

Course Code	21ECC401T	Course Name	WIRELESS COMMUNICATION AND ANTENNA SYSTEMS	Course Category	C	PROFESSIONAL CORE	L	T	P	C
							3	0	0	3

Pre-requisite Courses	21ECC205T	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	ECE	Data Book / Codes / Standards	Nil		

Course Learning Rationale (CLR):		Program Outcomes (PO)												Program Specific Outcomes		
The purpose of learning this course is to:		1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2	PSO-3
CLR-1:	understand the elements of Wireless Communication and mobile communications	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning			
CLR-2:	understand the elements of Wireless Communication and mobile communications															
CLR-3:	analyze how to apply Mobile Radio Wave Propagation - Small Scale Fading															
CLR-4:	study the Capacity and Diversity concepts in wireless communications															
CLR-5:	acquire the knowledge of Wireless System and Standards and Understand and design various wireless systems															
Course Outcomes (CO):		At the end of this course, learners will be able to:														
CO-1:	acquire the knowledge of Wireless communication and basic cellular concepts	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO-2:	understand the essential Radio wave propagation and mobile channel models	-	3	-	-	-	-	-	-	-	-	-	2	-	-	3
CO-3:	familiarize about Various performance analysis of mobile communication system	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
CO-4:	attain the knowledge of Diversity and capacity concepts	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
CO-5:	be familiar with the various standards of Mobile Communication Systems and Explore the various concepts of wireless communication, its design with respect to fading and link performance	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3

<b>Unit-1 - Introduction to Wireless Communications and Antennas</b>	<b>9 Hour</b>
Introduction to wireless communication and mobile radio communication- Classification of wireless communications-simplex, half duplex, full duplex- Paging and Cordless systems- Cellular telephone systems- Timing diagram - landline to mobile Two- Timing diagram - mobile to mobile- Basic antenna parameters, Far field and near field- Frequency reuse, sectorized and omnidirectional Antennas- Channel assignment strategies- Handoff and its types- Interference and system capacity- Cell splitting-Sectoring- Microcell Zone Concepts-Umbrella Cells- Solving Problem on antenna parameters	
<b>Unit-2 - Large Scale Fading</b>	<b>9 Hour</b>
Introduction to Radio Wave Propagation-Large scale and small scale fading-Fris transmission equation-Free propagation model-pathloss model-Two ray model-Simplified pathloss model-Empirical model (Okumara)- Empirical model(Walfish and Bertoni model)-Piecewise linear model-log normal model-Shadowing-Combined pathloss and shadowing-Outage Probability-Cell coverage area-Solving problems-VHF/UHF Antennas - Log periodic dipole array - Parabolic Reflector antennas	
<b>Unit-3 - Small Scale Fading</b>	<b>9 Hour</b>
Introduction Small Scale multipath propagation-Impulse response model of multipath channel-Small Scale multipath measurements-Direct Pulse measurement-Slide -Small Scale multipath measurements-Sliding Correlator Measurements-Small Scale multipath measurements-Swept frequency measurement-Parameters of mobile multipath channel-Doppler spread and Coherent time-Type of fading: Flat and Frequency selective fading-Fast and slow fading-Ricean distribution-Rayleigh distribution-Solving problems(Doppler effect)- Design of Microstrip Patch Antenna	
<b>Unit-4 - Improvement of link Performance</b>	<b>9 Hour</b>
Introduction to diversity, equalization, and capacity-Space Diversity-Scanning Diversity-Maximal ratio combiner-Equal gain diversity-Rake Receiver-Capacity in AWGN-Capacity of flat fading channels-Equalizer and its mode-Adaptive equalizer block diagram-Type of Equalizers-Introduction to MIMO antennas-Case Study: Recent Trends in Diversity and MIMO antennas	

**Unit-5 - Wireless Systems and Standards****9 Hour**

AMPS Voice modulation Process- GSM system architecture and its interfaces-GSM frame structure-GSM speech operations input-output-Forward CDMA process- Reverse CDMA process-Multicarrier modulation-OFDM Transmitter Block diagram-OFDM Receiver Block Diagram-Importance of Cyclic Prefix-Case study (Modern Antennas)

<b>Learning Resources</b>	1 Rappaport.T.S." Wireless Communications: Principles and Practice", 2nd Edition, Pearson, 2011.	4 Andreas.F. Molisch., "Wireless Communications", Wiley, 2nd Edition- 2005, Reprint-2014
	2 John D Kraus, Ronald J Marhefka, Ahmed S Khan "Antenna and Wave Propagation", 4th Edition, Tata McGraw Hill, 2010	5 Andrea Goldsmith, "Wireless Communications", Cambridge University Press, Aug 2005
	3 Constantine Balanis. A, "Antenna Theory: Analysis and Design", 3rd Edition, John Wiley, 2012.	6 Schiller, "Mobile Communications", Pearson Education Asia Ltd., Reprint 2012 7 Lee W.C.Y., " Mobile Communications Engineering: Theory and Applications", McGraw Hill, New York, 2nd Edition ,1998

Learning Assessment							
	Bloom's Level of Thinking	Continuous Learning Assessment (CLA)				Summative Final Examination (40% weightage)	
		Formative CLA-1 Average of unit test (50%)		Life-Long Learning CLA-2 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	25%	-	20%	-	25%	-
Level 3	Apply	30%	-	25%	-	30%	-
Level 4	Analyze	30%	-	25%	-	30%	-
Level 5	Evaluate	-	-	10%	-	-	-
Level 6	Create	-	-	5%	-	-	-
	Total	100 %		100 %		100 %	

**Course Designers****Experts from Industry**

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