

Branch Name:	Information and Communication Technology
Program Code:	ET107
Semester/Year:	Semester VII / Fourth Year
Course Name:	Wireless Communication
Course Code:	2ET1070701T
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:

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

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	The Wireless Channel: Overview of wireless systems – Physical modeling for wireless channels – Time and Frequency coherence – Statistical channel models – Capacity of wireless Channel- Capacity of Flat Fading Channel — Channel Distribution Information known – Channel Side Information at Receiver – Channel Side Information at Transmitter and Receiver – Capacity with Receiver diversity – Capacity comparisons – Capacity of Frequency Selective Fading channels.	9	20
2	Cellular Concepts: Frequency Reuse – Channel Assignment Strategies – Hand off Strategies – Interference and system capacity- Co-Channel Interference- Adjacent Channel Interference – Trunking and Grade of service – Improving coverage & capacity in cellular systems-Cell Splitting- Sectoring-Repeaters for Range Extension- Microcell Zone Concept.	9	20
3	Multiple Access And Modulation Techniques: FDMA, TDMA, CDMA, SDMA, OFDM. Receiver structure- Diversity receivers- selection and MRC receivers, RAKE receiver, equalization: Linear-ZFE (Zero-Forcing Equalizer) and Adaptive DFE (Decision Feedback Equalizer). Transmit diversity Alamouti scheme. Introduction to Spread spectrum Techniques	10	22

4	Cellular Wireless Standards: Wireless Standards: Overview of 2G 3G, 4G and 5G cellular mobile standards. System examples. GSM, EDGE, GPRS, IS-95, CDMA 2000 and WCDMA, 3G, 4G and 5G mobile communications.	8	18
5	MIMO Systems: MIMO and space time signal processing, spatial multiplexing, diversity/multiplexing tradeoff. Performance measures- Outage, average SNR, average symbol/bit error rate.	9	20

List of Reference Books:

1. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Wiley Series in Telecommunications, Cambridge University Press, 2005.
2. Theodore.S. Rappaport, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, India, 2009.
3. Arogyaswami Paulraj, Rokit Nabar, Dhananjay Gore, "Introduction to Space-Time Wireless Communication", 1st Edition, Cambridge University Press, 2008.
4. W.C.Y.Lee, "Mobile Cellular Telecommunications - Analog and Digital Systems", 2nd Edition. Tata McGraw Hill, 2006.
5. Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2005.

e-Resources (If any):

1. <https://nptel.ac.in/courses/106106167>

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand cellular concepts and signal propagation in mobile communication	1 Remembering 2 Understanding
CLO2	Understand the fundamental principles of signal propagation in wireless communication	2 Understanding
CLO3	Compare and contrast various multiple access techniques and their suitability for different applications.	4 Analyze
CLO4	Evaluate the advantages and limitations of different modulation schemes	3 Applying
CLO5	Understand the architecture of mobile communication networks	2 Understanding 3 Applying

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	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CLO1	H	M		L	L	M							H	L		
CLO2		L		H	L	L					L	L	M	L		
CLO3	L	M	M	L	M	H						M	M	L		
CLO4	M	M	M	L	M	H						M	M	L		
CLO5	M	L	L	L	M	H							H	L		

H: High, M: Medium, L: Low