	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	**VIII**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 412	**Wideband Communication**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	To provide complementary knowledge to wireless communication.		CO1	Able to acquire the knowledge about direct sequence spread spectrum technology.
	To introduce the standard and technology behind 3G, 4G and 5G networks.		CO2	Able to understand the DSSS based CDMA wireless system.
	To enhance knowledge of wireless technology and current standards.		CO3	Able to analyse the multicarrier system for wireless communication.
			CO4	Able to examine MIMO systems and different diversity techniques in multi antenna scenarios.

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**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**-**	**3**	**3**
2	CO2	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**2**	**3**
3	CO3	**2**	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**	**3**
4	CO4	**3**	**2**	**2**	**1**	**2**	**2**	**3**	**-**	**2**	**-**	**-**	**1**	**2**	**3**	**2**	**2**

SYLLABUS

No.	Content	Hours	COs
I	**Spread Spectrum:** Spread-Spectrum Principles, Direct-Sequence Spread Spectrum (DSSS), DSSS System Model, Spreading Codes for ISI Rejection: Random, Pseudorandom, and *m*-Sequences , Synchronization , RAKE Receivers , Frequency-Hopping Spread Spectrum (FHSS) , Multiuser DSSS Systems, Spreading Codes for Multiuser DSSS, Downlink Channels, Uplink Channels, Multiuser Detection.	**08**	**CO1**
II	**CDMA System:** General Principles of CDMA, CDMA Codes and Their Properties, CDMATransmission Channel Model, Receiver Structures for Synchronous Transmission, Receiver Structures for MC-CDMA and Asynchronous Wideband CDMA Transmission, Examples for CDMA Systems: Wireless LANs according to IEEE 802.11, Global Positioning System etc.	**08**	**CO1** **CO2**
III	**Overview of Multicarrier Communication:** General Principles: The Concept Of Multicarrier Transmission, Multicarrier Modulation with Overlapping Subchannels, Discrete Implementation of Multicarrier Modulation, The DFT and Its Properties, The Cyclic Prefix, Orthogonal Frequency-Division Multiplexing (OFDM), Matrix Representation of OFDM, Vector Coding, **Challenges in Multicarrier Systems**: Peak-to-Average Power Ratio, Frequency and Timing Offset. Case Study: The IEEE 802.11a Wireless LAN Standard. Other types of MC techniques	**11**	**CO3**
IV	**MIMO System:** Useful Matrix Theory, Deterministic MIMO Channel Capacity, Channel Capacity when CSI is Known to the Transmitter Side, Channel Capacity when CSI is Not Available at the Transmitter Side, Channel Capacity of SIMO and MISO Channels, Channel Capacity of Random MIMO Channels, Antenna Diversity, pace-Time Coding (STC), Space-Time Block Code (STBC)	**09**	**CO4**
	Total Hours	**36**	

Essential Readings

1. Goldsmith, Andrea. *Wireless communications*. Cambridge university press, 2005.,
2. Molisch Andreas,"Wideband Wireless Digital Communication",Pearson LPE,1st Ed., 2001.

Supplementary Readings

1. Cho, Yong Soo, Jaekwon Kim, Won Y. Yang, and Chung G. Kang. *MIMO-OFDM wireless communications with MATLAB*. John Wiley & Sons, 2010.
2. Schulze, Henrik, and Christian Lüders. *Theory and applications of OFDM and CDMA: Wideband wireless communications*. John Wiley & Sons, 2005.
3. Fazel, Khaled, and Stefan Kaiser. *Multi-carrier and spread spectrum systems: from OFDM and MC-CDMA to LTE and WiMAX*. John Wiley & Sons, 2008.