



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ADVANCED MOBILE AND WIRELESS NETWORKS								
II Semester: ES								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
BESD19	Elective	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisite: Computer Networks, Wireless communications and Networks								

I. COURSE OVERVIEW:

This course introduces fundamental aspects of wireless networks, with emphasis on current and next-generation wireless networks. This course will cover cellular communication, mobile radio propagation, multiple access techniques, mobility support, channel allocation, wireless PAN/LAN/MAN standards, mobile ad-hoc networks, wireless sensor networks, and routing in wireless and mobile networks. The goal of this course is to introduce the students to state-of-the-art wireless network protocols and architectures in various communication networks.

II. COURSES OBJECTIVES:

The students will try to learn

- I. The propagation mechanisms and radio wave propagation to know the behavior of radio waves.
- II. The types of wireless local area networks and networking standards for implementing the network of computing devices.
- III. The platforms and protocols used in mobile environment.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 Understand the fundamentals of mobile communication systems.
- CO2 Learn about Carrier Sense Multiple Access with Collision Detection (CSMA/CD).
- CO3 Understand the difference between tree-based, mesh-based, and hybrid multicasting protocols.
- CO4 Identify the limitations of 2G and 2.5G wireless mobile communication.
- CO5 Understand the fading and shadowing concept in wireless communication systems.
- CO6 Design 3G and beyond mobile communication systems.

IV. COURSE CONTENT:

MODULE – I: FUNDAMENTALS OF WIRELESS COMMUNICATION TECHNOLOGY (10)

Overview and applications, types of wireless and mobile networks; evolution and challenges of wireless networks; the electromagnetic spectrum; spread spectrum; frequency reuse; radio propagation mechanisms, signals, antennas; characteristics of wireless channels; modulation techniques and multiple access techniques for wireless systems.

MODULE – II: WIRELESS LANS AND PANS (09)

Wireless LANs & PANs: Use and design goals for WLANs; IEEE802.11 standard: architecture, infrastructure vs. Ad-hoc modes, physical & MAC layer, CSMA/CA mechanism; HIPERLAN 1/2 standards; technical features of HOMERF; BLUETOOTH specifications and architecture; introduction to other PAN technologies and their applications.

MODULE – III: WIRELESS WANS & MANS (10)

The cellular concept; call set-up; frequency reuse channel allocation algorithms; handoffs; mobility management.

Telecommunication Systems: GSM and IS-95 architecture, channels and Call Establishment; Wireless Data Service; Generations in Wireless; DECT, TETRA, UMTS; Satellite Systems.

WiMAX: physical layer, media access control, mobility and networking, overview of IEEE 802.22, Wireless, regional area networks. Wireless internet: address mobility; mobile IP; IP and TCP for wireless domains; WAP.

MODULE –IV: ADHOC WIRELESS NETWORKS: (09)

Introduction; applications & design issues. **MAC Protocols for Ad Hoc Wireless Networks:** Issues, design goals and classification; Contention based protocols; Contention based mac protocols with reservation and scheduling mechanism; Other MAC Protocols. Cellular Networks and their features

Routing Protocols for Ad Hoc Networks: Introduction, issues; classification; table-driven routing protocols; on- demand routing protocols; hybrid routing protocols; routing protocols with efficient flooding mechanisms; Hierarchical routing protocols.

MODULE – V: MULTICAST ROUTING IN AD HOC NETWORKS (10)

Introduction; Issues; Operation of Multicast Routing Protocols; Classification; Tree-Based Multicast Routing Protocols; Mesh-Based Multicast Routing Protocols; Energy Efficient Multicasting.

Energy Management in Ad Hoc Wireless Networks: Need and classification of energy management schemes. Transport layer for Ad Hoc Wireless Networks: Introduction and design issues; TCP over Ad Hoc wireless networks.

V. TEXT BOOKS:

1. Dharma Prakash Agrawal and Qing, a Zeng, introduction to Wireless and Mobile Systems, Tomson, 2006, 2nd edition, (ISBN: 0-534-49303-3).
2. Jochen Schiller: Mobile Communication.

VI. REFERENCE BOOKS:

1. David Tso & Pramod Viswanath: Fundamentals of Wireless Communication, Cambridge University Press.
2. Ezio Bigler: MIMO Wireless Communications, Cambridge University Press ARM Assembly Language, William Hohl, CRC Press, ISBN:978-81-89643-04-1.

VII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Assignments
4. Model question paper - I
5. Model question paper - II
6. Lecture notes
7. Power point presentations