

Branch Name:	Information and Communication Technology
Program Code:	107
Course Name:	Wireless Communication (Elective-I)
Course Code:	1ET1070606
Pre-requisite Course:	Digital and analog Communication, Signals & Systems, Electromagnetic Theory, Probability & Random Processes.

Course Objectives:

1. To understand the functioning of wireless communication system and evolution of different wireless communication systems and standards.
2. To compare recent technologies used for wireless communication.
3. To explain multiple access techniques for Wireless Communication.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	04	70	30	30	20	150

Subject Contents

Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Wireless Communication System: Evolution of mobile communications, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Trend in Cellular radio and personal communication. Second generation Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop(WLL), Wireless Local Area network(WLAN), Bluetooth and Personal Area Networks.	02	10
2	The Cellular Concept - System Design Fundamentals: Cellular system, Hexagonal geometry cell and concept of frequency reuse, Channel Assignment Strategies Distance to frequency reuse ratio, Channel & Co-channel interference reduction factor, S/I ratio consideration and calculation for Minimum Co-channel and adjacent interference, Handoff Strategies, Umbrella Cell Concept, Improving Coverage & Capacity in	10	20

	Cellular System - cell splitting, Cell sectorization, Repeaters, Micro cell zone concept.		
3	Mobile Radio Propagation Model, Small Scale Fading and diversity: Large scale path loss:- Free Space Propagation loss equation, Path-loss of NLOS and LOS systems, Reflection, Ray ground reflection model, Diffraction, Scattering, Link budget design, Max. Distance Coverage formula, Small scale multipath propagation, Delay spread, Feher's delay spread, upper bound Small scale, Types of small scale Fading, Rayleigh and rician distribution, Statistical for Models multipath fading channels and diversity techniques in brief.	08	20
4	Multiple Access Techniques: Introduction, Comparisons of multiple Access Strategies TDMA, CDMA, FDMA, OFDM, CSMA Protocols.	7	15
5	Wireless Systems: GSM system architecture, Radio interface, Protocols, Localization and calling, Authentication and security in GSM, GSM speech coding, Architecture of IS- 95 CDMA system, RAKE Receiver, GPRS system architecture.	8	20
6	Recent Trends: Introduction to Wi-Fi, WiMAX, ZigBee Networks, VoLTE, Wireless Adhoc Network and Mobile Portability, Security issues and challenges in a Wireless network.	7	15

Text Book:

1. Wireless Communication, Theodore S. Rappaport, Prentice hall.

List of Reference Books:

1. Wireless Communications –T.L.Singh –TMH.
2. Wireless Communications and Networking, Vijay Garg, Elsevier.
3. Mobile Communications Engineering, William C. Y. Lee, Mc Graw Hill Publications.
4. Wireless digital communication, Kamilo Feher, PHI.

List of Suggested titles of Experiments:

1. Study of Baseband communication.
2. Study of GSM Architecture.
3. Study of CDMA Architecture.
4. Study and verify various GSM AT commands.
5. Study of Adaptive Linear Equalizer using trainer kit.
6. To observe the BER performance of DS-CDMA using mixed codes in multipath channel using RAKE receiver for single user case.
7. To determine the free space loss and the power received using Matlab program.
8. To write a Matlab program to calculate the link budget for satellite communication.
9. To write a Matlab program to calculate the median path loss for Okumura model for outdoor propagation.

10.To write a Matlab program to calculate the median path loss for Hata model for outdoor propagation.

e-Resources (If any):

1. <https://nptel.ac.in/courses/117/102/117102062/>

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the basic concepts of basic Cellular System and the design requirements.	1 Remembering 2 Understanding
CLO2	Understanding the concept related to radio resource management techniques such as power control, channel allocation and handoffs.	2 Understanding
CLO3	Gain insights into various mobile radio propagation models and how the diversity can be exploited to improve performance.	4 Analyze
CLO4	Get knowledge and awareness of the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc.	3 Applying
CLO5	Learn depth understanding of the design consideration and architecture for different Wireless Systems like GSM, CDMA, GPRS etc.	2 Understanding 3 Applying
CLO6	To get knowledge of the emerging trends in Wireless communication like WiFi, WiMAX, VoLTE.	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	H	M	M	L	L	M			L				H	L		
CLO2		L	M	H	L	L					L	L	M	L		
CLO3	L	M	M	L	M	H		M		L			M	L		
CLO4	M	M	M	L	M	H		M	L				M	L		
CLO5	M	L	L	L	M	H		M		L			H	L		
CLO6	L	M	L	L	M	H		M			L		H	L		

H: High, M: Medium, L: Low