

Mobile Communication (404205)

Teaching Scheme:

Lectures: 3 Hrs/ Week

Examination Scheme:

In Semester Assessment:

Phase I : 30

End Semester Examination:

Phase II: 70

Course Objectives:

1. To introduce the concepts and techniques associated with wireless cellular communication systems.
2. To give an exposure to students of various techniques used for modulation, equalization, diversity, coding & multiple access in cellular communication system.
3. To familiarize with state of art systems & standards used in wireless cellular systems.

Course Outcomes

By the end of the course, the student will be able to:

1. Understand the fundamentals of cellular system & radio propagation.
2. Design mobile communication system by appropriately selecting necessary techniques.
3. Analyse different wireless networking & communication systems & standards.

Unit I : Fundamentals of Wireless Communication

6L

Evolution of mobile radio communication, Examples of mobile radio system, Overview of 2G, 2.5G, 3G wireless networks, Cellular fundamentals: frequency reuse, channel assignment strategies, handoff strategies, Interference & system capacity, Trunking & grade of service, Techniques of improving coverage & capacity of cellular system.

Unit II: Mobile Radio Propagation

6L

Radio wave propagation, Free space propagation model, Propagation mechanisms: reflection, ground reflection model, diffraction, scattering.

Small scale multipath propagation, Impulse response model of multipath channel, Small scale multipath measurements, Parameters of mobile multipath channels, Types of small scale fading.

Unit III: Modulation, Equalization & Diversity Techniques

6L

Linear modulation techniques, Constant envelope modulation techniques, Combined linear & constant envelope modulation techniques, Spread spectrum modulation techniques.

Equalization: fundamentals, training & survey of equalization techniques, Linear & Non-linear Equalization, Algorithms for Adaptive Equalization, Fractionally spaced equalizers, Diversity Techniques, RAKE receiver, Interleaving.

Unit IV : Channel, Speech Coding & Multiple Access Techniques

6L

Fundamentals of channel coding.

Speech coding: Characteristics of speech signal, Quantization Techniques, ADPCM, Frequency domain coding of speech, Vocoders, Linear Predictive Coders, Selection of Speech Coders for Mobile Communication, GSM codec, USDC codec.

Multiple Access: FDMA, TDMA, spread spectrum multiple access, SDMA, Packet Radio.

Unit V: Wireless Networking

6L

Wireless Networks: Introduction, Development, Fixed network transmission hierarchy, Traffic routing in wireless networks, Wireless data services, Common channel signaling, ISDN, SS7, PCS/PCN, Protocols for network access, Network databases, UMTS.

Unit VI: GSM & IS-95

6L

GSM: services & features, system architecture, radio subsystem, channel types, example of GSM call, frame structure, signal processing.

IS-95: frequency & channel specifications, forward & reverse CDMA channel, IS-95 with 14.4 kbps speech coder.

Text Books

1. T. S. Rappaport, "Wireless Communications: Principles & Practice" Second Edition, Pearson Education.
2. A. Goldsmith, "Wireless Communications", First Edition, Cambridge University Press.

Reference Books

1. A. F. Molisch, "Wireless Communications", Second Edition, Wiley India.
2. W. C. Y. Lee, "Wireless and Cellular Telecommunications", Third Edition, Tata McGraw-Hill Education.