

Branch Name:	Signal Processing and Communication
Program Code:	ET214
Course Name:	Emerging Communication Technology
Course Code:	2ET2140301T
Pre-requisite Course:	Fundamentals of wireless communication

Course Objectives:

1. Introduce current and future communication technologies, mainly 4G and 5G mobile communication.
2. Acquire a solid understanding of foundations of 4G technologies, systems, network issues.
3. Economic deployment considerations of 4G technologies and 5G technologies.

Teaching and Examination Scheme:

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

Course Contents:

Sr. No	Topic	Total Hours	Weight (%)
1	Introduction: Architectural Review of UMTS and GSM, History of Mobile Telecommunication Systems, The Need for LTE , From UMTS to LTE , From LTE To LTE – Advanced , The 3GPP Specifications for LTE	04	5
2	System Architecture Evolution : Architecture of LTE , Communication Protocols , Bearer Management , State Diagrams , Spectrum Allocation	04	10
3	Orthogonal Frequency Division Multiple Access: Orthogonal Frequency Division Multiplexing , OFDMA in a Mobile Cellular Network , Single Carrier Frequency Division Multiple Access	06	15
4	Architecture of the LTE Air Interface : Air Interface Protocol Stack , Air Interface Protocol Stack , The Resource Grid , Multiple Antenna Transmission , Resource Element Mapping	06	15
5	Data Transmission and Reception: Data Transmission Procedures, Transmission of Scheduling Messages on the PDCCH, Data Transmission on the PDSCH and PUSCH, Transmission of Hybrid ARQ Indicators on the PHICH, Uplink Control Information, Transmission of Uplink Control Information on the PUCCH , Uplink Reference Signals , Uplink Power Control , Discontinuous Reception	08	20
6	Delivery of Voice and Text Messages over LTE : The Market for Voice and SMS , Third Party Voice over IP , The IP Multimedia Sub system, Circuit Switched Fall back , VoLGA	05	15
7	Performance of LTE and LTE – Advanced : Coverage Estimation , Peak Data Rates of LTE and LTE-Advanced, Typical Data Rates of LTE and LTE - Advanced	03	10
8	Overview of 5G networks : An overview of 5G requirement , spectrum analysis and regulation of 5G , spectrum sharing of 5G	03	10

List of Text Book:

1. Christopher Cox, Introduction to LTE:LTE,LTE-ADVANCED , SAEAND 4G MOBILE COMMUNICATIONS , A John Wiley & Sons ,Ltd.,Publication,2012
2. Wei Xiang ,Kan Zheng, Xuemi n (Sherman) Shen, “ 5G Mobile Communication ”, Springer International Publishing, Swizerlan, 2017

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand system architecture evaluation of GSM and UMTS.	1 Remembering 2 Understanding
CLO2	Understand behavior of OFDMA and Application of OFDMA in GSM Cellular Network.	2 Understanding 3 Applying
CLO3	Analyze Architecture of LTE, procedures of data transmission and reception of LTE.	4 Analyze
CLO4	Acquire a solid foundation of design issues/performance of the 4G communication.	5 Evaluate
CLO5	Evaluate Performance of LTE and Advanced LTE	3 Applying 4 Analyze
CLO6	Acquire an overview of 5Gnetwork.	2 Understanding

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					L	M						H	H	M	L	
CLO2		H	M	M	L					L		H		M	L	
CLO3		M	H		L									H		L
CLO4		M	H		L			L					L		M	H
CLO5	H	M	H		L				L			H	L		M	H
CLO6	H	M	H		L							M	L		M	H

H: High, M: Medium, L: Low