

Branch Name:	Information and Communication Technology
Program Code:	ET107
Semester/Year:	Semester VII/ Fourth Year
Course Title:	Professional Elective -IV- Digital Signal Processing
Course Code:	2ET1070703T
Pre-requisite Course:	Linear algebra, Signals and systems, time-domain and frequency domain representation

Course Objective:

1. Design and implementation of digital signal processing building blocks such as FFT, digital filters, multirate systems, adaptive digital filters etc.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min	Max.	Mn	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction to Digital Signal Processing: Introduction and signification of DSP, convolution, correlation	5	10
2	Z-Transform and Analysis in Z-Domain: z-transform, inverse z-transform, properties of z-transform, analysis in z domain	6	15
3	Structures for Discrete-Time Systems: Block diagram and signal flow diagram representations of Linear Constant Coefficient Difference equations, Basic Structures of IIR Systems, Transposed forms, Basic structure of FIR	6	15
4	Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT): Discrete Fourier Transform (DFT) and its inverse, relation between Discrete Time Fourier Transform (DTFT) and DFT, properties of DFT, computational complexity of DFT, decimation-in-time FFT, decimation-in-frequency FFT	9	20
5	Digital Filter Design: Introduction to digital filters, choosing between FIR and IIR filters, digital filter design steps, key characteristics of FIR filters, Linear phase response and its implication, types of linear phase FIR filters, FIR filter design, FIR filter specifications, FIR coefficient calculation methods, Window method, basic features of IIR filters, design steps, specification, impulse invariance method, bilinear transformation method	10	25
6	Advanced concept in DSP: Concept of Multi-rate DSP, decimation, interpolation, concept of adaptive digital filter	6	10

7	General and special purpose hardware for DSP: computer architecture for signal processing such as pipelining, MAC etc	3	5
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List of References:

1. Digital signal processing: Principles, Algorithms & Applications by J. G. Proakis & D. G. Monalakis, PHI 4th edition 2007.
2. Discrete-time Signal Processing-Alan V. Oppenheim & R. W. Schaffer, PHI 3rd edition 2009.
3. Sanjit K. Mitra, Digital Signal processing, Tata McGraw- Hill 4th edition 2013.

E-Resources:

1. <https://archive.nptel.ac.in/courses/108/101/108101174/>
2. <https://github.com/openlists/DSPResources>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Formulate engineering problems in terms of DSP tasks	2 Understanding
CLO2	Analyze digital and analog signals and systems	2 Understanding 4 Analyze
CLO3	Analyze discrete time signals in frequency domain	3 Applying 4 Analyze
CLO4	Design digital filters	5 Synthesis

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes(POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	M	M	H	H	L				M		M	L	H	L	M	
CLO2	H	M		M	M							L	H	L	M	M
CLO3	H	M		L	L							L	H	M		M
CLO4	H	M	H	L	L						L	L	M	M		

H:High, M:Medium, L:Low