UTA EE5368 Wireless Communication Systems — Fall 2010

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Lecture: MoWe 2:30PM - 3:50PM, WH308

Office Hours: TuTh 10:00AM-11:00AM, NH205

Course Webpage: http://www-ee.uta.edu/Online/liang/EE5368/

TA: Ishrat Maherin
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TA Office Hours: Tu Th 10:00AM-1:00PM

Pre-req: EE3330 (or equivalent) and some linear algebra (matrix) background.

Other Requirements: Basic programming skills in MATLAB

Course Objective
Students will be able to understand the issues involved in wireless communication system design and will be able to design a wireless communication system (in physical layer) using the knowledge to be covered in this course: channel fading and simulations, modulation schemes, diversity and receiver design for time-varying channels.

Course Project (see handout)
Design a Wireless Modem (Due: December 1, Wednesday, 2010).
It's a team project up to 3 graduate students per team (i.e., 1, 2, 3 students per team). It's good opportunity to gain some *industrial* and *teamwork* experiences.
Reference: A. J. Viterbi and A. M. Viterbi, "Nonlinear estimation of PSK-modulated carrier phase with application to burst digital transmission", *IEEE Trans on Information Theory*, vol. 29, no. 4, July 1983, pp. 543-551.

Exam Dates:
Midterm Exam: Monday, October 11, 2010, 2:30PM - 3:50PM, WH308
Final Exam: Monday, December 6, 2010, 2: 30PM - 3: 50PM, WH308

Grading:
5% Homework
35% Midterm Exam
35% Final Exam
25% Project

Grading Policies:

- **Final grades** will be assigned by a combination of student score distribution (histogram) and the discretion of the instructor.
- **Homework** will not be graded, but checked.
- **Late Homework** will not be accepted.
- **Make-up Exams:** No make-up exams will be given. If you can't make the above exam dates, you must drop the class.
- **Attendance:** Lecture attendance is encouraged but not mandatory. However, students are responsible for all material presented in lecture.
- **Academic Integrity Policy:** As per university rules and guidelines.

Textbook

No required textbook.

Reference Books:

1. A. Goldsmith, *Wireless Communications*, Cambridge University Press, 2005, ISBN: 0-521-83716-2.
2. T. S. Rappaport, *Wireless Communications: Principles and Practice* (2nd Edition), Prentice Hall, 2002 (ISBN:0-13-042232-0).
3. G. L. Stuber, *Principles of Mobile Communication* (2nd Edition), Kluwer Academic Press, 2001 (ISBN: 0-7923-7998-5).
4. K. Etemad, *CDMA 2000 Evolution, System Concepts and Design Principles*, John Wiley & Sons, Inc, Hoboken, NJ, 2004. ISBN: 0-471-46125-3.

Course Material:

1. Overview of Wireless Communication Systems (AMPS, TDMA/FDMA, CDMA. etc)

2. Cellular System Design
   - Large-scale channel models (path loss and shadowing)
   - Multiple access techniques
   - Reuse and sectoring
   - System Capacity
   - Example Systems

3. Physical Layer of Wireless Communications
   - Introduction to a communication system
   - Channel estimation and detection for time-varying channels
   - Small-scale channel models and simulations: Rayleigh fading and Rician fading
   - Course project – design a wireless modem
   - Multipath fading
   - Modulation techniques: OQPSK, pi/4-DQPSK, GMSK, etc.
   - Diversity
   - Other channel impairments because of RF distortion

4 Selected Topics

- Overview of existing and developing systems/standard
- CDMA2000 and WCDMA
- Procedures and challenges for designing a wireless communication product
- Spread spectrum techniques
- Time-hopping and frequency-hopping
- Mobility management and handoff
- Wireless LAN and OFDM

Academic Dishonesty

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22).