approach", McGraw Hill, 2nd Edition.		
Course Objective:	This course aims to develop mathematical and analytical skills necessary to analyze digital signals both in time and frequency domains. From the system's perspective, the objective is to incorporate extensive design skills in the students enabling them to develop relevant prototypes with the desired level of accuracy.		
Course Learning Outcome	CLO Statement	PLO	Bloom
CLO-1:	Analyze the digital systems using z-Transform and Discrete Time Fourier Transform.	PLO-1	C4
CLO-2:	Analyze the discrete time signals and systems in the frequency domain using Discrete Fourier Transform and Fast Fourier Transform.	PLO-2	C4
CLO-3:	Design FIR and IIR filters using a variety of techniques.	PLO-2	C5
Topics covered in the course and level of coverage:	❖ Overview of Discrete-time systems	3 hours	
	❖ z-transform and its properties	3 hours	
	❖ Transform analysis of LTI systems	6 hours	
	❖ Filter designing techniques	9 hours	
	❖ Structures of discrete-time systems	6 hours	
	❖ Discrete Fourier Transform	9 hours	
	❖ Fast Fourier Transform	6 hours	

	❖ FIR and IIR Filter design										6 hours	
Program learning outcomes and how they are covered by specific course outcomes:	Detailed Contents										CLO	PLO
	Overview of Discrete-time systems										CLO-1	PLO-1
	z-transform and its properties										CLO-1	PLO-1
	Transform analysis of LTI systems										CLO-1	PLO-1
	Filter designing techniques										CLO-1	PLO-1
	Structures of discrete-time systems										CLO-1	PLO-1
	Sampling of continuous-time signals and changing the sampling rate										CLO-1	PLO-1
	Fast Fourier Transform										CLO-2	PLO-2
	Discrete Fourier Transform										CLO-2	PLO-2
	Design of FIR Filters										CLO-3	PLO-2
Design of IIR Filters										CLO-3	PLO-2	
Mapping of CLOs with PLOs and Bloom's Taxonomy Cognitive Levels:												
PLO	1	2	3	4	5	6	7	8	9	10	11	12
CLO-1	C4											
CLO-2		C4										
CLO-3		C5										
Mapping of CLOs with Assessment Methods:												
CLOs/Assessment	CLO-1			CLO-2			CLO-3					
Assignments:	√			√								
Quizzes:	√			√								
Lab work:							√					
Mid-Semester:	√											
End-Semester:				√			√					