



**National Institute of Technology Meghalaya**  
An Institute of National Importance

**CURRICULUM**

Programme	Bachelor of Technology in Electronics and Communication Engineering	Year of Regulation	2018-19
Department	Electronics and Communication Engineering	Semester	V

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total

<b>EC 305</b>	<b>Digital Signal Processing</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>50</b>	<b>50</b>	<b>100</b>	<b>200</b>	
Course Objectives	To develop the student's ability to analyze discrete time signals and systems in the time domain and frequency domain.	Course Outcomes	CO1	Able to identify, formulate, and solve engineering problems in the area of signal processing.						
	To develop the student's ability to perform Discrete Fourier Transform (DFT) by using different types of Fast Fourier Transform algorithms.		CO2	Able to implement FFT algorithms for computing the DFT.						
	To develop student's ability to design FIR and IIR filter for various applications		CO3	Able to design and implementation of FIR and IIR filters.						
	To develop the student's ability to implement digital infinite Impulse Response (IIR) and Finite Impulse Response (FIR) filters.		CO4	Able to apply down and up sampling techniques in designing of advanced digital signal processing systems.						
	To understand the concepts of Multirate Signal Processing									

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1	CO1	3	3	1	1	-	-	-	-	-	-	-	-	3	-	3	-
2	CO2	3	3	2	2	-	-	-	-	-	-	-	-	2	2	2	-
3	CO3	3	3	3	3	-	-	-	-	-	-	-	2	2	-	2	-
4	CO4	3	3	3	3	-	-	-	-	-	-	-	2	2	2	2	-

**SYLLABUS**

No.	Content	Hours	Cos
I	<b>Review of Discrete-Time Signals and Systems:</b> Discrete - Time signals, systems and their classification, Analysis of Discrete - Time LTI systems: Impulse response, Difference equation, Frequency Response, Transfer Function, DTFT, DTFS and Z-transform.	<b>04</b>	<b>CO1</b>
II	<b>Fast Fourier Transform:</b> Introduction, Direct Evolution Of DFT, The Fast Fourier Transform, Decimation-In-Time Algorithm, Summary Of Steps Of Radix-2 DIT-FFT Algorithm, Decimation-In-Frequency Algorithm, Summary Of Steps Of Radix-2 DIF-FFT Algorithm.	<b>10</b>	<b>CO2</b>
III	<b>Finite Impulse Response Filters:</b> Linear Phase FIR Filters, Frequency Response of Linear Phase FIR Filters, Location of the Zeros of Linear Phase FIR Filters Fourier Series method of Designing FIR Filters, Design of FIR filters using Windows, Frequency Sampling Method of Designing FIR Filters <b>Infinite Impulse Response Filters:</b> Design of IIR Filters from Analog Filters: using Approximation of Derivatives, Impulse Invariance Technique, Bilinear Transformation and Frequency Transformation in Digital Domain	<b>12</b>	<b>CO3</b>
IV	<b>Realization of Digital Filters:</b> Realization of FIR filters; Realization of IIR Filters.	<b>06</b>	<b>CO3</b>
V	<b>Multirate Signal Processing:</b> Introduction, Down Sampling, Spectrum of The Down Sampled Signal, Up Sampling Spectrum Of The Up-Sampled Signal, Anti-Imaging Filter, Cascading Sample Rate Converters, Efficient Transversal Structure For Decimator, Efficient Transversal Structure For Interpolator.	<b>04</b>	<b>CO4</b>
Total Hours		<b>36</b>	

**Essential Readings**

- Proakis J. G. and Manolakis D. G., "Digital Signal Processing: Principles, Algorithms and Applications", Pearson Education, 4<sup>th</sup> Edition, 2007.
- Oppenheim A. V. and Shafer R. W., "Discrete-Time Signal Processing", Pearson Education India; 3<sup>rd</sup> edition, 2014.

**Supplementary Readings**

- Mitra Sanjit K., "Digital Signal Processing: A Computer Based Approach", McGraw Hill Education; 4<sup>th</sup> edition, 2013.
- Babu Ramesh P., "Digital Signal Processing", SciTech Publication, 2011.
- Shaliwahan S., Vallavaraj A. and Gnanapriya C., "Digital Signal Processing", Tata McGraw-Hill, 1<sup>st</sup> Edition, 2008.
- Padmanabhan K., "A Practical Approach to Digital Signal Processing", New Age International, 2<sup>nd</sup> Edition, 2013.