ECE 5680 – Mobile Communication Systems

Professor Stephen B. Wicker
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386 Rhodes Hall

Lecture MW 1:25 – 2:40 pm in 407 Phillips Hall

Teaching Assistant: Sergio Bermudez (sab222@cornell.edu)

Office Hours: **TA –** T, 4 – 6 pm
Th, 10 – 12 pm

Prof. Wicker – W, 12 - 1:15 pm

Course Website: http://wisl.ece.cornell.edu/ECE5680/

This course will provide an overview of wireless communications, with an emphasis on untethered transceivers. We will cover the traditional topics – channel modeling, demodulation in the presence of noise, and error control coding – and then move on to recent developments in multicarrier modulation, spread spectrum, and space-time modulation and coding. We will emphasize applications to successful wireless telephony and LAN systems. We will also consider higher-layer system concepts such as mobility management, with an emphasis on 3rd and 4th generation cellular systems. The course will conclude with a brief overview of communication and privacy law, with a discussion of recent research into privacy-aware network design techniques.

Prerequisites: ECE 4110

Required Text: Andrea Goldsmith, *Wireless Communications*

Grading:

- 2 tests 40%
- 1 final 20%
- 8 homework assignments (lowest grade dropped) 40%

Course Policies:

- Late homework is not accepted for any reason. The lowest grade will be dropped.

ECE 5680 – Mobile Communications
Course Outline

Modern Telecommunication Networks
- Early wireless
- The Cellular Revolution: 1, 2, 2.5, 2.75, and 3G
- Wireless LANs
- Why some technologies succeed, and some don't

The Wireless Channel
- Fading, Shadowing, and Multipath
- Specific Models

Digital Modulation and Detection
- Signal Space Analysis
- Amplitude and Phase Modulation
- Synchronization and Carrier Phase Recovery
- Performance over Wireless Channels

Multiple Antennas and Space Time Communications
- MIMO
- Space-Time Modulation and Coding

Multicarrier and Spread Spectrum Modulation
- FFT-Based Multicarrier
- OFDM in 802.11
- Processing Gain
- Frequency Hopping and Direct Sequence

Multi-User Systems
- FDMA, TDMA, and CDMA

Telecommunication Law, Privacy Law, and Privacy-Aware Network Design
- Data Collection Cases and Cellular Phone Tracking
- Electronic Communications Privacy Act
- Privacy-Aware Design