WIRELESS COMMUNICATION (THEORY) EE-445

Pre-requisite: Communication Systems
Credit Hours 03
Contact Hours 48

RECOMMENDED BOOKS

- Wireless Communications: Principles and Practice by Theodore S. Rappaport, Prentice Hall

REFERENCE BOOKS

- Andrea Goldsmith, "Wireless Communications", 2005, Cambridge University Press, ISBN: 0521837162
- William Stallings, "Wireless Communications & Networks", 2nd edition, 2004, Prentice Hall, ISBN: 0131918354

OBJECTIVE OF COURSE

The objective of this course is to familiarize with broad-spectrum knowledge of wireless communication systems. It begins with the basic cellular system modeling and then proceeds towards the characterization and modeling of radio fading channels, multiplexing techniques in wireless communications and major standards of mobile radio systems.

S.NO	CLO/PLOS MAPPING	DOMAIN	PLO
01	**Describe** various wireless communication systems and recognize their multiple access technologies in accordance with their use in current and future wireless and cellular communications standards	C2	01
02	**Explain** concepts such as frequency reuse, handover, capacity and relate interference between mobiles and/or base stations with the capacity of cellular systems. Moreover, apply the multiple access techniques, cellular concept, trunking, system capacity and large- and small-scale fading to solve for various performance parameters.	C2	01
03	**Analyze** propagation effects such as fading, time delay spread and Doppler spread, and analyze their impact on the instantaneous received signal strength in multipath channels	C4	02

COURSE CONTENTS

Introduction to Wireless Communication Systems
- Evolution of Mobile Radio Communications
- Mobile Radio Telephony in the U.S.
- Components of a Cellular Telephone System
- Call Set-up Procedure in Cellular Telephone System
- Trends in Cellular Radio

History of Modern Cellular Communication Systems around the World
- 1st Generation
- 2nd Generation
- 3rd Generation
- 4th Generation

Cellular Concept and System Design Fundamentals
- Frequency Reuse
- Channel Assignments Strategies
- Handoff Strategies
- SIR and System Capacity
- Trunking and Grade of Service
- Improving Coverage and Capacity of Cellular Systems

Mobile Radio Propagation: Large-Scale Fading
- Three Basic Propagation Mechanisms
- Free-Space Propagation Model
- Ground Reflection Model
- Diffraction
- Scattering
- Practical Link Budget Design using Path-Loss Models
- Log-Normal Shadowing
- Determination of Percentage of Coverage Area

Mobile Radio Propagation: Small-Scale Fading and Multipath
- Multipath Propagation
- Delay Spread
- Doppler Spread
- Parameters of Mobile Multipath Channels
- Types of Small-Scale Fading
- Statistical Models for Multipath Fading Channels

Introduction to Equalization and Diversity
- Fundamentals of Equalization
- Survey of Equalization Techniques
- Various Diversity Techniques

Multiple Access Techniques for Wireless Communications
- Duplexing

- FDMA
- TDMA
- SDMA
- SSMA (CDMA, FHMA)