Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Electronics and Communication Engineering

BET008 WIRELESS NETWORKS

Eight Semester, 2015-16 (even Semester)

Course (catalog) description

The course considers digital communication systems and techniques. In this course, we will introduce some of the basic mathematical concepts that will allow us to think in the two "domains" of communications, the time domain and the frequency domain. The course covers the basic types of wireless communication from both a mathematical description and from a block-diagram system approach.

Compulsory/Elective course : Elective for ECE students

Credit hours **:** 3 credits

Course Coordinator **: Mr.R.Mohanraj** Asst. Professor, Department of ECE

Instructor(s) **: Mr.Srinivasan**, Asst. Professor, Department of ECE

Name of the instructor	Class handling	Office location	Office phone	Email (domain: @bharathuniv.ac.in)	Consultation
Mr.R.Mohanraj	Fourth year ECE	SA006		mohanraj.ece @bharathuniv.ac.in	9.00-9.50 AM
Mr.Srinivasan	Fourth year ECE	SA006		Srinivasan.etc @bharathuniv.ac.in	12.45-1.15 PM

Relationship to other courses

Pre-requisites	:	Communication engineering-II, Computer Networks
Assumed knowledge	:	The students will have a physics and mathematics background obtained at a high school (or equivalent) level. In particular, working knowledge of basic mathematics including differentiation, integration and probability theories are assumed.
Following courses	:	Nil

Syllabus Contents

UNIT 1 WIRELESS LAN **9 HOURS**

Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer Link manager Protocol, security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

UNIT 2 MOBILE NETWORK LAYER **9 HOURS**

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6- Network layer in the internet-Mobile IP session initiation protocol - mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing

UNIT 3 MOBILE TRANSPORT LAYER **9 HOURS**

TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks.

UNIT 4 WIRELESS WIDE AREA NETWORK **9 HOURS**

Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

UNIT 5 4G NETWORKS **9 HOURS**

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

TOTAL 45

Text book(s) and/or required materials

TEXT BOOKS

T1. Jochen Schiller, Mobile Communications , Second Edition, Pearson Education 2012.(Unit I,II,III)
T2. Vijay Garg , —Wireless Communications and networking , First Edition, Elsevier 2007.(Unit IV,V)

REFERENCES

R1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband , Second Edition, Academic Press, 2008.
R2. Anurag Kumar, D.Manjunath, Joy kuri, —Wireless Networking , First Edition, Elsevier 2011.

Computer usage: Nil

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area: Communication | Signal Processing | communication|

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 2nd week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2nd week	Session 15 to 28	2 Periods
3	Model Test	April 2nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

The scope of this course is to provide the Wireless networks, protocol stack and standards. This knowledge helps them to acquire fundamentals of 3G Services, its protocols and applications. The overall objective is to introduce the student to the basics of Wireless networks, protocol stack and standards. This course emphasizes:	Correlates to program outcome		
	H	**M**	**L**
1. Conversant with the latest 3G/4G and Wi-MAX networks and its architecture.	a	f	e
2. Design and implement wireless network environment for any application using latest wireless protocols and standards	c	a	b
3. Implement different type of applications for smart phones and mobile devices with latest network strategies	i	a	d
4. Compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.	e	g	a
5. Classify network protocols, ad hoc and sensor networks, wireless MANs, LANs and PANs	e	a	i
6. Apply wireless ID technologies, in particular RFID work.	f		

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	Topics	Problem Solving (Yes/No)	Text / Chapter
UNIT 1 WIRELESS LAN			
1.	Introduction-WLAN technologies	No	[T2] chapter - 5, [R1] chapter -3
2.	Infrared, UHF narrowband, spread spectrum	No	
3.	IEEE802.11: System architecture	No	
4.	IEEE802.11: protocol architecture.	No	
5.	physical layer, MAC layer	No	
6.	802.11b, 802.11a – Hiper LAN	No	
7.	WATM, BRAN, HiperLAN2 – Bluetooth:	No	
8.	Architecture, Radio Layer, Baseband layer Link manager Protocol	No	
9.	security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX	No	
UNIT 2 MOBILE NETWORK LAYER			
10.	Introduction - Mobile IP: IP packet delivery	No	
11.	Agent discovery, tunneling and encapsulation	No	
12.	IPV6- Network layer in the internet	No	

13.	Mobile IP session initiation protocol	No	[T2] chapter – 6
14.	mobile ad-hoc network	No	
15.	ad-hoc network: Routing	No	
16.	Destination Sequence	No	
17.	distance vector	No	
18.	Dynamic source routing	No	
Session	**Topics**	**Problem Solving (Yes/No)**	**Text / Chapter**
UNIT 3 MOBILE TRANSPORT LAYER			
19.	TCP enhancements for wireless protocols	No	[T2] chapter – 6, [R1] chapter - 8
20.	Traditional TCP: Congestion control	No	
21.	fast retransmit/fast recovery	No	
22.	Implications of mobility - Classical TCP improvements	No	
23.	Indirect TCP, Snooping TCP, Mobile TCP	No	
24.	Time out freezing	No	
25.	Selective retransmission	No	
26.	Transaction oriented TCP	No	
27.	TCP over 3G wireless networks	No	
UNIT 4 WIRELESS WIDE AREA NETWORK			
28.	Overview of UTMS Terrestrial Radio access network	No	[T2] chapter– 4, [R1] chapter–2
29.	UMTS Core network Architecture	No	
30.	3G-MSC	No	
31.	3G-SGSN	No	
32.	3G-GGSN	No	
33.	SMS-GMSC/SMS-IWMSC	No	
34.	Firewall,	No	
35.	DNS/DHCP-High speed Downlink packet access (HSDPA)	No	
36.	LTE network architecture and protocol.	No	
UNIT 5 4G NETWORKS			
37.	Introduction – 4G vision	No	[T2] chapter– 5,6 [R1] chapter–7
38.	4G features and challenges	No	
39.	Applications of 4G – 4G Technologies	No	
40.	Multicarrier Modulation	No	
41.	Smart antenna techniques	No	
42.	OFDM-MIMO systems	No	
43.	Adaptive Modulation	No	
44.	coding with time slot scheduler	No	
45.	Cognitive Radio	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	10%
Cycle Test – II	-	10%
Model Test	-	25%
Attendance	-	5%
Final exam	-	50%

Prepared by: Mr.R.Mohanraj, Assistant Professor ,Department of ECE **Dated :**

Addendum

ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate:

(a) an ability to apply knowledge of mathematics, science, and engineering

(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) an ability to function on multidisciplinary teams

(e) an ability to identify, formulate, and solve engineering problems

(f) an understanding of professional and ethical responsibility

(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning

(j) a knowledge of contemporary issues

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: Graduates will perform as a successful professional engineer in related fields of Electronics and Communication Engineering.

PEO2: Graduates will pursue higher education and/or engage themselves in continuous professional development to meet global standards.

PEO3: Graduates will work as a team in diverse fields and gradually move into leadership positions.

PEO4: Graduates will understand current professional issues, apply latest technologies and come out with innovative solutions for the betterment of the nation and society.

COURSE TEACHER	SIGNATURE
Mr.MOHANRAJ	
Mr.SRINIVASAN	

Course Coordinator	Academic Coordinator	Professor In-Charge	HOD/ECE
(Mr.R.Mohanraj)	( )	(Dr.)	(Dr.M.Sundararajan)