

Course Code	Course Title	L	T	P	C
1153EC106	WIRELESS COMMUNICATION NETWORKS	3	0	0	3

a) Course Category

Allied Elective

b) Preamble

This course addresses the fundamentals of wireless communication and provides an overview of existing and emerging wireless communications networks. It covers radio propagation and fading models, fundamentals of cellular communications, multiple access technologies, and various wireless networks, including past and future generation networks

c) Prerequisite

Nil

d) Related Courses

Wireless Technologies

e) Course Outcomes

On successful completion of this course the student will be able to

CO Nos.	Course Outcomes	Knowledge Level (Based on Revised Bloom's Taxonomy)
CO1	Learn to model radio signal propagation issues and its impact on communication system performance.	K2
CO2	Understand the multiple access schemes based on reservation and random access methods. Explain the concepts of Wi-Fi.	K2
CO3	Describe the fundamentals of cellular communication and its related services as GSM and UMTS.	K2
CO4	Describe the concepts of Packet switching cellular system.	K2
CO5	Understand the concept of mobility management and WPAN	K2

f) Correlation of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L	L	-	M	M	-	-	L	-	L	L	-	-	-
CO2	L	-	-	-		-	-	-	-	-	L	-	L	L
CO3	L	-	-	-	M	-	-	M	L	-	-	M	L	M
CO4	L	-	-	M	M	-	-	M	L	-	-	M	-	-
CO5	L	-	-	M	-	M	-	M	L	-	L	M	L	M

g) Course Content

UNIT I OVERVIEW AND BASIS OF WIRELESS CHANNELS AND COMMUNICATION 9

Review of Digital Communications - Cellular Systems from 1G to 3G - Wireless 4G Systems - Components of a Wireless Transmitter and Receiver – Bandwidth, Duplexing, Licensed and Unlicensed Bands - Power, Rate and SNR - Shannon’s Capacity, Bandwidth and Power-Limited Regimes - Radio Propagation and Propagation Path-Loss Model: Free-Space Attenuation, Multipath Channel Characteristics, Signal Fading Statistics, Path-Loss Models.

UNIT II RANDOM ACCESS SYSTEMS AND WIFI 9

Types of Multiplexing: Fixed Assignment vs. Statistical Multiplexing - Aloha, Slotted Aloha - Review of Poisson Process and Analysis of Aloha - CSMA with Collision Avoidance and Collision Detection - WIFI: History and Motivation, Architecture - DCF Mode, RTS-CTS, Hidden and Exposed Terminal Problem - 802.11n Enhancements

UNIT III CIRCUIT-SWITCHED CELLULAR SYSTEMS 9

Cellular Concept and Spatial Reuse - Interference-Limited and Coverage-Limited Systems - Frequency Reuse - Cellular vs. WIFI - GSM: Architecture, Voice Support – UMTS: Basics of CDMA, Architecture and Key Channels.

UNIT IV PACKET-SWITCHED CELLULAR SYSTEMS 9

Packet-Switched vs. Circuit-Switched Communication - HSDPA (High Speed Downlink Packet Access) - HSUPA (High Speed Uplink Packet Access) - Introduction to LTE: History, Architecture - OFDM - Uplink and Downlink Communication in LTE

UNIT V MOBILITY AND WPANS 9

Principles of Handovers: Switching Conditions, Hysteresis, Detection - Mobility in Cellular Systems: The Gateway Concept, Measurement Reports, Mobility Procedures - Mobile IP: Basic Components, Tunneling, Enhancements For Mobile Ipv6 - Wireless Personal Area Networks (PANS): Bluetooth 802.15.1, Zigbee 802.15.4.

h) Learning Resources

Text Books

1. V. K. Garg, Wireless Communications and Networking, Morgan Kaufmann, 2007, ISBN: 9780123735805.
2. D. P. Agrawal and Q.-A. Zeng, Introduction to Wireless and Mobile Systems, Third Edition, Cengage Learning, 2010, ISBN: 1439062056.
3. W. Stallings, Wireless Communications & Networks, Second Edition, Prentice Hall, 2004, ISBN: 0131918354.
4. T. S. Rappaport, Wireless Communications, Second Edition, Prentice Hall, 2002, ISBN: 0130422320
5. J. Schiller, Mobile Communications, Second Edition, Addison Wesley, 2003, ISBN: 0321123816

Online Resources

1. www.nptelvideos.in/2012/12/wireless-communication.html
2. nptel.ac.in/courses/117105076/pdf/2.2%20Lesson%203%20.pdf
3. <https://www.coursera.org/learn/wireless-communication.../5g-mobile-communications>
4. <https://www.mooc-list.com/.../wireless-communication-emerging-technologies-courser...>

Practice Aspects:

NS3 simulator Tool