

Al-Quds University
Faculty of Engineering
Department of Electronics Engineering

Mobile Communications (0701577)
Second Semester 2007/2008

Instructor : Dr. Ali Jamoos, ali@eng.alquds.edu
Lectures : Sat., Wed., 12:30 – 13:50
Office Hours : Sat., Sun., 11:00 – 12:30
Prerequisites : Electromagnetic II (0701412), Communication I (0701451)

Textbook : Wireless Communications: Principles & Practice,
Theodore S. Rappaport, Second edition, 2002

References :

1. Principles of Mobile Communication, G. L. Stuber, 2001
2. Mobile Communications, J. Schiller, 2003
3. Modern Wireless Communications, Simon Haykin, 2005
4. Wireless Communications & Networks, William Stallings, 2005
5. Communication systems, Simon Haykin, 2001
6. <http://en.wikipedia.org>

Course Outline :

- ❑ **Overview of Wireless Communication Systems**
Elements of wireless communication systems. Frequency bands. Evolution of mobile radio communications: first Generation (1G) cellular systems, 2G, 3G and beyond. Examples of Wireless communication systems and standards: GSM, IS-95, GPRS, EDGE, WCDMA, CDMA2000, Bluetooth, WLAN, WiMAX.
- ❑ **The Cellular Concept: System Design Fundamentals**
Introduction. Frequency reuse. Channel assignment strategies. Handoff strategies. Interference and system capacity. Trunking and grade of service. Improving coverage and capacity in cellular systems: cell splitting, cell sectoring and microcell concept.
- ❑ **Mobile Radio Propagation: Large-Scale Path Loss**
Introduction to radio wave propagation. Free space propagation model. Relating power to electric field. The three basic propagation mechanisms. Reflection. Ground reflection (two-ray) model. Diffraction. Scattering. Practical link budget design using path loss models.
- ❑ **Mobile Radio Propagation: Small-Scale Fading and Multipath**
Small-scale multipath propagation. Impulse response model of a multipath channel. Small-scale multipath measurements. Parameters of mobile multipath channels. Types of small-scale fading. Rayleigh and Rician distributions.
- ❑ **Modulation Techniques for Mobile Radio Systems**
Digital modulation techniques (BPSK, QPSK), QPSK Transmission and Detection Techniques: $\pi/4$ -QPSK , Offset QPSK , Constant Envelope Modulation Techniques, Continuous Phase modulation, MSK, GMSK, Spread Spectrum Modulation Techniques: PN sequences, DS, FH

❑ **Multiple Access Techniques for Wireless Communications**

Introduction. Frequency Division Multiple Access (FDMA). Time Division Multiple Access (TDMA). Code Division Multiple Access (CDMA). Spread Spectrum Multiple Access (SSMA). Capacity of Cellular FDMA, TDMA and CDMA Systems.

❑ **Mobile Systems and Standards**

First Generation Mobile Systems, AMPS, ETACS. Second Generation Mobile Systems, USDC, GSM, IS-95. Third Generation Mobile Systems, CDMA-2000, UMTS.

Grading :

First Hour Exam (22/03/2008)	20%
Second Hour Exam (26/04/2008)	20%
Project	20%
Final Exam	40%
Total	100%