GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Master of Computer Application
Subject Name: Mobile Computing and Wireless Communication
Subject Code: 639411

Type of course: Elective Group-2 (Only for IEP Students)

Prerequisite: Computer Network

Rationale: Wireless communication provides mobility, flexibility, convenience. Wireless communication devices are used in various areas including healthcare. Wireless communication has opened many areas for research also.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA	ESE (V)	PA (I)	
3	0	2	4	70	30	20	30	150

Sr. No.	Content	Total Hrs.
1	**Introduction, Transmission Fundamentals:** Signals for Conveying Information, Analog and Digital Data Transmission, Channel Capacity, Transmission Media, Multiplexing **Communication Networks:** LANs, MANs and WANs, Switching Techniques, Circuit Switching, Packet Switching	07
2	**Cellular Wireless Networks:** Principles of Cellular Networks, First-Generation Analog Second-Generation TDMA Second-Generation CDMA, Third-Generation Systems **Antennas and Propagation:** Antennas, Propagation Modes, Line-of-Sight Transmission, Fading in the Mobile Environment **Spread Spectrum-**The Concept of Spread Spectrum, Frequency Hopping Spread Spectrum, Direct Sequence Spread Spectrum **Coding and Error Control:** Error Detection, Block Error Correction Codes, Convolutional Codes, Automatic Repeat Request	10
3	**Multiple access in Wireless System:** Multiple access scheme, frequency division multiple access, Time division multiple access, code division multiple access, space division multiple access, packet radio access, multiple access with collision avoidance. **Global system for mobile communication**: Global system for mobile communication, GSM architecture, GSM entities, call routing in GSM, PLMN interface, GSM addresses and identifiers, network aspects in GSM, GSM frequency allocation, authentication, and security.	13

	General packet radio service (GPRS): GPRS and packet data network, GPRS network architecture, GPRS network operation, data services in GPRS, Applications of GPRS, Billing and charging in GPRS. **Wireless System Operations and Standards:** Cordless Systems, Wireless Local Loop, WiMAX and IEEE 802.16 Broadband Wireless Access Standards **Mobile IP and Wireless Application, Protocol**	
4	**Wi-Fi and the IEEE 802.11 Wireless LAN Standard**: IEEE 802.11 architecture and services, IEEE 802.11 Medium access control, IEEE 802.11 physical layer, Wi-Fi protected access.	04
5	**Bluetooth:** Radio specification, baseband specification, link manager specification, logical link control and adaption protocol.	04
6	Android APIs, Android Architecture, Application Framework, The Application components, The manifest file, downloading and installing Android, Exploring the Development Environment, Developing and Executing the first Android application, Working with Activities, The Linear Layout , The Relative Layout , The Scroll View Layout, The Table Layout, The Frame Layout, Using the Text View, Edit Text View, Button View, Radio Button, Checkbox, Image Button, Rating Bar, The options Menu, The Context Menu.	07

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**40**	**10**	--	--	--

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Wireless Communications & Networks, Second Edition, William Stallings by Pearson.
2. Mobile Computing Technology, Applications, and service creation by Asoke K Telukder, Roopa R. Yavagal, TMH.
3. Wireless Communications, Principles and Practices by T. S. Rappaport, Pearson Education India.
4. Android Application Development Black Book by Pradeep Kothari, Dreamtech Press.
5. Wireless and Mobile Networks by Dr. Sunilkumar S. Manvi, Dr. Mahabaleshwar S.Kakkasageri, WILEY.
6. Wireless Networks by P. Nicopolitidis, M.S. Obaidat, G. I. Papadimitriou, A.S.Pomportsis by Wiley

7. Mobile Computing by Raj Kamal, Oxford.
8. Mobile Computing Theory and Practice-Kumkum Garg-Pearson.
9. Lauren Darcey and Shane Conder, Android Wireless Application Development, Pearson Education, 2nd ed. (2011).

Course Outcome: After learning the course the students should be able to:

Sr. No.	CO Statement	Marks % Weightage
CO-1	Understand the mobile and wireless network systems such as 2G/3G/4G	20
CO-2	Understand GSM and GPRS	20
CO-3	Implement various error coding techniques.	10
CO-4	Differentiate between multiple access schemes and various Spread Spectrum techniques.	25
CO-5	Understand the working with local area network, Bluetooth and Android APIs environment.	25

List of Open-Source Software/learning website:

http://www.wirelessdevnet.com/
http://www.protocols.com/
www.tutorialspoint.com/mobile_computing

Suggested List of Experiments:

1) Write a program to simulate Fixed Time Division Multiplexing. Take 12 stations. Every station has time slice of 417 microseconds. Delay should be 10ms. Every time the station gets turn, it shows message.
2) Write a program that identifies the bluetooth devices in the wireless range.
3) Write a program that prints the signal strength of WiFi connection of the given computer.
4) Write a program to find hamming distance. For example Hamming distance d(v1,v2)=3 if v1=011011,v2=110001.
5) Write a program to perform infrared communication.
6) Write a program to perform Bluetooth file transfer.
7) Develop an android app which displays “Hello, welcome to Android Lab” message.
8) Develop an android app which displays a form to get following information from user.
    a) Username
    b) Password
    c) Email Address
    d) Phone Number
    e) Country
    f) State
    g) State
    h) Gender
    i) Interests

j) Birth Date
k) Birth Time

9) Form should be followed by a Button with label "Submit". When user clicks the button, a message should be displayed to user describing the information entered. Utilize suitable UI controls (i.e. widgets). [When user enters country in AutoCompleteTextView, list of states should be displayed in Spinner automatically.]
10) Using Android, Create a login Activity. It asks "username" and "password" from user. If username and password are valid, it displays Welcome message using new activity.
11) Develop a calculator Android Application.

Design based Problems (DP)/Open Ended Problem:

1) Radio connectivity is inherently poor. How to ensure data delivery without retransmission?
2) Resource manager might have allocated resources to applications. How to revoke those resources? How to utilize available resources optimally?