



# SILVER OAK UNIVERSITY

## Engineering and Technology (M.Tech.)

Electronics & Communication (Communication Systems Engg)

Subject Name: Wireless and Mobile Networks

Subject Code:

Semester: II

### Prerequisite:

Higher Engineering Mathematics, Fundamental knowledge of Signals and Systems Antenna and Wave Propagation and Digital Communication theory

### Objective:

The purpose of this course is to provide an understanding of modern digital mobile and wireless communication systems. Topics include: overview of cellular concept; interference and traffic analysis for cellular networks; wireless fading channel modeling and characterization; modulation and detection performance over fading channels; multi-carrier systems; receiver and transmitter diversity techniques

### Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme				Total Marks
L	T	P	C	Internal		External		
				Th	Pr	Th	Pr	
3	0	2	4	40	20	60	30	150

### Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	Overview of wireless communication, cellular communication, different generations and standards in cellular communication system, satellite communication including GPS, wireless local loop, cordless phone, paging systems, RFID.	8	15
2	<b>Recent wireless technologies:</b> multicarrier modulation, OFDM, MIMO system, diversity multiplexing trade-off, MIMO-OFDM system, smart-antenna; beamforming and MIMO, cognitive radio, software defined radio, communication relays, spectrum sharing	8	10
3	Multiple access techniques in wireless communication: contention-free multiple access schemes (FDMA TDMA, CDMA, SDMA and Hybrid), contention-based multiple access schemes (ALOHA and CSMA).	8	25

4	Wireless personal area networks (Bluetooth, UWB and ZigBee), wireless local area networks (IEEE 802.11, network architecture, medium access methods, WLAN standards), wireless metropolitan area networks (WiMAX).	7	25
5	<b>Ad-hoc wireless networks:</b> Design Challenges in Ad-hoc wireless networks, concept of cross layer design, security in wireless networks, energy constrained networks. MANET and WSN. Wireless system protocols : mobile network layer protocol (mobile IP, IPv6, dynamic host configuration protocol), mobile transport layer protocol (traditional TCP, classical TCP improvements), support for mobility (wireless application protocol).	8	25

### Course Outcome:

Sr. No.	CO statement	Unit No
<b>CO-1</b>	Demonstrate their understanding on functioning of wireless communication system and evolution of different wireless communication systems and standards.	1
<b>CO-2</b>	Compare different technologies used for wireless communication systems	2
<b>CO-3</b>	Explain the architecture, functioning, protocols, capabilities and application of various wireless communication networks.	3
<b>CO-4</b>	Demonstrate an ability explain multiple access techniques for Wireless Communication	4
<b>CO-5</b>	Demonstrate an ability to evaluate design challenges, constraints and security issues associated with Ad-hoc wireless networks.	5

### Teaching & Learning Methodology: -

1. Direct Instruction
2. Flipped Classrooms
3. Kinesthetic Learning
4. Context-Based Learning
5. Adaptive Teaching

### List of Experiments/Tutorials:

- 1 To study different mobile communication standards and measure BW of each standard.
- 2 To study and perform channelization scheme and measure adjacent and co-channel interference in cellular system.
- 3 To study different diversity schemes and measure RF signal strength.
- 4 To study and measure path loss exponent for different environment.
- 5 To study and perform GSM AT commands
- 6 To study Trunking theory and generate ERLANG table.
- 7 To study and generate PN sequence using matlab.
- 8 To study the phase linearity of GMSK

**Major Equipment:**

Matlab, NS-2

**Books Recommended: -**

1. Vijay K Garg, “Wireless Communications and Networks”, Morgan Kaufmann Publishers an Imprint of Elsevier, USA 2009 (Indian reprint)
2. J. Schiller, “Mobile Communication” 2/e, Pearson Education, 2012.
3. ItiSahaMisra, “Wireless Communication and Networks : 3G and Beyond”, 2/e, McGraw Hill Education (india) Private Ltd, New Delhi, 2013.
4. Wireless Communications ,Andrea Goldsmith Cambridge University Press, 2007
5. Mobile Cellular Telecommunications (Analog and Digital Systems), 2nd Edition, By William C.Y. Lee-McGraw Hill
6. David Tse and Pramod Viswanath Fundamentals of Wireless Communication ,Cambridge University Press 2005

**List of Open Source Software/learning website:**

[www.nptel.org](http://www.nptel.org), [ocw.mit.edu](http://ocw.mit.edu) (MIT Open-Course Ware)