



McGill

Department of Electrical & Computer
Engineering
McConnell Engineering Building
3480 University, Montréal, Québec, H3A 2A7

WINTER
2008

304-413B: COMMUNICATIONS SYSTEMS II
Tuesday/Thursday: 08:35-9:55, ENGTR2120

Instructor: Tho Le-Ngoc,

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Course Outline:

The objective of this course is to provide a solid foundation in applications of digital transmission techniques to communications system design with special emphasis on wireless communications. The following subjects will be covered:

CONTENTS:

- A. **Introduction:** Digital Communications Systems • Communications Resources • Transmissions Media • Quality of Services • Noise • Overview of Wireless Communications and Networking
- B. **Wireless Channel Modeling:** Point-to-Point Wireless Line-of-Sight (LOS) Link: Propagation, LOS Link Engineering, Fades, Fade Margin • Multipath Propagation • Linear Time-Variant Channel Model • Channel Correlation Functions • Large-Scale Path Loss and Shadowing • Small-Scale Multipath Fading
- C. **Digital Transmission Techniques for Wireless Mobile Communications:** Digital Modulation Techniques: PSK, QAM • Probability of Error • Power Spectral Density • Power and Bandwidth Efficiency • Overview and Concepts of Error Control Coding • Receiver Techniques for Fading Dispersive Channels: Diversity • Equalization • OFDM
- D. **Multiple-Access Techniques:** FDMA • TDMA • CDMA • Fixed and Dynamic Capacity Allocation
- E. **Digital Communications Systems and Standards:** Cellular Communications Systems: Frequency Reuse, Interference Considerations, System Capacity, System Architectures • Satellite Communications • xDSL • WLAN & WiFi/802.11 • WiMAX/802.16 • UWB • Blue-Tooth • ZigBee.

Course Notes based on the following references:

1. J. Mark, W. Zhuang, *Wireless Communications and Networking*, Prentice-Hall, 2003
2. P.M. Shankar, *Introduction to Wireless Systems*, John Wiley & Sons, 2002
3. S. Haykin, *Communication Systems*, 4th Edition, John Wiley & Sons, 2001
4. T.S. Rappaport, *Wireless Communications: Principles and Practice*, 2nd Ed, Prentice-Hall, 2002

and related technical papers.

MARKING:

Assignment (15%); Term-Project (15%); Open-book Exams: Midterm (30%), Final (40%)

YOUR FINAL MARK=MAX (M1, M2)

WHERE: $M1=(ASG+MIDTERM+FINAL+PROJECT)$, $M2=(ASG+FINAL+PROJECT)/0.70$

GRADING: A \geq 85%, A- \geq 80%, B+ \geq 75%, B \geq 70%, B- \geq 65%, C+ \geq 60%, C \geq 55%, D \geq 50%, F<50%