



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	
EC 301	Analog and Digital Communication Systems	3	1	0	4	50	50	100	200	
Course Objectives	To understand the fundamentals of modulation and demodulation of a communication system (analog and digital)	Course Outcomes	CO1	Able to acquire the knowledge about the modulation and demodulation of AM, FM, and PM						
	To understand the concepts of baseband data transmission		CO2	Able to understand and design a communication system using analog modulation techniques						
	To understand and analyze the signal flow digital data transmission		CO3	Able to design the communication systems for baseband data transmission and analyze the performance of binary signals in Gaussian noise						
	To understand the concepts of Band pass Signal Transmission of digital data		CO4	Able to design the system for bandpass signal transmission of digital data						
CO5			Able to examine the detection performance of band pass signals in noise environment.							

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	2	3	-	3	-	-	-	-	-	-	-	-	2	-	2	-
2	CO2	3	2	-	3	-	-	-	-	-	-	-	-	2	2	2	-
3	CO3	3	3	2	-	-	-	-	-	-	-	-	-	2	3	2	-
4	CO4	2	1	-	-	-	-	-	-	-	-	-	-	3	2	2	-
5	CO5	2	1	-	-	-	-	-	-	-	-	-	-	3	2	2	-

SYLLABUS

No.	Content	Hours	COs
I	Amplitude Modulation (AM): Introduction communication systems, Review of Fourier Transforms, need for modulation and its advantages, Circuits for generation and detection of Amplitude modulation- <i>Double Sideband (DSB)</i> , <i>DSB suppressed carrier (DSB-SC)</i> , <i>Single Sideband (SSB)</i> , <i>Vestigial Sideband (VSB)</i> , Bandwidth and spectrum of AM, Superheterodyne AM receiver.	08	CO1, CO2
II	Angle Modulation: Concept of instantaneous frequency, Circuits for generation and detection of Angle modulation (<i>Narrowband (NB)</i> , <i>Wideband (WB)</i>)-Frequency Modulation (FM), Phase Modulation (PM), spectra and bandwidth of Angle Modulation, Phase locked loop (PLL), FM Receivers, White Noise, Signal-to-noise ratio (SNR) analysis for analog communications.	10	CO1, CO2
III	Baseband Transmission and Reception: Introduction to digital communications, analog communication vs digital communication, sampling- <i>natural and flat-top</i> , Quantization of Signals, Quantization Error, Companding, waveform coding- <i>Pulse code modulation (PCM)</i> , <i>Differential PCM (DPCM)</i> , <i>Delta Modulation (DM)</i> , Review of Gaussian random process, detection of binary signals in gaussian noise- <i>maximum likelihood (ML)</i> , <i>matched filter (MF)</i> and <i>correlation receivers</i> , <i>error probability performance of binary signaling</i> , Baseband shaping for data transmission- <i>Nyquist criterion</i> , <i>raised cosine family of pulses</i> , <i>intersymbol interference (ISI)</i> , <i>equalization</i> .	14	CO3
IV	Bandpass Transmission: signal space analysis- <i>orthogonal expansion of signals</i> , <i>Gram-Schmidt procedure</i> , <i>representation of digitally modulated signals</i> , amplitude shift keying (ASK), Phase shift keying (PSK), frequency shift keying (FSK), Quadrature amplitude modulation (QAM), M-ary Digital Carrier Modulation, Mapping of Digitally Modulated Waveforms onto Constellations of Signal Points.	08	CO4
V	Bandpass Reception: Coherent reception, performance of matched filter receiver and correlator receive in the presence of white noise, Decision Procedure: Maximum a posteriori probability (MAP) detector, Maximum likelihood (ML) Detector, performance comparison of digital modulation schemes (Error Rate, Bandwidth), Basics of TDMA, FDMA and CDMA, any case study or Introduction to upcoming techniques of transmission.	08	CO5
Total Hours		48	

Essential Readings

- Bernard Sklar, "Digital Communications - Fundamentals and Applications," Pearson Education, 2nd Edition, 2001.
- B.P. Lathi and Ding Zhu, "Modern Digital and Analog Communication Systems", Oxford University Press, 4th Edition, 2010.
- Simon. Haykin, Michael Moher, "An Introduction to Analog and Digital Communications", John Wiley & Sons, 2nd Edition, 2007.

Supplementary Readings

- John G. Proakis and Masoud Salehi, "Digital Communications", McGraw-Hill, 5th Edition 2008.
- Leon W. Couch, II, "Digital and Analog Communication Systems," Pearson Education, 6th Edition, 2004.
- K. Sam Shanmugam, "Digital and Analog Communication Systems", Wiley India Pvt Ltd, 2006.