ECE 414 Wireless Communications  
(Winter 2011)

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Prerequisite: ECE 316, ECE 318, and ECE 411
Lectures: Mon., Wed., Fri. 10:30-11:20am, RCH-309
Tutorials: Mon. 5:30-6:20pm, RCH-309
Office Hour: Mon. 1:00-2:30 (Zhuang); Tue. 7:00-8:00pm (Qiao)

Lecture Notes: J.W. Mark and W. Zhuang, Wireless Communications and Networking. Available at EIT copy Center (2nd floor).

Course Description: This course focuses on fundamentals of wireless communications and networking for systems such as 3G cellular networks, wireless local area networks (WiFi), and broadband wireless access (WiMAX). It extends the studies of digital communications over an additive white Gaussian noise (AWGN) channel in ECE 411 to a fading dispersive channel in a mobile environment. We start with modeling a wireless propagation channel as a linear time variant system, and study digital modulation schemes used in the physical layer transmission of wireless system standards. We also study how to mitigate channel impairments in transceiver design, such as using diversity to overcome channel fading. After that, we will learn the rationals for cellular systems and the properties of frequency reuse to enlarge system capacity. To support multiple mobile users, we will study how to permit multiple access of the common radio resources (i.e., to avoid interference in simultaneous transmissions from multiple users), using techniques such as code-division multiple access (CDMA). If time permits, we will study mobility and resource management in wireless networks.

Sequence of Lecture Presentation:
1. Overview of wireless communications;
2. Characterization of wireless channels;
3. Bandpass transmission over wireless channels;
4. Channel impairment mitigation techniques;
5. Fundamentals of cellular communications;
6. Multiple access techniques;
7. Mobility and resource management of wireless systems.

Homework Assignments: Problems and solutions will be posted on the course website.

Tutorials: The tutorials will be conducted by the TA for the purposes of (1) answering questions about the course materials, (2) providing example problems that illustrate applications of the theory learned in the class and detailing methods of solution, and (3) elaborating the course materials if necessary. Tutorial materials will be posted on the course website before the tutorial.

There is no lab/project component in this course.

Grading: Midterm=30% and Final Exam=70%. 